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Shared Storybook Reading and the Development of Oral Language Skills

Das gemeinsame Lesen von Kinderbüchern und die Entwicklung frühkindlicher Sprachfähigkeiten

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SUMMARY

Storybooks and talk centered around shared reading contain more rare words, complex syntax, and narrative structures than the language that caregivers usually use when talking to children. Therefore, interactive storybook reading has the potential to facilitate children's acquisition of lower level language (LLL) skills (e.g., vocabulary, grammar) and higher level language (HLL) skills (e.g., comprehension monitoring, narrative comprehension). This dissertation addresses gaps in shared storybook reading research pertaining to questions of assessment, intervention, and early literacy models. It investigates from a developmental and educational perspective how shared reading in the home literacy environment (HLE) and the child care literacy environment (CCLE) is related to children's oral language skills. The first aim is to validate two recognition tests for German-speaking participants. This allows an objective and economic assessment of storybook exposure and adult literature exposure, both of which are related to children's language development. The second aim is to clarify (a) the relation between parent and child as literacy agents in a home literacy model of shared reading, and (b) whether shared reading is related to children's HLL skills besides being related to their LLL skills. The third aim is to test the effectiveness of a narrative dialogic reading intervention targeting LLL and HLL skills. To this end, four studies were conducted.

Study 1 validated a storybook title recognition test (TRT) for German-speaking preschoolers and caregivers. The TRT captures relative differences in the amount of shared reading. In structural equation models, the TRT was a unique predictor of preschoolers' language skills, explaining about 50% of variance in language skills. By contrast, questionnaire measures of socioeconomic status and home literacy environment did not explain additional variance in language skills.

Study 2 validated an author recognition test (ART) for 13 to 80-year-old German-speaking readers. The ART is a measure of leisure reading that explains a substantial amount of variance in caregivers' language skills, which is in turn related to children's language development. Even though print exposure accumulates with time, several life span studies did not find a positive relation between reader age and ART scores. Study 2 used a sample of 13- to 77-year-old readers. The recognition probability of classic authors increased between ages 15 and 65. By contrast, the recognition probability of recent authors only increased between ages

15 and 45. The author mean publication year turned out to be a key variable for estimating print exposure in age-diverse samples. This author variable should be taken into account when modelling relationships between literacy environments and children's language skills, especially if the age of caregivers varies (e.g., adolescent siblings, parents, grand-parents).

Study 3 examined how HLE and CCLE are related to preschoolers' storybook exposure and how the storybook exposure of preschoolers, parents, and child care workers is related to LLL and HLL skills. Parents' exposure to storybooks was a unique predictor of children's vocabulary and grammar skills. Parents' storybook exposure was also moderately related to children's storybook exposure, which in turn explained unique variance in vocabulary, grammar, comprehension monitoring, and narrative comprehension. Therefore, the storybook exposure of children and parents should be conceptualized as related, but separate variables in models of the home literacy environment. Moreover, models should differentiate between LLL and HLL skills as correlates and outcomes of shared reading.

Study 4 developed a narrative dialogic reading intervention with wordless picture books that targeted preschoolers' LLL and HLL skills. The intervention had small short-term effects on narrative comprehension and vocabulary skills. Comparisons with an alternative treatment and a no treatment group showed that the effects were due to the specific intervention contents. Individual differences in storybook exposure and general cognitive abilities did not moderate intervention gains. Children in control groups caught up after five months, with the exception of inferential narrative comprehension, where intervention effects were maintained at first follow-up. This indicates that narrative dialogic reading provided a unique opportunity to preschoolers for learning inferential narrative comprehension skills.

In sum, this dissertation provides new methods and insights for the assessment of print exposure and shows that narrative dialogic reading fosters a broad range of oral language skills. Regarding the refinement of early literacy models, additional analyses showed that, above children's and parents' storybook exposure, the ART was a unique predictor of LLL skills. Parental leisure reading and shared storybook reading were connected to children's oral language skills through multiple pathways that should be represented in early literacy models.

ZUSAMMENFASSUNG

Bilderbücher und Gespräche während dem Vorlesen enthalten mehr seltene Wörter, komplexe Syntax und narrative Strukturen als die gewöhnliche kindgerichtete Sprache von Eltern. Folglich kann das interaktive Vorlesen von Bilderbüchern zur Entwicklung von niedrigen Sprachfähigkeiten (z. B. Wortschatz, Grammatik) und höheren Sprachfähigkeiten (z. B. Überwachen von Verstehen, narratives Verstehen) beitragen. Diese Dissertation adressiert Lücken in der Vorlese-Forschung welche Fragen der Messung, Intervention und Modelle des frühen Schriftspracherwerbs betreffen. Aus entwicklungs- und pädagogisch-psychologischer Perspektive wird untersucht wie das Bilderbuchlesen in der häuslichen Leseumwelt und der Kita-Leseumwelt mit den Sprachfähigkeiten von Vorschulkindern zusammenhängt. Erstens sollen zwei Rekognitionstests für deutschsprachige Kinder und Vorlesende validiert werden. Hierdurch können Unterschiede im Lesevolumen hinsichtlich Bilderbüchern sowie Erwachsenenliteratur objektiv und ökonomisch erfasst werden. Beide stehen im Zusammenhang mit der kindlichen Sprachentwicklung. Zweitens soll geklärt werden, wie (a) Eltern und Kind als Handelnde im Vorleseprozess in der häuslichen Leseumwelt zueinander in Relation stehen und (b) ob das gemeinsame Lesen von Bilderbüchern neben niedrigen Sprachfähigkeiten auch mit höheren Sprachfähigkeiten zusammenhängt. Drittens soll überprüft werden, ob eine Sprachintervention zum narrativen dialogischen Lesen positive Effekte auf niedrige und höhere Sprachfähigkeiten hat. Zu diesem Zweck wurden vier Studien durchgeführt.

Studie 1 validierte einen Bilderbuch-Titelrekognitionstest (TRT) für deutschsprachige Vorschulkinder und Vorlesende. Der TRT erfasst relative Unterschiede im Vorlesevolumen. In Strukturgleichungsmodellen klärte der TRT etwa 50% der Varianz in Sprachfähigkeiten auf, der sozioökonomische Status und die häusliche Leseumwelt klärten hier hingegen keine zusätzliche Varianz auf.

Studie 2 validierte einen Autorenrekognitionstest (ART) für 13- bis 80-Jährige. Der ART misst das Leseverhalten in der Freizeit. Hierdurch kann ein substanzieller Anteil der Varianz in den Sprachfähigkeiten von Vorlesenden aufgeklärt werden. Die Sprachfähigkeiten von Vorlesenden hängen wiederum zusammen mit der kindlichen Sprachentwicklung. Das kumulative Lesevolumen wächst mit zunehmendem Alter. Mehrere Lebensspanne-Studien haben allerdings keinen positiven

Zusammenhang zwischen Alter und ART-Score gefunden. Studie 2 untersuchte deshalb in einer Stichprobe von 13- bis 77-Jährigen wie das Lesevolumen zunimmt. Für bereits kanonisierte Autorinnen und Autoren stieg die Rekognitionswahrscheinlichkeit zwischen 15 und 65 Jahren an. Hingegen stieg die Rekognitionswahrscheinlichkeit für Gegenwartsautorinnen und -autoren nur zwischen 15 und 45 Jahren. Folglich ist das mittlere Publikationsjahr von Autorinnen und Autoren bedeutsam für die Schätzung des Lesevolumens in altersdiversen Stichproben. Diese Variable sollte bei der Modellierung von Leseumwelt-Einflüssen auf die kindliche Sprachentwicklung einbezogen werden – insbesondere dann, wenn unterschiedliche Generationen regelmäßig mit Kindern kommunizieren (z. B. Geschwister im Jugendalter, Eltern, Großeltern).

Studie 3 untersuchte wie häusliche und Kita-Leseumwelt mit dem Vorlesevolumen von Vorschulkindern zusammenhängen und wie das Vorlesevolumen von Kindern, Eltern und Kita-Mitarbeitern zu niedrigen und höheren Sprachfähigkeiten beiträgt. Das Vorlesevolumen der Eltern erklärte einen uniquen Varianzanteil in Wortschatz und Grammatik der Kinder. Auch bestand zwischen Vorlesevolumen der Eltern und Vorlesevolumen der Kinder eine mittelstarke Korrelation. Das Vorlesevolumen der Kinder wiederum erklärte einen uniquen Varianzanteil in Wortschatz, Grammatik, Verstehensüberwachung und narrativem Verstehen. Folglich sollten die Vorlesevolumina von Kindern und Eltern in Modellen der häuslichen Leseumwelt als getrennte, aber in Verbindung stehende Variablen konzeptualisiert werden. Diese Modellen sollten zudem zwischen niedrigen und höheren Sprachfähigkeiten differenzieren.

Studie 4 überprüfte die Effektivität einer neu entwickelten Intervention zum narrativen dialogischen Lesen in der Bilderbücher ohne Worte verwendet wurden. Die Intervention hatte kurzfristig kleine positive Effekte auf das narrative Verstehen und Wortschatzfähigkeiten. Die Interventionseffekte konnten durch Vergleiche mit der aktiven sowie der passiven Vergleichsgruppe auf die spezifischen Inhalte der Intervention zurückgeführt werden. Interindividuelle Unterschiede im Vorlesevolumen vor Interventionsbeginn sowie Unterschiede in den allgemeinen kognitiven Fähigkeiten hatten keinen Einfluss auf die Interventionseffekte. Die Kinder in den Vergleichsgruppen holten nach fünf Monaten in allen Sprachfähigkeiten auf. Nur hinsichtlich des inferenziellen narrativen Verstehens bestanden bei der ersten Folgeuntersuchung noch Gruppenunterschiede zugunsten der

Intervention. Dies weist darauf hin, dass das dialogische Lesen spezielle Lerngelegenheiten für das inferenzielle narrative Verstehen bereit stellte.

Insgesamt liefert diese Dissertation wichtige Erkenntnisse für die Erfassung des (Vor-)Lesevolumens und zur Effektivität des narrativen dialogischen Lesens. Hinsichtlich der Präzisierung eines Modells zum Einfluss des Vorlesens auf die Sprachentwicklung zeigten zusätzliche Analysen, dass der ART über den TRT hinaus zusätzlich Varianz in niedrigen Sprachfähigkeiten aufklärt. Offensichtlich bestehen mehrere Pfade von elterlichem Freizeitlesen und interaktivem Vorlesen zu den Sprachfähigkeiten von Kindern, welche entsprechend in Modellen zum Sprachenlernen durch Umwelteinflüsse repräsentiert sein sollten.

GENERAL THEORETICAL BACKGROUND

1 Introduction

From early childhood on, being proficient in the majority language is a key competence for learning in educational contexts, such as child care and school (Hoff, 2013; Kempert, Schalk, & Saalbach, 2019). Evidence from empirical studies favors a usage-based theory of language acquisition (e.g., Tomasello, 2009) over theories postulating that language development is by and large an innate process (e.g., Chomsky, 1980). To become proficient speakers of a language, children need both communicative opportunities and proficient language models (Hoff, 2006). Longitudinal studies show marked differences in children's vocabulary and grammar skills and in their rate of language acquisition as early as the first year of life, and these individual differences are strongly related to children's language environment (Kidd, Donnelly, & Christiansen, 2018). At the same time, there is a high stability of individual differences in oral language skills during early childhood (Bornstein, Hahn, Putnick, & Suwalsky, 2014; Nation, Cocksey, Taylor, & Bishop, 2010).

Oral language comprehension is a major limiting factor in reading comprehension after children have acquired basic reading skills (i.e., fluent and accurate decoding of single words). Reading research differentiates between lower level language skills, which are related to word and sentence processing (e.g., vocabulary and grammar skills), and higher level language skills, which are related to the processing of texts (e.g., comprehension monitoring and narrative skills). The *Simple View of Reading* (Gough & Tunmer, 1986; Hoover & Gough, 1990) describes reading comprehension as the product of decoding and linguistic comprehension. Accordingly, both are necessary for understanding written texts. A child with poor decoding or oral language skills will most likely show poor reading comprehension. Indeed, cross-sectional and longitudinal studies report that oral language skills become increasingly important for reading comprehension in relation to word reading skills between Grades 1 and 4 (Hjetland et al., 2019; Language and Reading Research Consortium, 2015a; Lervåg, Hulme, & Melby- Lervåg, 2017; Storch &

Whitehurst, 2002). This developmental trajectory has been found in relatively transparent orthographies, such as Spanish, Slovak, Czech (Caravolas et al., 2019), Finnish (Torppa et al., 2016), and German (Ennemoser, Marx, Weber, & Schneider, 2012).

Even though our understanding of reading acquisition has seen considerable progress in recent decades (e.g., Castles, Rastle, & Nation, 2018), there is still a substantial proportion of children who experience severe difficulties while learning to read. Educational large-scale studies have documented that disparities in reading skills of school students in Germany are particularly strong. For example, results from the *Progress in International Reading Literacy Study* (PIRLS) 2016 study show that by the end of Grade 4, there are already large differences between high achievers and low achievers in Germany in comparison to other developed countries (Bos, Valtin, Hußmann, Wendt, & Goy, 2017). At the end of the Grade 4, about 19% of the school children in Germany have severe reading comprehension problems and need additional support to acquire adequate reading skills. This proportion of struggling readers is particularly high in Germany (Bos et al., 2017).

Among their recommendations for amending this situation, the authors of the PIRLS 2016 study propose that educational policy should aim to increase the quality of early childhood education and care (Bos et al., 2017). In particular, fostering children's language development through shared storybook reading before school entry is recommended as a means for reducing the proportion of struggling readers in Germany (Valtin, 2017). Evaluation studies of programs for language education and intervention studies targeting early literacy skills have found no or small effects on precursor skills of reading (e.g., Gasteiger-Klicpera, Knapp, & Kucharz, 2010; Roos, Polotzek, & Schöler, 2010; Wolf, Stanat, & Wendt, 2011), which leaves room for improvement. Therefore, more research investigating the impact of early literacy environments and language interventions on children's language development is needed. The present dissertation investigates how children's shared storybook reading experiences at home and at the child care center are related to the development of their oral language skills.

In the following, chapter 2 discusses models of environmental influences on child development, focusing on socio-constructivist theories of development and Bronfenbrenner's bioecological model with regard to language and reading development during early childhood. It summarizes evidence for the role of socio-

cultural, educational, and familial factors for language and reading development. In addition, this chapter develops a framework for the effects of shared reading on language and reading development in the context of the home literacy environment (HLE) and the child care literacy environment (CCLE). Chapter 3 summarizes evidence regarding concrete characteristics of the HLE that are related to the development of language and reading abilities. It develops a triad model of oral language learning through shared book reading that integrates approaches and evidence from educational psychology, developmental linguistics, corpus linguistics, and socio-emotional developmental research. The model describes characteristics of children, adults, and books, and how their interplay influences shared reading activities. Modifications to the *Home Literacy Model* (Sénéchal & LeFevre, 2002) regarding the conceptualization of shared reading as an important source of language development and the language outcomes are proposed.

Chapter 4 discusses methodological approaches to the assessment of literacy activities and resources in the HLE and the CCLE, such as measures of socio-economic status, literacy environment questionnaires, behavior observations, diary methods, and recognition and recall tests of storybooks. Chapter 5 summarizes evidence from studies investigating language and reading development as a function of informal learning environments and language interventions. This chapter reviews findings from correlational, experimental, and intervention studies conducted at home and at the child care center. Chapter 6 summarizes desiderata derived from the previous chapters and gives an overview of how the studies conducted for the present dissertation aim to fill these research gaps. The chapter presents an overview of the overall research aim of the present dissertation, including connections between the four studies and overarching research questions.

After this introduction to the background of the dissertation, chapters 7, 8, 9, and 10 each present the manuscript of one of the four studies. The general discussion in chapter 11 summarizes the main findings from these four studies and discusses the overall implications with respect to (a) the assessment of children's and caregivers' exposure to books, (b) effects of book reading on preschoolers' oral language skills, (c) environmental models of shared storybook reading, and (d) pedagogical practice and educational policy. The chapter concludes with general limitations, possible avenues for future research, and the final conclusion.

2 Environments and language development

Theories and models of children's learning environments provide a frame for understanding how children acquire oral language skills during early childhood. In their theories, Vygotksy and Bronfenbrenner both conceptualize interactions between caregivers and children as the primary drivers of human development (Bronfenbrenner & Morris, 2006; Vygotsky, 1978). Chapter 2.1 introduces some of Vygotsky's (1978) key socio-constructivist concepts for describing and investigating interactions between caregivers and children that result in the transmission of language skills and cultural knowledge. Chapter 2.2 summarizes Bronfenbrenner's bioecological framework for understanding human development that builds on Vygotskian concepts and also focuses on the operationalization of proximal and distal environmental influences (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006). Chapter 2.3 takes a look at shared reading and early literacy research through the lens of Bronfenbrenner's framework and describes a bioecological model of oral language learning through shared reading.

2.1 Socio-constructivist concepts

Vygotsky introduced to psychology and pedagogy the notion that individual development is intertwined with the material and social environment of children (Miller, 2011). Therefore, individual development cannot be understood when separated from the experiential, physical, historical, and action contexts of children and their participation in cultural activities, which are closely related to their needs and goals (Miller, 2011). Children can extend their skills when they act in the zone of proximal development in collaboration with adults or more capable peers: Children's learning is facilitated through a guided participation in culturally determined, meaningful situations. Instruction can be implicit or explicit (Rogoff, 1998). Children's emerging skills are individually supported by adults' input, questions, and feedback, which create a 'scaffold' that facilitates children's development in the zone of proximal development, allowing them to reach a higher level of functioning. Repeated scaffolding enables children to internalize these more advanced modes of action and apply them independently in similar situations. Crucially, the influence of adults and peers on the cognitive development of children is mediated through the shared use of psychological and technical 'tools' that are

culturally shaped, such as language, children's books, or toys. During the interaction, a conversation or activity is co-constructed between a child and another person.

According to Vygotsky (1978), the language caregivers use while talking to children is important for their language development. The support for the acquisition of concepts is most effective when adults relate an unfamiliar concept to concepts the child is already familiar with, acting in the zone of proximal development (Vygotsky, 1978). Children learn new words during shared reading by gradually discovering the meanings of words through the help of adults, e.g. when caregivers label an object that is depicted in a storybook, or when they explain what a particular word means (Vygotsky, 1978). New concepts that are important to the story in a book are repeatedly mentioned, and this helps children to build a sophisticated representation of the word's meaning. In other communication situations, the topic changes faster and new concepts are not always referred to repeatedly (Fletcher & Reese, 2005). Therefore, word acquisition during shared storybook reading can be particularly effective.

Shared reading is a context in which not only children can acquire new concepts: Caregivers gain new insights into the vocabulary knowledge of the children, and also into their ability to learn concepts through shared reading, allowing caregivers to adjust their activities so that children enjoy shared reading and can learn efficiently at the same time (Fletcher & Reese, 2005). This diagnostic knowledge and adjustment of shared reading activities is presumably more intuitively than consciously used. Thus, the zone of proximal development changes during repeated readings of the same storybook. Children can become more active in the co-construction of narratives and also understand the more difficult concepts if they are embedded in concepts that they have already mastered, and adults can discuss in a more sophisticated way about the story after a basic understanding of the story has been established (van Kleeck, 2003). Storybooks contain vocabulary that is rarely used in child-directed speech and therefore can be described as 'lexical reservoirs' (De Temple & Snow, 2003; Mesmer, 2016). Repeated readings of the same storybook allow children to explore such lexical reservoirs with greater detail during each new reading.

2.2 Bronfenbrenner's bioecological model

Vygotsky describes human development and social spheres as inherently interlocked and time-dependent processes (Miller, 2011). Similarly, Bronfenbrenner characterizes human development as a function of the interplay between psychological, biological, and environmental factors. His bioecological model of human development (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006) describes different social spheres as the environmental contexts in which child development occurs. Bronfenbrenner's starting point was a critique of psychological laboratory experiments as the prevalent form of developmental studies in the 1970s. Earlier versions of the model (e.g., Bronfenbrenner, 1977) focused on characteristics of different environmental systems that influence development directly and indirectly, which are microsystems, mesosystems, exosystems, and the macrosystem. The interplay between a child and another person (e.g., family members, child care workers, peers) is conceptualized as a microsystem, which is a "pattern of activities, social roles, and interpersonal relationships experienced by the developing person in a given face-to-face setting with particular physical, social, and symbolic features that invite, permit, or inhibit, engagement in sustained, progressively more complex interaction with, and activity in, the immediate environment." (Bronfenbrenner, 1994, p. 1654). Microsystems influence the child's development directly and are also reciprocally influenced by the child. Due to the direct engagement of children in microsystems, these environments are regarded as proximal influences on child development. The combination of and relationships between two or more interacting microsystems is called mesosystem (e.g., communicative practices at home and at the child care center that are similar or different).

An exosystem, by contrast, is conceptualized as distally influencing child development. It consists of connections and transmissions between two or more settings, of which at least one is not an immediate environment to the child (e.g., a parent's workplace), and therefore, an exosystem can have indirect effects on a child's development (e.g., a parent who works late spends less time interacting with the child in the evening). The exosystem includes, for example, characteristics of the parents' workplace that affect the time parents spend with their children, or regulations by educational institutions that affect preschool curricula. Finally, the most distal influence on child development is exerted by the macrosystem, which

consists of cultural values, norms, and laws that can be specific for people of different social classes, religious confessions, or nationalities (Bronfenbrenner & Morris, 2006).

Earlier versions of the bioecological model have stressed the importance of investigating the influence of each system component on human development. Most of the ensuing research, however, has revealed that proximal processes in microsystems are the "primary engines of development" (Bronfenbrenner & Morris, 2006, p. 798), which has led to an intensified interest in these processes. Proximal processes are the interactions between a child and other persons in the child's immediate external environment. Proximal processes need to operate regularly and over a sufficient time span to have an effect on the person's development. The latest version of the bioecological model describes human development primarily as a function of a "progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate external environment […]." (Bronfenbrenner & Morris, 2006, p. 797).

At first, young children interact mostly with their parents. During early childhood, these proximal processes allow them to acquire the skills and motivation needed to engage in similar activities with other persons as well as in activities on their own. Proximal processes that are developmentally effective include active involvement of the developing person and reciprocal interactions between people, objects, and symbols. Proximal processes develop in accordance with the developmental course of the involved persons. Over time, they become more complex to meet the developmental needs and to support further development of the persons.

To investigate environmental influences on development, research should take into account that the power of proximal processes (e.g., shared reading) depends both on the environmental context (e.g., shared reading at home and at the child care center) and characteristics of the person (e.g., memory; Bronfenbrenner & Morris, 2006). For persons from disadvantaged environments, effective proximal processes can help to minimize the negative effects on developmental outcomes. Therefore, effects of proximal processes should be more pronounced in disadvantaged populations than in more privileged populations. Interactions between environmental factors and person variables are of key interest in

bioecological research: “The form, power, content, and direction of the proximal processes effecting development vary systematically as a joint function of the characteristics of the developing person and the environment – both immediate and more remote – in which the processes are taking place […].” (Bronfenbrenner & Morris, 2006, p. 798). Effects of proximal processes vary as a function of the developing person’s characteristics, most notably a child’s dispositions for engaging in proximal processes that can help to initiate and sustain proximal processes. For example, children who show an active interest in picture books are more likely to ask caregivers to be read to, and they might prefer this activity over other activities such as watching a series or physical activities. By contrast, children who find it in general hard to focus on the story of picture books are less likely to demand being read to, and they might prefer other activities over shared reading.

Additionally, personal resources are important developmental variables, such as ability, experience, and knowledge (Bronfenbrenner & Morris, 2006). For example, effects of shared reading on oral language skills might depend on children’s prior oral language skills, shared reading experiences, and knowledge about the contents of a picture book. In turn, developmental outcomes of these proximal processes (e.g., vocabulary and narrative skills that were facilitated through shared reading) are themselves resources that help to extend the effects of the proximal processes (e.g., more advanced extratextual talk between a child and the caregiver during shared reading that supports the development of higher level language skills). According to Bronfenbrenner and Morris (2006), bioecological research should focus on the specific aspects of the behaviors that are assumed to be most closely related to the developmental outcome, for example, investigating which aspects of literacy environments are most closely related to oral language development.

Finally, effects of proximal processes also vary as a function of the more remote environmental contexts into which the proximal processes are embedded, the historical periods in which the proximal processes occur, and the developing person’s biological systems. The biological systems within a developing organism both limit individual development and represent at the same time the potential for development that can be realized through adequate experiences (Bronfenbrenner & Morris, 2006). Regarding interactions between genetic endowment and environmental influences, the heritability of an ability should be higher when

proximal processes are strong, and lower when such processes are weak (Bronfenbrenner & Morris, 2006).

2.3 A bioecological model of language development through shared reading

In the following section, a bioecological model of oral language development through shared reading is described (see Figure 2.1 for an overview of the components).

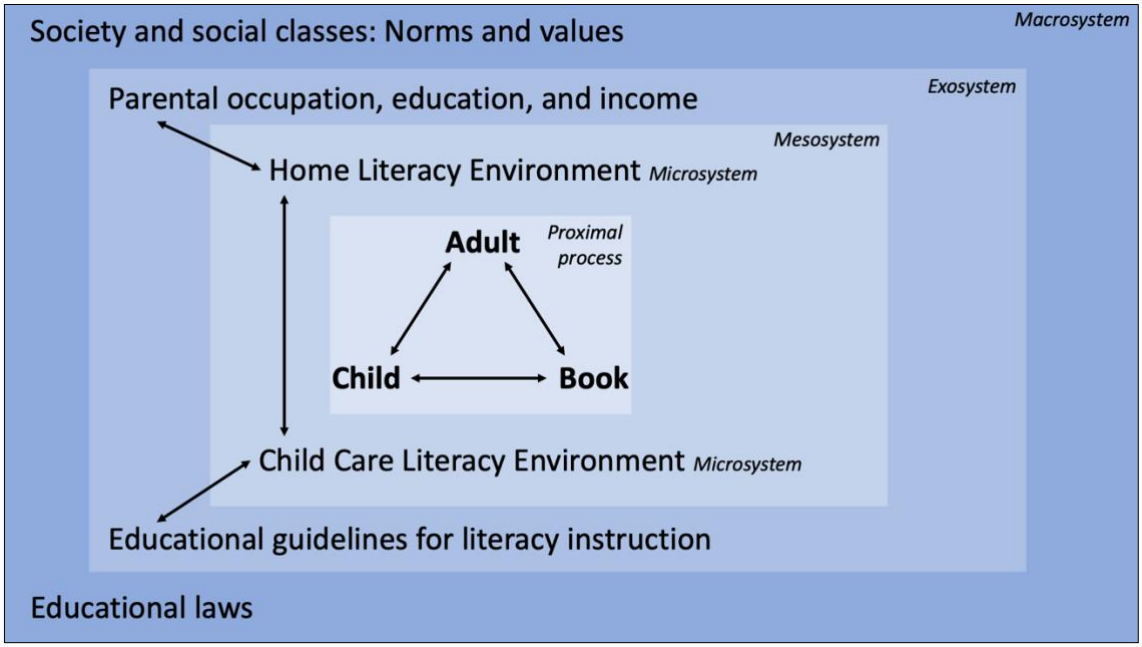

Figure 2.1. A bioecological model of oral language development through shared reading.

Basic language development in early childhood requires oral language input from proficient speakers, but it does not require shared reading. Consequently, most children acquire sufficient oral language skills for everyday communication purposes regardless of the amount or quality of shared reading they experience. However, individual differences in oral language skills, such as vocabulary and grammar skills, are largely due to differences in print exposure (Mol & Bus, 2011). Shared reading (and later independent reading) is not the only proximal process that fosters oral language development, but it is one main driving force behind oral language individual differences, and the most important source of variability in oral language skills that are precursors of reading comprehension (e.g., vocabulary; Montag et al., 2015).

The proximal process of shared reading can be described through relationships between child, adult, and book, which are described in the triad model of oral language development through shared reading (see chapter 3.1). Several person variables can influence how children and caregivers interact during shared reading. Bronfenbrenner and Morris (2006) distinguish between resource characteristics (e.g., oral language skills, general cognitive skills), demand characteristics (e.g., literacy interest), and force characteristics (e.g., reading motivation). Moreover, shared genes and gene-by-environment interactions constrain the extent to which children's oral language skills are malleable through environmental factors such as shared reading. Several studies found that the shared environment explains more variance in oral language skills than genetic differences in early childhood (Chow et al., 2011; Hayiou-Thomas et al., 2006; Olson et al., 2011; Spinath et al., 2004). Oral language skills have a low heritability before school entry, but heritability increases between age 7 and 16 (Tosto et al., 2017). In conclusion, both genetic and shared environment influences constrain the maximum effect of early literacy interventions on young children's oral language skills. However, aiming to support the development of oral language skills seems to be reasonable because their heritability at preschool age and subsequent years is lower than the heritability of decoding precursors, potentially benefitting reading comprehension in early primary school (Tosto et al., 2017). Finally, the proximal effects of shared reading on oral language skills also depend on book characteristics, such as the lexical and grammatical diversity of the text (Montag et al., 2015; see chapter 3.2.1 for a discussion).

On the microsystems level, educational research has identified two learning environments that are related to children's oral language development through shared reading: the home literacy environment (HLE) and the child care literacy environment (CCLE; Ebert et al., 2013; Niklas & Schneider, 2013; Sénéchal et al., 1996; Weigel et al., 2005; Weinert & Ebert, 2013). Some studies found that the HLE is more closely related to oral language than the CCLE (Ebert et al., 2013; Weinert & Ebert, 2013), whereas other studies found that the influence of both literacy environments had a similar magnitude (Weigel et al., 2005; Schmerse et al., 2018). Whereas almost every child grows up in a home literacy environment starting from birth, the environmental influence of child care begins for a substantial proportion of children three years later. In Germany, about 33% of children attend child care

before age 3, and 93% attend child care after they turned 3 (Statistische Ämter des Bundes und der Länder, 2019). In addition, studies in German child care centers found that the average literacy process quality was rather low (Ebert et al., 2013; Weinert & Ebert, 2013). By contrast, studies that investigated the influence of medium and high quality child care on language and literacy development found some small positive effects (Melhuish et al., 2013; Weigel et al., 2005; Schmerse et al., 2018) that were similar in magnitude to the impact of the home literacy environment (Weigel et al., 2005; Schmerse et al., 2018).

On the mesosystem level, there are potential reciprocal effects between HLE and CCLE, but few studies have investigated connections between the two (Weigel et al., 2005; Schmerse et al., 2018). In a large-scale German study, children's vocabulary skills benefitted more from high childcare language process quality if they experienced a medium or high quality HLE rather than a low quality HLE (Schmerse et al., 2018). By contrast, a U.S. study did not find that interactions between caregivers' activities or beliefs in the HLE and CCLE predicted vocabulary skills or development (Weigel et al., 2005). Due to the limited number of studies, the magnitude and the source of concurrent and longitudinal environmental effects is unclear (see Hoff, 2006, for a review).

On the exosystem level, parents' occupation, education, and income are important predictors of oral language skills at preschool age (Hoff, 2006). As they are highly interdependent, the three predictors are often combined to form a socioeconomic status (SES) variable (Buckingham, Beaman, & Wheldall, 2014). Children from lower SES families are exposed to only about one-third of the oral language input quantity that children from lower SES families get (Hart & Risley, 1995). On average, kindergarten children from poor neighborhoods receive much less language input and less diverse language input with regards to vocabulary and grammar from their parents and teachers than children from lower middle class neighborhoods during shared reading, play situations, and classes, leading to slower growth rates in expressive vocabulary skills (Neuman, Kaefer, & Pinkham, 2018). The language of parents with a lower SES often has a lower lexical diversity in comparison to the language of parents with a higher SES (Burchinal, Vernon-Feagans, & Cox, 2008; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010). As a consequence of these input differences, children with a higher SES background often have a larger vocabulary (Gilkerson et al., 2017; Hart & Risley, 1995; Hoff,

2006) and more often use diverse and advanced grammatical constructions than children from lower SES families (Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002). Importantly, communicative and shared reading practices not only vary between families as a function of their SES, but they can also differ considerably between families with a similar SES. Within groups of SES (lower vs. middle vs. upper SES), there is a large variability of communicative practices, such as the amount and linguistic characteristics of talk between parents and children and the frequency of shared book reading in the family (Hoff, 2006; van Steensel, 2005). Therefore, SES does not determine the amount and quality of literacy activities at home, even though children from lower SES households are on average more likely to receive less literacy activities than children from higher SES households. Another important influence on the exosystem level are educational guidelines for language education and language fostering in the child care center (e.g., Ruberg & Rothweiler, 2012) because they provide an orientation for effective oral language activities. For example, recent approaches to child care language education highlight the importance of the professional's understanding of the general linguistic background of language development, the instrumental use of language as a key motivator for children, and the use of general communicative principles in everyday situations for implicit language teaching (Ruberg & Rothweiler, 2012).

On the macrosystem level, reading research and educational policies have influenced the norms and values connected to shared reading practices. In the last 50 years, research has accumulated a large body of evidence showing that shared reading in the first years of childhood is important for literacy development in general, and for oral language development in particular (Bus et al., 1995; Mol & Bus, 2011). At the same time, the main benefits that caregivers associate with children's books in early child care have changed since the 1980s from social, emotional, play, and general cognitive skills to specific early literacy skills, such as vocabulary, grammar, and narrative skills (van Kleeck & Schuele, 2010). Concerning parents' literacy activities, there are some differences between social classes regarding the attitudes, beliefs, and values connected to education in general and early literacy in specific, which become apparent in "characteristic modes of language use and interaction" (Hoff, 2006, p. 75). For example, compared to parents with a higher SES, parents with a lower SES tend to value the promotion of their children's literacy development less (Kluczniok, Lehrl, Kuger, & Rossbach, 2013),

tend to value reading to their preschool children less (DeBaryshe, 1995), and exhibit a lower interaction quality with their child during shared reading (e.g., asking less questions, larger proportion of parent talk in relation to child talk, and less verbal distancing; Lehrl et al., 2012).

Another important factor on the macrosystem level is that in most German states, educational laws make it an obligation for child care workers to document and foster language development, especially if the children's native language is not German (e.g., Senatsverwaltung für Bildung, Jugend und Wissenschaft, 2017). There are no binding preschool curricula in German states, and therefore, shared reading is not an obligatory child care activity. However, professional associations and educational administrations encourage parents and child care workers to use children's books as a means for promoting children's emergent literacy skills (e.g., National Association for the Education of Young Children 2009; Senatsverwaltung für Bildung, Jugend und Wissenschaft, 2014). As a consequence, shared reading is almost universally seen as a highly desirable activity for child development promotion in Western societies, and depriving children of shared reading experiences is therefore often described as a major disadvantage with respect to later success in school in the public discourse (e.g., Stiftung Lesen, 2018). In accordance with this view, a large survey found that in the majority of child care centers in Germany, a shared reading session is part of the daily routine (Wirts et al., 2017).

In sum, socio-constructivist and bioecological models of development and learning highlight that psychological and technical tools (e.g., language and books) are used for the co-construction of meaning between a caregiver and a child. Ideally, caregivers scaffold children's processes of meaning-making by providing a developmentally appropriate context in which children can relate new language knowledge to prior language knowledge (zone of proximal development; Vygotsky, 1978), thereby refining their oral language skills. Bronfenbrenner and Morris (2006) posit a strong reciprocity of caregiver-child interactions, emphasizing the active involvement of young children in educational processes such as shared reading. Moreover, development is conceptualized as an outcome of interactions between environmental and person variables, whereby proximal processes that take place in microsystems are considered to be the main drivers of change. Applied to oral language development, shared reading as a proximal process depends on

child, adult, and book characteristics, and relationships between these three literacy agents. Studies have identified the HLE and the CCLE as the two main environments that are directly related to oral language development through shared reading. In comparison, parental SES is a more distal variable with regard to language development, which is nevertheless related to differences in shared reading practices and the diversity of parent language, thereby affecting children's language development.

In the following chapter, I focus on shared reading in the HLE. Studies with German preschoolers have provided evidence that this literacy environment is especially important for language development, and that differences in the HLE can explain more variance in language skills than differences in the CCLE (Ebert et al., 2013; Weinert & Ebert, 2013). The average quality of literacy instruction seems to be low in German child care centers (Ebert et al., 2013; Weinert & Ebert, 2013) and the process quality regarding language-related activities is in need of improvement (Anders et al., 2015; Simon & Sachse, 2013). This can partly be explained by the pedagogical focus of Early Childhood Education and Care (ECEC) in Germany: Since the 1970s, ECEC has mainly focused on fostering children's socio-emotional, motor, and creative skills rather than fostering precursors of reading or other skills that are taught in primary school (Anders, 2018).

3 Shared reading in the home literacy environment

Several studies have investigated the components of the HLE that are related to oral language development. Chapter 3.1 summarizes which components of the HLE can be distinguished, and which of them are related to different early literacy skills. Chapter 3.2 summarizes evidence for a triad model of shared reading that is proposed as a framework for more detailed investigations of shared reading as a proximal process. In chapter 3.3, I propose a modified version of the *Home Literacy Model* (Sénéchal & LeFevre, 2002) that incorporates this shared reading triad, allowing a more detailed understanding of how interactions between child, adult, and book and their characteristics affect language development.

3.1 HLE components and relationships to early literacy skills

Early conceptualizations of the HLE have often focused on shared reading frequency and similar items that were collected via parent questionnaires (Bus et al., 1995). However, reducing the HLE to a set of few variables could underestimate the role of HLE in early literacy development (Burgess, Hecht, & Lonigan, 2002; Lehrl, Ebert, & Rossbach, 2013). Understanding how specific components of the HLE affect different early literacy skills during early childhood can inform targeted interventions in the HLE (Burgess et al., 2002). For the evaluation of the HLE's overall impact on early literacy skills (including oral language skills), different models of the HLE have been proposed that include diverse facets such as the amount and variety of literacy resources and activities at home, quality of shared reading, parental language and reading skills, and their literacy beliefs and attitudes (e.g., Burgess et al., 2002; Sénéchal & LeFevre, 2002).

Children's literacy interest and screen time are also considered to be key variables in reading development (Frijters, Barron, & Brunello, 2000; Hume, Lonigan, & McQueen, 2015; Skwarchuk, Sowinski, & LeFevre, 2014). Literacy interest explains unique variance over and above the formal HLE in decoding precursors and early reading skills (Frijters et al., 2000). In addition, there is some evidence that shared reading activities precede an increase in children's literacy interest, and that interest in reading versus print are two separate constructs that are not correlated (Hume et al., 2015). Concerning screen time, a longitudinal study found that kindergarten children who watch more than three hours of TV per day spend less time reading books in their leisure time and show a decelerated growth

of reading skills in primary school (Ennemoser & Schneider, 2007). By contrast, less than two hours of daily screen time apparently have no negative effect on the language and reading development of children who are older than three years (Zimmerman & Christakis, 2005).

Components of the HLE can be divided into environment resources and exposure to literacy activities (see Figure 3.1). The latter includes passive HLE (model learning) and active HLE (shared reading, TV time). In addition, Sénéchal & LeFevre's (2002) conceptualization of the HLE distinguishes formal teaching of writing and reading from shared storybook reading. Many studies have found that differences in the active HLE explain variance in early literacy and language skills over and above parent SES, literacy resources, and the passive HLE (e.g., Burgess et al., 2002; Sénéchal et al., 1996). This finding is consistent with the bioecological model of human development (Bronfenbrenner & Morris, 2006), positing that reciprocal interactions between active children and the persons and objects in their immediate environment are the main driving force of development. Therefore, more recent reading acquisition research has focused more on the active HLE than on the other components.

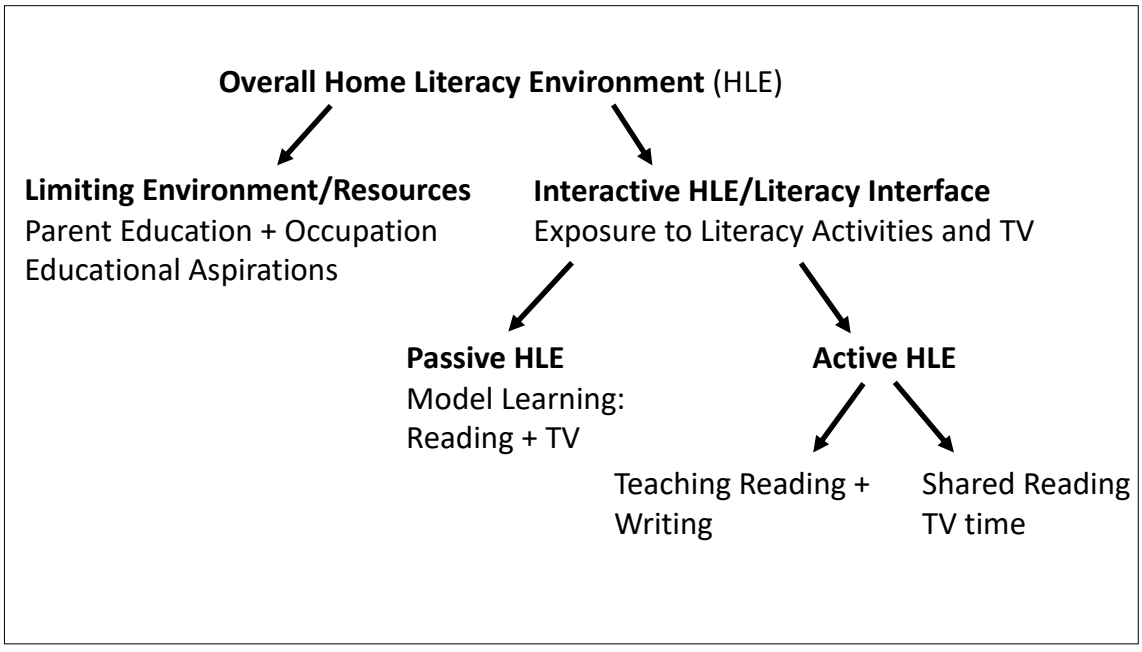

Figure 3.1. Components of the home literacy environment (Burgess et al., 2002; Sénéchal & LeFevre, 2002)

The *Home Literacy Model* (Sénéchal & LeFevre, 2002; Sénéchal & LeFevre, 2014; see Figure 3.2) has been particularly influential. The model proposes that there are two independent parental influences that shape the home literacy environment: Shared reading activities between parents and children, called informal home literacy environment, support the development of oral language skills, such as vocabulary. By contrast, parental teaching of reading and writing skills, called the formal home literacy environment, supports the development of decoding precursors, such as letter knowledge and phonological awareness.

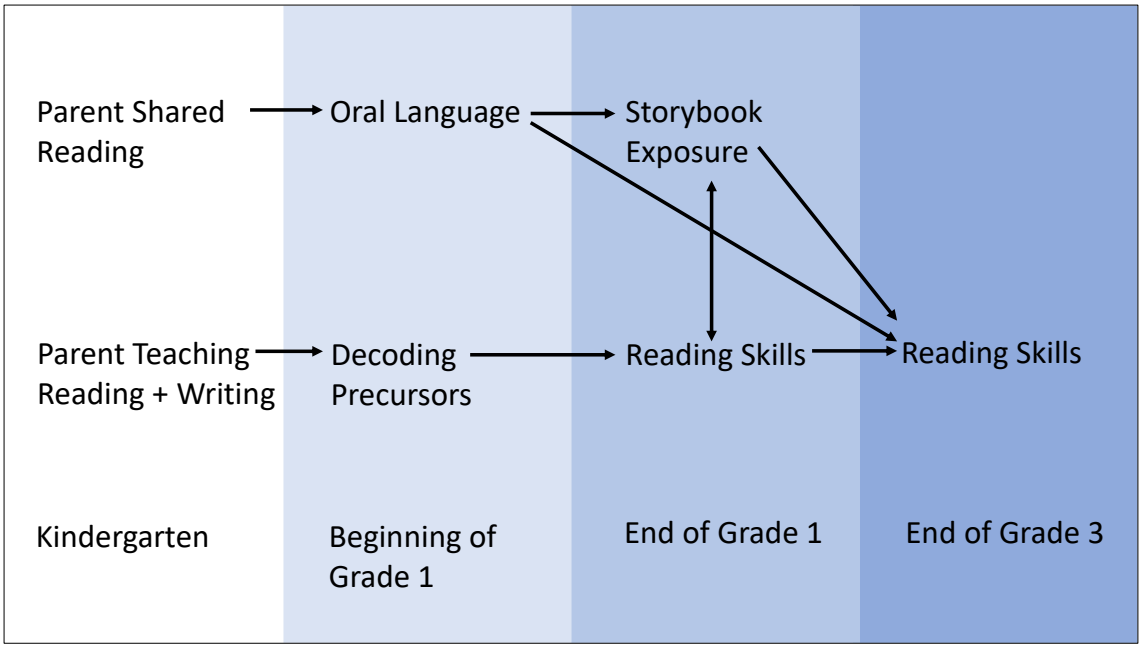

Figure 3.2. *Home Literacy Model* (adapted from Sénéchal & LeFevre, 2002).

The aim of the *Home Literacy Model* is to describe which specific parental activities and early literacy experiences support the acquisition of oral language skills and precursors of decoding skills in young children (Sénéchal & LeFevre, 2002). Evidence from longitudinal studies that were conducted in different cultures (e.g. Chen, Zhou, Zhao, & Davey, 2010; Hood, Conlon, & Andrews, 2008; Lehrl et al., 2013; Sénéchal & LeFevre, 2014) supports this proposed dichotomy. For example, a five-year longitudinal study with English-speaking children found that informal and formal home literacy activities were not correlated (Sénéchal & LeFevre, 2002), and that storybook exposure of kindergarten children predicted vocabulary development and comprehension skills at the beginning of grade 1, which in turn predicted reading comprehension at the end of grade 3 (Sénéchal & LeFevre, 2002). In the

same study, parental teaching of reading and writing skills during kindergarten predicted precursors of decoding at the end of grade 1, which in turn predicted reading comprehension in grade 3.

Overall, the *Home Literacy Model* (Sénéchal & LeFevre, 2002, 2014) is a parsimonious model whose proposed concurrent and longitudinal relationships between activities and early literacy outcomes can be tested with a reasonable effort. Evidence from numerous cross-sectional and longitudinal studies and from different cultures support this model. However, from the perspective of Bronfenbrenner's bioecological theory (Bronfenbrenner & Morris, 2006), the model also has several shortcomings. In particular, shared reading as a proximal process that drives oral language development seems to be underspecified. First, characteristics of child, adult, and book as literacy agents, their bivariate relationships, and their interplay should be taken into consideration. For example, motivation for leisure time reading in primary school declines during the first grades, exacerbating individual differences in reading skills (Wigfield, Gladstone, & Turci, 2016). A more differentiated understanding of how children's engagement during shared storybook reading can be enhanced could help to identify approaches for supporting reading motivation in primary school or even before. Second, even though different oral language skills on the word, sentence, and text level are highly correlated before school entry (Language and Reading Research Consortium, 2015b), there is some evidence that lower versus higher level language skills are each unique predictors of reading comprehension (Catts, Herrera, Nielsen, & Bridges, 2015; Lepola, Lynch, Laakkonen, Silvén, & Niemi, 2012; Kim, 2014; Silva & Cain, 2015). Therefore, a model of HLE's effects on oral language should distinguish these two sets of language skills, and studies should investigate how they are related to shared reading.

3.2 Determinants of the shared reading triad's effects on language skills

On the level of shared reading as a proximal process of development (Bronfenbrenner & Morris, 2006), the communication during shared reading and its effects on oral language skills depend on the fit between the three literacy agents child, adult, and book (Fletcher & Reese, 2005; van Kleeck, 2003). Experimental and intervention studies investigating shared reading effects often observe that children only learn a fraction of the target words (Wasik et al., 2016). Many study designs are

based on the manipulation of only a few shared reading variables and fail to mention other characteristics of the shared situation that are potentially important for secondary analyses (e.g., meta-analyses). To develop a better understanding of the interplay between these agents, it is helpful to consider the cognitive, motivational, emotional, and material characteristics that influence the shared reading process, including the specifics of the written language contained in children's books. In addition to the characteristics of these three components, the relationships between them affect both the process and effectiveness of shared reading.

Figure 3.3 displays a triad model of shared reading in literacy environments that is based on theoretical accounts of shared reading and literacy environments (Fletcher & Reese, 2005; Jaeger, 2016; van Kleeck, 2003) and evidence from empirical studies (see Flack et al., 2018; Hoff, 2006; Mol et al., 2008; Mol & Bus, 2011; Wasik et al. 2016, for reviews and meta-analyses). The main difference in comparison with previous models is a differentiation between characteristics of adults, children, and books involved in the shared reading process, their bivariate relationships, and the interplay of all three agents during shared reading. In the following, I discuss how characteristics of literacy agents and their relationships can affect shared reading.

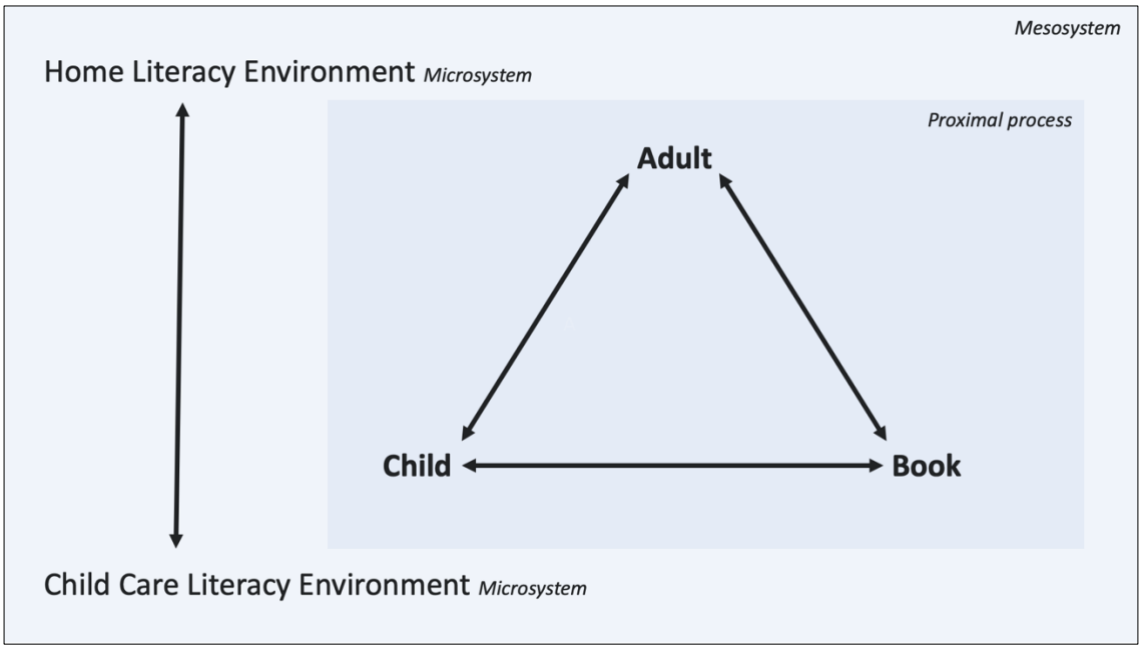

Figure 3.3. Bioecological triad model of oral language learning through shared reading in literacy environments.

3.2.1 Characteristics of child, adult, and book

Theoretically, children's language learning from shared reading should be related to differences in perceptive and cognitive functions that predict differential language learning from any environmental language input, such as phonetic distinction, wording segmentation from the speech stream, attentional functions (working memory and executive functions), and statistical learning (see Kidd, et al., 2018, for a review). In a correlational study, the relationship between children's storybook exposure and vocabulary skills was not moderated by verbal short-term memory, inhibitory control, or sustained attention (Davidse et al., 2011). In another correlational study, by contrast, working memory capacity moderated the relation between HLE and language skills: The average language skills of children were lowest if they had a lower working memory capacity and came from a home with less shared reading activities (Leseman, Scheele, Mayo, & Messer, 2007). Overall, evidence is scarce and inconclusive regarding the moderating role of children's general cognitive functions with respect to language development. Moreover, there is a lack of research investigating whether effects of early literacy and language interventions are moderated by working memory or executive functions (Hasselhorn, 2010), which would allow causal inferences. The few studies that investigated differential effects of shared reading activities on language skills did not focus on such general cognitive functions but on verbal abilities (i.e., vocabulary) as moderator. Experimental studies found that children with higher pre-intervention vocabulary had larger language gains from shared reading (e.g., Coyne et al., 2009; Lenhart, Lenhard, Vaahtoranta, & Suggate, 2019; Sénéchal, Thomas, & Monker, 1995). Similarly, a meta-analysis of intervention studies found that dialogic reading with parents had very small effects on the oral language skills of children at risk for literacy and language impairments, whereas the effects on children not at risk were moderate (Mol, Bus, & de Jong, 2008).

Parents who believe that education and reading is important for child development provide shared reading activities to their children more often (DeBaryshe, 1995; Kluczniok et al., 2013). Additionally, parents who enjoy reading themselves are more likely to engage actively in shared reading with their children (Bus, Leseman, & Keultjes, 2000; Sonnenschein et al., 1997). Even more fundamentally, the language and reading skills of an adult, which depend to a large part on leisure time reading (Mol & Bus, 2011), are likely to determine the amount

and quality of shared reading. For example, adults with low reading comprehension skills engage less frequently in shared reading activities with their children than adults with higher reading comprehension skills, presumably because reading is not an overly joyful leisure time activity to them (Neumann et al., 2018), and therefore, they are less likely to choose shared reading over other leisure time activities.

The characteristics of written language in children's books are also important for explaining effects of shared reading on oral language skills. A children's book can be analyzed as a "language model" (Hoff, 2006) that enables children to develop their language skills with the help of a reading person. On the word level, analyses of linguistic corpora have demonstrated that children's books contain more diverse vocabulary than the language adults use in everyday situations with their children (called child-directed speech; Massaro, 2015; Montag et al., 2015). More specifically, the texts in children's books for children aged birth to six years contain more unique words, so-called types, than child-directed speech of adults talking to children in the same age range (Montag et al., 2015). Moreover, children's books contain a larger proportion of low frequency words (defined as words occurring less than 10 times per 1 million word tokens in a book corpus) than child-directed speech in oral conversations (Crain-Thoreson, Dahlin, & Powell, 2001; DeTemple & Snow, 2003; Mesmer, 2016; Montag & MacDonald, 2015). Books present such words in semantic contexts that differ more than the semantic contexts of the child-directed speech outside shared reading. Unlike most talk about the immediate environment, storybooks introduce words and concepts to the adult-child conversation that are independent from the situation in which the shared reading takes place (decontextualized language; Snow & Ninio, 1986; Nyhout & O'Neill, 2013). Being exposed to the same word in different contexts facilitates word learning and word recognition (Hills et al., 2010; Hsiao & Nation, 2018). As a consequence, shared reading not only facilitates the basic learning of new words (vocabulary breadth), but also the acquisition of the words' semantic features (vocabulary depth; Ouellette, 2006). On the sentence level, corpus analyses have shown that children's books contain more complex grammatical constructions than child-directed speech (Montag, 2019; Cameron-Faulkner & Noble, 2013). Finally, on the text level, children's books contain different narrative structures, providing a context in which children can learn to understand and (re-)produce narratives (Pantaleo & Sipe, 2012; Wagner, 2013, 2017).

3.2.2 Relationships between child, adult, and book during shared reading

The effects of shared reading on oral language development depend on the relation and interaction between child and adult (Fletcher & Reese, 2005). Adults need to calibrate their communication to the child's development in order to facilitate their learning in the zone of proximal development. More specifically, adults need to have a knowledge of a child's language skills and prior world knowledge in order to select adequate books and ask questions of adequate difficulty. For example, the oral language skills of children with higher language scores benefit more from discussing stories than from the labelling and description of pictures, whereas children with lower language scores benefit more from the latter than from discussing stories (Reese & Cox, 1999; Zucker, Justice, Piasta, & Kaderavek, 2010). In order to be effective, adults need to explicitly direct their talk during shared reading at the child (and maintain contact with the child) because talk that is not directed to children does not improve their oral language skills (Shneidman et al., 2013; Weisleder & Fernald, 2013). Finally, children's attachment style is also related to behaviors during shared reading and the frequency of shared reading: Several studies have found that securely attached children are more engaged in shared reading, and they are also more often read to, which in turn leads to a favorable development of oral language skills (see Bus, 2003; Fletcher & Reese, 2005, for reviews).

Even before they become independent readers, children exhibit large differences in their interest in books, their motivation for shared reading, and their engagement during shared reading activities (Frijters et al., 2000; Hume et al., 2015). Studies have found that, while maternal reading behavior was not related to children's engagement during shared reading, children's engagement predicted language development and reading achievement (Crain-Thoreson & Dale, 1992; Dale, Crain-Thoreson, & Robinson, 1995). Similarly, the amount that children answered questions during shared reading predicted how many words they learned (Sénéchal, 1997; Sénéchal et al.,1995).

The relation between adults and books is also an important factor in shared reading effectiveness. Adults differ in their preferences for reading over other leisure activities (Stanovich, West, & Harrison, 1995) and show large differences in print exposure (amount of leisure time reading; Stanovich & West, 1989). Parents who provide a minimum of children's books to their children from age 3 on (e.g.,

more than 20 books) reduce the likelihood that their children develop poor receptive vocabulary skills until school entry by a factor of approximately three (Farrant & Zubrick, 2013). Moreover, adults with more print exposure exhibit better oral language skills (Mol & Bus, 2011), which is likely to influence their language use during shared reading. For example, while describing pictures, adults with more print exposure tend to use more complex grammatical constructions than adults with less print exposure (Montag & MacDonald, 2015). Parents often choose more complex books for shared reading with their preschool-aged children than for their younger children, reflecting that they are at least to some degree aware of their developmental differences (van Kleeck & Beckley-McCall, 2002). In addition, adults prefer children's books with fewer words over books that contain more text, and they also indicate that their preschool-aged children prefer books with less text (Wagner, 2017). They also prefer books that are culturally more prominent (classic books and award-winning books) over books that were more recently published and have not received an award (Wagner, 2017).

3.2.3 Children's and caregivers' extratextual talk during shared reading

Analyzing how literacy agents' characteristics and the relationships among them affect shared reading helps to better understand the wealth of cognitive, behavioral, and socio-emotional components that are involved in shared reading. The effects of some shared reading behaviors on language learning, however, depend on the fit and the active coordination between all three literacy agents; for example, joint attention, extratextual talk, storybook selection, and repeated readings. One key question is how caregivers can facilitate children's active engagement and language production during shared reading, and, in turn, their language learning.

The language production of adults and children in everyday situations is highly context-sensitive (Dickinson, Hofer, Barnes, & Grifenhagen, 2014; Griffin & Ferreira, 2006). Children's books allow the activation of a more diverse vocabulary than other communication settings because they provide very diverse language production contexts (Montag et al., 2015). For example, mothers' talk during storybook shared reading with five-year-olds contained more infrequent words (that were not included in the text of the book) than their talk during other activities (mealtime, toy play, magnet play, and information book reading; Weizman & Snow, 2001). The

proportion of infrequent words was an important longitudinal predictor of children's vocabulary in second grade (Weizman & Snow, 2001). In addition, several studies found that parents produce more grammatically complex sentences when reading a book with their children in comparison to their child-directed speech while playing with their child. The mean length of parents' utterances is longer, they respond more to the utterances of their children, and they use more abstract language (Noble, Cameron-Faulkner, & Lieven 2018; see Fletcher & Reese, 2005, for a review).

Language learning through shared reading is facilitated when adults and children engage in a sustained situation of joint attention (Farrant & Zubrick, 2011, 2013; Fletcher et al., 2008; Ninio & Bruner, 1978; Rudd, 2003), which means that adults and children share a common (visual) focus with respect to a children's book and that the two interact in this framework (e.g., pointing at and conversing about certain details of illustrations). For example, an experimental study found that instructing children to point at the illustrations of a children's book during shared reading facilitates their word learning in comparison to passively listening to the adult's reading (Sénéchal et al., 1995). More recent studies, however, have found that infants can acquire a new object's verbal label just by overhearing its name, which indicates that joint attention is not always necessary for some aspects of word learning (e.g., Gampe et al., 2012). Overhearing alone, however, is unlikely to be sufficient for acquiring a deep and nuanced comprehension of word meaning (i.e., vocabulary depth).

To establish joint attention, an adult activates and scaffolds a child's thinking by (a) asking questions about a book's contents (van Kleeck, Hamilton, & McGrath, 1997), such as asking the child to label depicted objects or asking to explain what happens on a certain page, (b) expanding the child's answers, which in turn (c) elicits new utterances from the child, and so on (dialogic cycle of communication during shared reading, Ninio & Bruner, 1978; Zevenbergen & Whitehurst, 2003). Many studies have found that asking basic comprehension questions during shared reading increases the effects on oral language skills in comparison to reading storybooks aloud without asking questions (see Flack, Field, & Horst, 2018; Hindman et al., 2016, for reviews). Asking such literal comprehension questions both serves to attain joint attention and to establish a fundamental understanding of concepts and events. Discussing the meanings of new words in the context of the

story and in other contexts facilitates a deeper word understanding (Coyne et al., 2009).

Asking inferential comprehension questions in addition to literal comprehension questions can further enhance the positive effects of shared reading on vocabulary learning (Hindman, Connor, Jewkes, & Morrison, 2008; van Kleeck, 2008) and facilitate the production of narrative structures (Silva & Cain, 2017; Silva, Strasser, & Cain, 2014). Children's books contain story grammar elements of which parents make use during shared reading: They produce story grammar elements that are contained both in the text and in the pictures of the books (Breit-Schmidt, van Kleeck, Prendeville, & Pan, 2017). Presumably, this exposure to story grammar elements and discussing them during shared reading helps children build an inner representation of story schemata, which in turn helps their understanding of oral and written stories (Fiorentino & Howe, 2004; Westerveld, Gillon, & Moran, 2008). Parents, however, rely heavily on contextualized utterances, that is, they stick closely to the literal textual and visual contents of books, focus often on the actions and only rarely combine this with more abstract contents such as inferences regarding figures inner states or plans (Breit-Smith et al., 2017). Even though inferential questions support the acquisition of HLL skills such as narrative comprehension, parents generally ask more literal comprehension questions than inferential questions about the contents of a story (Huebner & Meltzoff, 2005; van Kleeck et al., 1997). How an adult and a child interact about a book depends on the interplay of all three literacy agents, such as (a) the adult's propensity to ask open-ended questions during shared reading, (b) the child's responsiveness to the adult's questions and the contents in a storybook, and (c) features of the book that invite discussion, such as odd events.

The amount of pictorial information in relation to text-based information is also related to children's engagement and the amount of extratextual talk. Using children's books with illustrations during shared reading increases children's engagement and parent-child extratextual talk compared to using matched books without illustrations (Greenhoot, Beyer, & Curtis, 2014). In comparison to using children's books with text during shared reading, using wordless picture books facilitates interactions between caregivers and children (Sénéchal, Cornell, & Broda, 1995) and boosts the verbal production of both (Chaparro-Moreno et al., 2017; Sénéchal et al., 1995). More specifically, in the study by Chaparro-Moreno and

colleagues, children produced more words (number of tokens), more diverse words (lexical diversity), and more sentences (number of utterances). At the same time, teachers produced more diverse words when using wordless picture books in comparison to storybooks with text. By contrast, the mean length of teachers' utterances (sentences) was longer when using storybooks with texts compared to wordless picture books (Chaparro-Moreno et al., 2017), which is probably due to written sentences being longer and also more complex than spoken sentences in child-directed speech (Cameron-Faulkner & Noble, 2013; Montag, 2019). Therefore, using wordless picture books instead of storybooks with text during dialogic reading is likely to be more effective in fostering vocabulary skills, but also likely to be less effective in fostering grammatical skills. Another study found that the amount and quality of mothers' extratextual talk (i.e., lexical diversity and MLU) does not differ when they read picture books with their children that contain more versus less text (Muhinyi & Hesketh, 2017), resulting in a doubled amount of extratextual talk during shared reading when using text-reduced children's books, with no reduction in lexical diversity or MLU. Overall, evidence from these studies suggests that using wordless picture books during shared reading facilitates children's oral language comprehension and production, with the exception of grammatical constructions that are typically found in written text.

Repeated readings of the same books can also increase children's engagement (Fletcher & Jean-Francois, 1998; Morrow, 1988) and enhance their language learning through shared reading (Snow & Goldfield, 1983). Children who read a familiar book talk more than when reading a novel book (Fletcher & Reese, 2005). Moreover, parents and children talk more about related content or their own experiences when re-reading the same book, which also increases children's world knowledge (Haden et al., 1996; Hayden & Fagan, 1987). For children with lower language abilities, repeated readings of the same book increase engagement in comparison to readings of different books (Morrow, 1998). Repeated readings provide multiple opportunities for repeated imitation (Ninio, 1983) and processing of novel words in a meaningful context (Sénéchal, 1997). Experimental studies have found that children's expressive vocabulary is enhanced after two or more readings of the same book, whereas one reading often does not result in significant vocabulary gains (e.g., Horst, Parsons, & Bryan, 2011; McLeod & McDade, 2011; Sénéchal, 1997; Sénéchal & Cornell, 1993).

3.3 A modified home literacy model: Introducing the shared reading triad

In sum, effects of shared reading on oral language are related to characteristics of children, adults, and books, such as (a) children's prior oral language skills and presumably also their general cognitive functions, such as memory, (b) adults' own reading habits and their beliefs about and attitudes towards shared reading, and (c) children's books' characteristics, such as lexical and grammatical diversity and narrative structures. Moreover, it is also important to consider bivariate relationships between children, adults, and books, because effects of shared reading on oral language skills depend on (d) adults' ability to attract and sustain children's attention and adjust their extratextual talk to children's oral language skills level, (e) children's interest in books and their engagement during shared reading, and (f) adults' provision of children's books at home, their ability to select developmentally appropriate books for shared reading with their children at different ages, and also their own print exposure, which is related to their oral language and reading skills. Finally, concerning the interplay of children, adults, and books, children's engagement and language learning through shared reading can be enhanced by (g) establishing a common conversational focus with basic comprehension questions and (h) inferential comprehension questions during extended extratextual talk about vocabulary and story elements. Moreover, (i) repeated readings of (j) wordless picture books (or children's books with relatively little text in comparison to pictures) facilitate children's engagement and language production, and thus are effective means for increasing children's oral language skills.

Based on the evidence summarized above, Figure 3.4 shows a modified model of the HLE. In comparison to the original HLE model (Sénéchal & LeFevre, 2002), the modified model (a) adds child and book as literacy agents to shared reading as a key activity before school entry that influences later oral language and reading development, (b) highlights the active role of children (cognitive, motivational, and socio-emotional variables), (c) highlights the role of book characteristics and book selection, incorporating evidence from corpus linguistics into a shared reading research framework, (d) differentiates between direct effects of literacy agents and the reciprocal influences between three literacy agents that also affect oral language development, and (e) differentiates between lower and higher level language skills as outcome measures of shared reading.

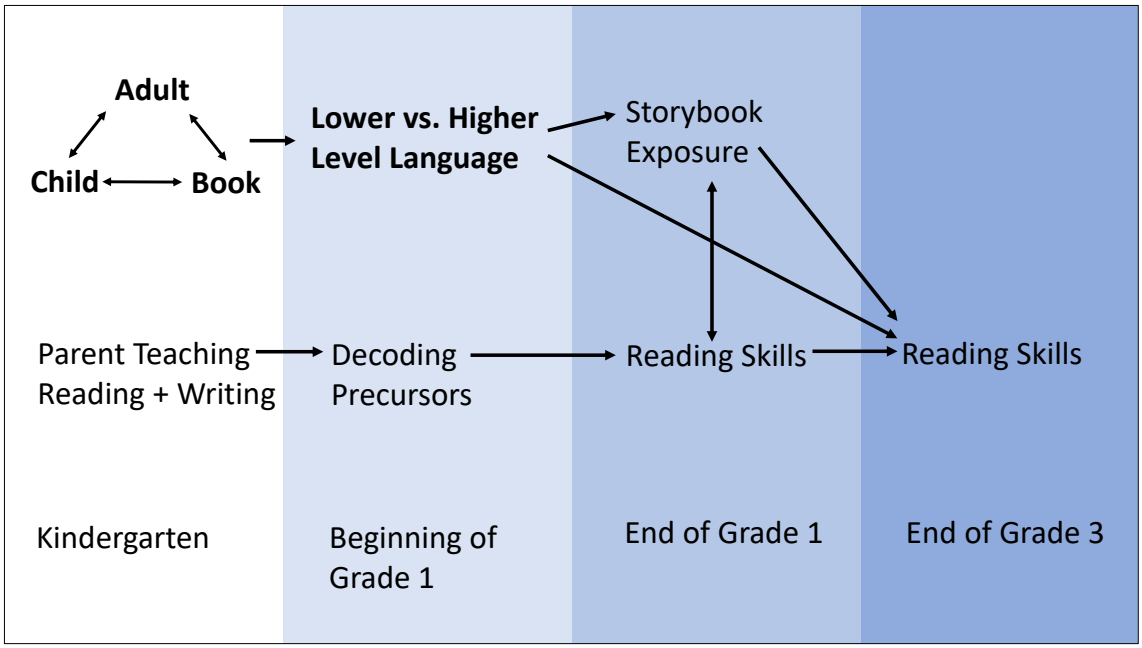

Figure 3.4. Modified *Home Literacy Model* with shared reading triad (adapted from Fletcher & Reese, 2005; Sénéchal & LeFevre, 2002; van Kleeck, 2003).

This modified model of the HLE reveals that shared reading is a complex process. In addition, shared reading as a proximal process is itself dynamic, changing over time in relation to children's language, attention, and socio-emotional development, which is presumably related to changes in adults' shared reading behaviors and characteristics of children's books for different ages. This implies that key variables for the effects of shared reading on oral language skills need to be identified to allow a complexity reduction in empirical studies. Effects of shared reading appear to be small when measured over a few months (Mol et al., 2009, Noble et al., 2019), but substantial when measured over several years (DeBaryshe, 1993; Farrant & Zubrick, 2013). Ideally, then, assessment of shared reading practices should capture the effects of shared reading activities over a relatively long time period. Otherwise, shared reading effects are likely to be underestimated (Noble et al., 2019). The following chapter discusses how literacy environments and shared reading activities in the HLE and the CCLE can be measured.

4 Assessment of literacy environments and shared reading

Investigating how shared reading in microsystems (HLE and CCLE) is related to oral language development in early childhood depends on the availability of adequate assessment methods. Pioneering correlational and longitudinal studies often had severe methodological shortcomings, among them measures with low reliability and social desirability bias (Lonigan, 1994). Since then, the field has developed and validated methods that capture different aspects of literacy environments and shared reading, which can be categorized as measures of (a) early literacy activities and shared reading input (e.g., literacy questionnaires and author recognition test; chapter 4.1), (b) the interactional quality during literacy activities and shared reading (e.g., environment rating scales and linguistic quality measures; chapter 4.2), and (c) memory outcomes of engaging in meaningful shared reading activities (e.g., recall of story details, recognition of storybook titles; chapter 4.3). The final chapter discusses which assessment methods are best suited for specific research questions and how they are related to environmental models of language learning (chapter 4.4).

4.1 Measures of literacy environments

The amount and quality of language and shared reading input provided by caregivers to young children depends on caregivers' language and reading skills (Neuman et al., 2018). Individual differences in adults' language and reading skills are related to differences in the amount of adults' leisure reading (Puglisi et al., 2017; Stanovich, West, & Harrison, 1995). Meta-analyses about the relation of leisure reading and outcome skills of preschoolers, school children, and college students found that the emergence of these individual differences is related to differences in the amount of leisure reading (Mol & Bus, 2011). As measures of the input provided for children through literacy environments and shared reading, studies have used socioeconomic status (chapter 4.1.1), caregiver questionnaires (chapter 4.1.2), activity diaries (chapter 4.1.3), and the author recognition test (chapter 4.1.4). In addition, linguistic approaches to oral language learning through shared reading have recently started to investigate the relation between the lexical and grammatical input qualities of storybooks and children's language development (e.g., Montag et al., 2015; von Lehmden, Porps, & Müller-Brauers; 2017; Wagner,

2017). In the future, this research will hopefully provide methods that are useful for the assessment of literacy environments and shared reading activities.

4.1.1 Socioeconomic status

Socioeconomic status (SES) is a comparatively broad construct that is often operationalized as parent education, occupation, and income, or some combination of these variables (Buckingham et al., 2014). Correlational and longitudinal studies corroborate that parent SES is positively associated with literacy activities (Fletcher & Reese, 2005; Hoff, 2006; van Steensel, 2006) as well as language and reading development during early childhood (Gilkerson et al., 2017; Hart & Risley, 1995; Huttenlocher et al., 2002). For example, parents with a middle SES report more shared reading than parents with a lower SES (Adams, 1990; Britto et al., 2002; Hammer, 2001; Heath, 1983; Teale, 1986). Whereas lower SES of parents is often associated with less frequent shared book reading, the effect of shared reading is not moderated by socioeconomic status (Bus, Ijzendoorn, & Pellegrini, 1995; Noble et al., 2019), indicating that children's oral language skills benefit from shared reading regardless of their social background.

Measures of SES provide important information on the broader context in which children grow up. They are, however, less helpful in determining which specific activities are particularly effective in fostering language development (Lonigan, 1994). SES is a 'catch-all' variable that is theoretically difficult to grasp because it includes many aspects that are shared with HLE activities and resources (e.g., number of books in a household), but also many additional aspects that are more generally related to child development (e.g., nutrition, healthcare, amount of stress experienced by parents and children, time available for educational activities; Lonigan, 1994). In sum, SES is an important context variable for estimating the extent to which social inequalities are related to differences in language development. In educational research, it should be used in combination with indicators of proximal processes that provide specific insights into how oral language skills can be fostered.

4.1.2 Literacy environment questionnaires

Between the 1950s and 1990s, the informal home literacy environment (HLE) has most often been measured by single or multiple items in parent questionnaires, such as frequency of shared reading, the number of children's books at home,

parental leisure reading habits, family TV consumption, and frequency of family library visits (Bus et al., 1995). Meta-analyses have found that literacy activities (frequency of shared reading) and literacy resources (number of children's books at home) are particularly robust predictors of language skills, and that questionnaire measures of the HLE explain about 8–12% of variance in children's language skills (Bus et al., 1995; Mol & Bus, 2011). Studies from Germany reported a similar magnitude of the relation between HLE questionnaires and oral language skills (e.g., Ebert et al., 2013; Lehrl et al., 2013; Niklas & Schneider, 2013).

Regarding the child care literacy environment (CCLE), few studies have used staff questionnaires to assess literacy activities and resources in the child-care setting (e.g., Slot, Leseman, Verhagen, & Mulder, 2015; Weigel et al., 2005) and found that literacy activities in the CCLE were a unique predictor of vocabulary growth (Weigel et al., 2005). A meta-analysis found that domain-specific questionnaires did not explain a significant amount of variance in children's outcomes (e.g., language and literacy skills), possibly due to a lack of reliable questionnaire measures available for the assessment of the quality of literacy activities in the CCLE (Ulferts et al., 2019).

In sum, questionnaires are reliable, valid and economic proximal measures of literacy activities and resources in the HLE. There are, however, several disadvantages to them that limit their predictive power. First, at least in Western societies, norms and values prescribe that reading to children is important for their development (see chapter 2.3), often resulting in social desirability bias when questionnaire measures are used. Parents tend to over-report literacy activities, thereby diminishing the usefulness of questionnaire measures for differentiating between children who experience more versus less shared reading activities (DeBaryshe, 1995). This can also constrain the variability of responses to questionnaire items and result in ceiling effects (e.g., Davidse et al., 2011; Sénéchal et al., 1996), reducing the magnitude of correlations between such questionnaire measures and language skills. Second, even if there is sufficient variability, questionnaire items can be still problematic when they ask for the average number of shared reading sessions or the average time spend with shared reading during a week. Due to memory constraints, most participants are not capable of providing reliable retrospective accounts of the average time they spend with different

activities over periods of time (e.g., Bradburn, Rips, & Shevell, 1987; Burt & Kemp, 1991).

4.1.3 Activity diaries

Activity diaries can be less prone to social desirability bias when participants are not informed that the research is specifically about leisure reading (Greaney, 1980). Participants fill in a form with a time grid for each day in which they describe everything they have done on this day (e.g., Ennemoser & Schneider, 2007; Rice, 1986; Smith, 2000). Activity diaries allow a more precise estimation of absolute reading times and rely less on participants' memory abilities than questionnaire items that ask for retrospective estimation of average reading time. Even the duration estimation of recent events, however, is not immune to retrospection problems (Bradburn et al., 1987; Burt & Kemp, 1991). The main disadvantage of activity diaries is that they have to be filled in for several weeks to allow a generalization in terms of participants' average leisure reading time. Therefore, diary measures require a high implementation effort, and participants need to be very motivated to comply over an extended period of time (Bolger, Davis, & Rafaeli, 2003; Carp & Carp, 1981).

4.1.4 Author recognition test

To circumvent social desirability and recall issues that come with literacy questionnaires and activity diaries, Keith Stanovich and colleagues developed a recognition test format that has been used with primary school children, adolescents, and adults (Allen, Cipielewski, & Stanovich, 1992; Cunningham & Stanovich, 1990; Stanovich & West, 1989). In the author recognition test (ART), participants indicate on checklists which names of bestselling authors they recognize. To discourage guessing, participants are informed that the list also contains fake authors (foils). To calculate a print exposure score that is corrected for guessing, the proportion of checked foils is subtracted from the proportion of checked real authors. ART scores are positively correlated with other measures of print exposure, such as reading habit questionnaires and activity diaries (Allen, Cipielewski, & Stanovich, 1992; see Mol & Bus, 2011, for a meta-analysis) and real-world reading behaviors (West, Stanovich, & Mitchell, 1993). Moreover, adults' ART scores also correlate positively with children's and adults' language and reading skills (Stanovich et al., 1995; West et al., 1993). Whereas activity diaries measure

absolute reading times, recognition tests estimate relative differences in leisure reading time and related literacy activities.

In sum, the ART is a reliable, valid, and objective measure of print exposure that does not suffer from ceiling effects, social desirability bias, or imprecisions of event duration recall. With an administration time of about 5 minutes, the ART is also a very economic measure. In early childhood research, parents' scores in the ART are often used as a proxy of parental literacy (Sénéchal et al., 1996; 2008) or children's print exposure (Puglisi et al., 2017). Therefore, the ART can be conceptualized as an input literacy environment measure with respect to children's language development. Despite an increasing interest in the relationship between shared reading, parental literacy, and children's oral language skills, the ART has not yet been adapted for German-speaking readers.

4.2 Interaction measures of shared reading

Whereas literacy environment questionnaires, activity diaries, and recognition tests focus on the quantity of shared reading, interaction measures also aim to assess quality features of literacy activities. In pedagogical research, observation measures are often used to characterize the quality of literacy-related interaction processes in the HLE and CCLE (chapter 4.2.1). Another approach to characterizing the quality of shared reading interactions is to analyze features of caregivers' language during shared reading as predictors of children's language development (chapter 4.2.2).

4.2.1 Observation measures of literacy activities

Even though observation measures are considered to be less biased by social desirability than HLE questionnaires (Bus et al., 1995), few observation rating scales have to date been developed for the HLE that focus on early literacy activities or shared book reading in particular. For example, in a longitudinal large-scale study that tracked children's development between age 3 and 10 in Germany (Pfost, Artelt, & Weinert, 2013), a semi-standardized shared book reading task was used for rating the quality of the caregiver-child interaction (Family Rating Scale; Kuger et al., 2005; see Lehrl, 2018, for details). Raters assessed verbal distancing, nonverbal behavior, amount of (complex) questions, parent extratextual language, amount of children talk in relation to parent talk, and phonological cues (Lehrl, 2018). Interactional quality explained unique variance in grammar skills at age 3, but not in vocabulary

skills. A brief HLE questionnaire (three items: quantity of books and children's books in the household, shared reading frequency) explained unique variance in vocabulary and grammar skills at age 3 above the variance explained by the Family Rating Scale (Lehrl, 2018).

In educational research, standardized observation protocols and rating scales administered by external assessors are often used to characterize the quality of literacy-related interaction processes in the CCLE. Two of the most often used scales are the Early Childhood Environment Rating Scales (ECERS-R; Harms, Clifford, & Cryer, 1998; ECERS-E; Sylva, Siraj-Blatchford, & Taggart, 2003) and the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008). Some of these scales, however, also assess structural aspects of early childhood education and care (ECEC) in addition to teacher-child interactions. Nevertheless, meta-analyses have reported positive correlations with children's vocabulary skills. Both the ECERS-R total score and the language-reasoning subscale (using books and pictures, encouraging children to communicate, using language to develop reasoning skills, and informal use of language) are weakly related to the vocabulary skills of 30-to-72-month-old children (Brunsek et al., 2017). Moreover, the CLASS scale Instructional Support (concept development, quality of feedback, language modeling, literacy focus) is weakly correlated with vocabulary skills (Perlman et al., 2016). In addition, a meta-analysis of longitudinal studies found that environment rating scales that focus on the interaction quality and the observation of the process quality of domain-specific activities (e.g., language and literacy) result in relatively stronger correlations with vocabulary skills than scales that focus on the physical surroundings or questionnaire measures. The effect sizes, however, are in general small (Ulferts et al., 2019).

In sum, environment rating scales are reliable and valid direct measures of proximal processes that provide a detailed evaluation of the caregiver-child interaction. Scores are based on external raters which prevents bias due to social desirability. Considering that the literacy-related interactional quality in child care centers is often lower than desirable (Slot et al., 2015; Ulferts et al., 2019), environment rating scales are particularly useful for professional development interventions aiming to increase interactional quality (McNerney, Nielsen, & Clay, 2006). On the other hand, the administration of environment rating scales is comparatively expensive because raters need to be trained for several hours, and

on-site ratings often take two or more hours per classroom (e.g., Abreu-Lima et al., 2013). In addition, rating scales are not always significant predictors of preschoolers' language skills (e.g., Hindman et al., 2012; Lehrl, 2018; Lonigan et al., 2011; Powell et al., 2010), possibly because the assessment is based on observations during one or two days, which might not be representative of the average quality of literacy activities in the CCLE (Slot et al., 2015). Interestingly, environment rating scales and questionnaires that aim to assess the same quality aspects of ECEC are only weakly correlated (Slot et al., 2015). Therefore, environment rating scales could be complemented by other measures that assess the average amount and quality of literacy activities over longer periods of time.

4.2.2 Linguistic measures of caregivers' speech and extratextual talk

Oral language development also depends on the quality of caregivers' child-directed speech (CDS) and the extratextual talk associated with shared book reading. Linguistic measures of caregivers' CDS, such as lexical diversity and mean length of utterances (MLU), are longitudinal predictors of preschoolers' oral language development (Hoff-Ginsberg, 1998; Hoff & Naigles, 2002; Huttenlocher et al., 2010; Rowe, 2012; Weisleder & Fernald, 2013). These linguistic measures have also been used to investigate the effects of linguistic quality of extratextual talk.

In the HLE, parents use more low frequency words and complex sentences when they read a book with their children in comparison to other activities (e.g., Crain-Thoreson et al., 2001; Noble et al., 2018). In turn, the proportion of low frequency words and the syntactic complexity in parents' extratextual during shared reading both predict preschoolers' growth of vocabulary skills (Baker et al., 2015; Weizman & Snow, 2001). In the CCLE, the lexical diversity and syntactic complexity of caregivers' CDS is also higher during shared book reading than during other activities (Dickinson et al., 2014). Similar to the findings in the HLE, the proportion of low frequency words (Dickinson & Porche, 2011) and complex syntax (Huttenlocher et al., 2002; Vasilyeva, Huttenlocher, & Waterfall, 2006) in caregivers' CDS predicts children's growth in vocabulary and grammar skills.

In sum, deriving linguistic measures from observations of CDS is a valid and objective method for assessing literacy environments and shared reading activities. Similar to environment rating scales that provide detailed information about caregiver-child interactions on a behavioral level, linguistic measures provide a

characterization of interactional quality features in educational settings that aim to foster oral language development. Therefore, evidence from linguistic measures can be used for the development of preschool curricula, and also for professional development feedback. Linguistic measures, however, often cannot be derived automatically from recorded speech. More often, the audio material is manually coded, requiring many hours of work by trained staff. Therefore, linguistic measures are comparatively expensive.

4.3 Outcome measures of shared reading

By adopting the rationale behind the ART (Stanovich & West, 1989), early childhood researchers have developed specific recognition and recall tests for the assessment of young children's storybook exposure. Whereas the ART is an input measure of literacy environments, storybook recognition and recall tests are outcome measures of shared reading activities. They assess relative differences in the recall of details from popular storybooks (chapter 4.3.1) and the recognition of popular storybooks' titles (chapter 4.3.2). Storybook information is memorized and retained as a result of shared reading activities that are meaningful to children.

4.3.1 Storybook knowledge recall tests

In a one-on-one setting, children are asked to name a book's title after they have seen its title page. If a title is correctly recalled, children are asked to tell some of the story details in order to control for guessing (Davidse et al., 2011; Sénéchal et al., 1996; Zhang et al., 2018). The recall scores explain a substantial amount of unique variance in children's vocabulary skills after controlling for the broader HLE and background variables (Davidse et al., 2011; Sénéchal et al., 1996; Zhang et al., 2018).

Storybook knowledge recall tests are objective and valid measures of print exposure. The administration time depends on the number of book covers presented to children. This test format, however, is rarely used, presumably because it has disadvantages that reduce its explanatory power. Most notably, a successful recall of both book title and story details poses high demands on children's cognitive skills, which could explain the floor effects often found in these measures (Davidse et al., 2011; Sénéchal et al., 1996). Also, confounds with memory, attention, and language skills are problematic in studies investigating the relation between shared reading and oral language skills.

4.3.2 Storybook title recognition tests

Storybook title recognition tests (TRTs) are often used for examining the relation between shared reading activities in the HLE and children's language development (see Mol & Bus, 2011, for a meta-analysis). TRTs are usually administered as paper and pencil tests in which parents mark the storybook titles that they recognize (e.g., Hamilton, Hayiou-Thomas, Hulme, & Snowling, 2016; Hood et al., 2008). Because they are not yet proficient readers, preschoolers cannot fill in TRTs. As in the ART, the proportion of checked foils is subtracted from the proportion of checked real titles, resulting in a hit rate that is corrected for guessing. Parents' TRT score is moderately correlated with HLE questionnaire measures and is considered to be a proxy of children's print exposure (Mol & Bus, 2011). However, children spend a considerable amount of their time from age 3 onwards in child care (Statistische Ämter des Bundes und der Länder, 2016), where daily shared reading is very common (Wirts, Egert, & Reber, 2017). Furthermore, parents are often exposed to children's book titles when they are not reading with their child (e.g., in the bookstore, in magazines, at friends' homes). Therefore, it seems unlikely that parents' TRT scores directly reflect their children's storybook exposure.

In sum, storybook TRTs are objective, reliable, and valid measures of shared reading activities in the HLE that are less confounded with children's cognitive skills than storybook knowledge recall tests. The test administration of the TRT takes about 5 minutes. Even though the TRT format has been adapted for many cultures in the last two decades (e.g. Hamilton, 2013; Ho, 2014; Hood et al., 2008), there is to date no storybook TRT for German-speaking participants. Moreover, studies used parents – not children – as informants, reducing the validity and the explanatory power of storybook TRTs (Mol & Bus, 2011). In addition, to date, the TRT has not been used as proxy of shared reading with caregivers other than parents, such as child-care workers or grandparents, even though they often read with children on a regular basis.

4.4 Conclusions

Overall, there is no single method that fits all research questions. Each method has strengths and shortcomings. Therefore, combining measures with complementing strengths is the most reasonable approach to a comprehensive assessment of environmental influences on oral language learning. In general, the

measures that were discussed in this chapter show an adequate dispersion of scores, with the exception of storybook knowledge recall tests, where floor effects can be problematic. In addition, the reliability of the measures is in general adequate or good, with the exception of staff questionnaires for the CCLE, where the reliability for some measures is relatively low (Ulferts et al., 2019). Figure 4.1 summarizes measures for the assessment of literacy environments and shared storybook reading and locates them in the shared reading triad of the modified home literacy model that was developed in chapter 3.2.

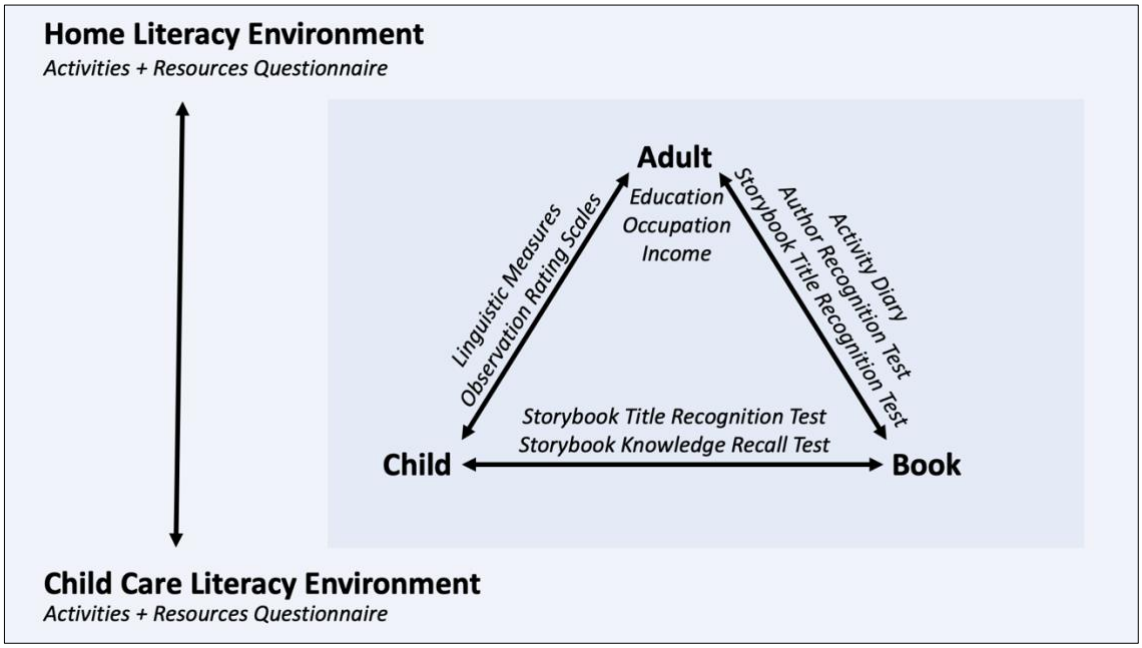

Figure 4.1. Measures for the assessment of literacy environments and shared book reading.

Considering that the influence of both HLE and CCLE on oral language should be assessed in sufficiently large samples to provide robust evidence for a bioecological model of language learning through shared reading, the amount of administration time and implementation effort are also critical factors that have to be considered. Most of the measures are relatively brief and cheap to implement; however, interactional measures (environment rating scales and linguistic measures) and activity diaries are much more time-intensive for researchers and participants, respectively. Therefore, environment rating scales and linguistic measures are probably used best when the evaluation of the interactional quality during shared reading or providing feedback during interventions is the focus of a

study. Activity diaries provide the most reliable estimate of absolute leisure reading time, and therefore should be used in studies that investigate this specific variable.

From the perspective of the bioecological model of human development (see chapters 2.2 and 2.3), proximal processes that take place in microsystems are the main drivers of development, whereas the impact of more distal environmental systems, such as the the exosystem and the macrosystem, are typically less strong. To understand how effects of shared storybook reading on oral language development are situated in communication settings, a comprehensive assessment of environmental factors should take into account distal environmental variables (e.g., SES), proximal environmental variables (e.g., descriptions of literacy environments), and descriptions or results of the proximal process itself, such as interaction or outcome measures of shared storybook reading.

Questionnaires about the HLE and CCLE are cost-effective measures for assessing the quantity of shared reading activities and resources. They also provide some basic description of shared reading activities and the physical environment but they often do not cover qualitative aspects. In addition, caregivers are aware that reading with children is beneficial for their development, which makes it more likely that they overstate the amount of shared reading. Besides this social desirability bias, items often ask for average occurrences of activities over an extended period of time, which leads to biases due to common event recall problems. Recognition test scores use foils as an effective control measure for social desirability. Also, they are based on the recognition of authors or titles, which is a simple memory process in comparison to averaging occurrences of shared reading over an extended time period, and therefore should be less confounded with memory abilities than questionnaire measures. Finally, recognition test scores reflect both long-term habits of leisure reading and recent reading activities because they contain classic and new authors (or storybook titles), capturing relative differences in shared reading activities over several years. Therefore, an cost-effective estimation of the relationships between the amount shared reading in HLE and the CCLE and language skills can be achieved by combining questionnaires and recognition tests.

5 Effects of shared reading on oral language skills

This chapter summarizes evidence from meta-analyses regarding the impact of shared book reading on children's oral language skills. Table 5.1 summarizes characteristics of the meta-analytic studies and the reported effect sizes. Numerous correlational studies have investigated the magnitude of the relation and whether it is moderated by participant characteristics or assessment methods (chapter 5.1). In addition, a large number of studies have examined the impact of additive shared reading interventions on children's oral language skills, and how intervention effects are moderated by study design and participant characteristics (chapter 5.2). Most intervention studies, however, combine several intervention strategies, making it impossible to disentangle the contributions of single strategies to language learning. Analyzing effects of particular shared reading strategies in naturalistic intervention and experimental studies from a more qualitative perspective could be a useful complementary approach for understanding how shared reading can be used to foster oral language skills (chapter 5.3). Finally, this chapter summarizes research gaps derived from correlational and intervention research that merit further investigation (chapter 5.4).

5.1 Meta-analytic evidence from correlational studies

In an early meta-analysis, shared reading in the HLE explained on average about 10% of variance in children's vocabulary skills (Bus et al., 1995). The amount of shared reading activities and resources in the HLE was measured by parent questionnaires. A follow-up meta-analysis (Mol & Bus, 2011) examined studies in which the amount of shared reading activities was either measured by a parent HLE questionnaire or by a storybook TRT that was completed by parents. Studies using either a questionnaire or a TRT were matched in terms of sample size, age, home language, and SES. The authors expected the correlation between storybook TRT and vocabulary skills to be higher than the correlation between HLE questionnaires and vocabulary skills due to problems of questionnaires regarding social desirability bias and restricted variance (see chapter 4.1.2). Surprisingly, the mean correlation between shared reading in the HLE and vocabulary skills did not differ between HLE questionnaire and storybook TRT (see Table 5.1).

Table 5.1
Meta-analyses Investigating the Impact of Shared Book Reading on Children's Vocabulary Skills

Meta-analysis	No. studies (years)	No. participants (age)	Study type	Environment	Assessment or intervention	Mean effect size
Bus et al., 1995	16 (1951–1993)	958 (3–8 years)	Correlation	Home	HLE questionnaire	r = .32
Mol & Bus, 2011	29 (1994–2009)	2,168 (2–6 years)	Correlation	Home	HLE questionnaire or storybook TRT	HLE: r = .33 TRT: r = .34
Mol et al., 2008	16 (1988–2006)	626 (2–6 years)	Intervention	Home	Dialogic reading interventions	Posttest: d = 0.42
Mol et al., 2009	31 (1986–2007)	2,049 (preschool, kindergarten)	Intervention	Child care	Interactive shared reading interventions	Posttest: d = 0.54
Noble et al., 2019	53 (1989–2017)	5,569 (2–7 years)	Intervention	Home and child care	Interactive shared reading interventions	Posttest: g = 0.19 Follow-up: g = 0.13 (ns)

Note. Meta-analyses included mostly studies with typically developing, monolingual children as participants. Fisher's z is reported as effect size for correlation studies. Cohen's d and Hedges' g are reported as effect sizes for intervention studies. All effects sizes are significant if not noted otherwise. Noble et al. (2019) report an overall effect size for early literacy skills that does not differ between vocabulary, print concepts, and phonological awareness. HLE, home literacy environment; TRT, title recognition test.

As in the meta-analysis by Bus and colleagues (1995), shared reading in the HLE explained on average about 10% of variance in children's vocabulary skills. Moreover, parents' ART scores explained 7% of unique variance in children's vocabulary skills over and above HLE questionnaire or storybook TRT (Mol & Bus, 2011). In sum, both meta-analyses found that shared reading in the HLE explained a substantial amount of variance in children's vocabulary skills. Most of the primary studies focused on vocabulary skills, whereas the relationships between shared reading and other oral language skills (e.g., grammar, comprehension monitoring, narrative skills) have not been examined thoroughly. Considering that these skills also predict later reading comprehension, research that investigates these relationships could contribute to the refinement of home literacy models and oral language interventions.

As a limitation of their study (Mol & Bus, 2011), the authors mention that parents' answers to storybook TRTs are taken as indicators of children's storybook exposure. Research needs to clarify whether parents' storybook TRT score is a close-enough proxy of preschoolers' storybook exposure or whether parents' storybook exposure should be treated as a separate variable. Presumably, a direct assessment of preschoolers' storybook exposure is a more precise measure of their shared reading experiences, which could also result in stronger correlations with their vocabulary skills in comparison to parents' TRT scores or HLE questionnaires. Preschoolers' memorization and recognition of storybook titles, however, could be confounded with their general cognitive abilities, such as memory and intelligence. If this was true, these cognitive abilities would be substantially correlated with preschoolers' recognition of storybook titles.

In addition, Mol and Bus (2011) also report mean correlations between print exposure and oral language skills for school children and college students. Accordingly, the magnitude of this correlation increases between preschool (r = .35, moderate effect) and college (r = .66, large effect). This pattern of results suggests that there are positive reciprocal effects between shared reading (later independent leisure reading) and vocabulary skills, where more shared reading could result in better oral language skills, leading in turn to more leisure reading, which would facilitate further oral language learning, and so on. To test this hypothetical Matthew effect, more longitudinal studies are needed that track the interdependence of print exposure and oral language development for several years.

Connected to this, the meta-analytic results also imply that individual differences in caregivers' leisure reading are highly correlated with their oral language skills, which are in turn related to children's vocabulary skills (Mol & Bus, 2011). Therefore, a comprehensive assessment of children's literacy environments should not only include questionnaire and TRT measures that capture shared reading experiences, but also measures that can assess the cumulative print exposure of caregivers, whose age can vary considerably (e.g., adolescent siblings, parents, child care staff, grand-parents). According to life span studies, there is evidence that ART scores are positively correlated with participant age (Choi, Lowder, Ferreira, Swaab, & Henderson, 2017; Liu et al., 2016; Payne et al., 2014). Earlier studies that investigated print exposure differences in life span samples, however, failed to find significant differences between ART scores of young and older adults (Stanovich et al., 1995; West et al., 1993). In sum, the ART has considerable potential to serve as a quick measure of cumulative print exposure in age-diverse caregivers, but further research with life span samples is warranted.

5.2 Meta-analytic evidence from intervention studies

Correlational studies are useful for constructing hypotheses about the effects of shared reading on oral language development. In correlational research, controlling for third variables that could account for systematic differences in the outcome variables safeguards against misinterpretations. There are, however, severe limitations to the conclusions that can be drawn from correlational data because such data typically preclude causal interpretation. By contrast, intervention studies that use randomized allocations to treatment conditions and well-defined intervention programs ensure that systematic differences between intervention and control groups are most likely caused by the intended manipulations. Comparisons between intervention groups, active control groups, and passive control groups allow a differentiation of specific and non-specific intervention effects (e.g., Hawthorne effects).

Systematic reviews from What Works Clearinghouse have investigated whether children's language development is affected by high-quality shared reading interventions in general (U.S. Department of Education, 2015) and dialogic reading in particular (U.S. Department of Education, 2007). For shared reading in general, the authors conclude that there are mixed results concerning the impact on oral

language development. Specifically, it is unclear whether shared reading interventions affect a range of oral language skills or only some of them (e.g., vocabulary; U.S. Department of Education, 2015). For dialogic reading, the authors conclude that this particular shared reading method has positive effects on oral language skills (U.S. Department of Education, 2007); however, the studies that were reviewed only investigated effects on vocabulary and grammar.

Regarding the HLE, a meta-analysis investigated the magnitude of dialogic reading intervention effects on vocabulary skills (Mol et al., 2008; see Table 5.1). All studies used randomization and non-treatment control groups. Parents participated in programs teaching and encouraging them to use dialogic reading strategies while reading with their children. Interventions lasted for 9 weeks on average (range: 4–28). Dialogic reading in the HLE had a moderate effect, explaining 4–8% of variance in vocabulary development. Moderator analyses provided evidence that the effect was larger for preschoolers (k = 10, d = 0.50) than for kindergarteners (k = 6, d = 0.14, not significant). Moreover, children from families with a low SES did not benefit from the intervention (k = 7, d = 0.13), whereas children's oral language skills from families with a middle SES increased significantly (k = 9, d = 0.53). As a limitation, the authors note that none of the studies controlled for the amount of shared reading activities in control groups, which is also likely to influence oral language development.

In regard to the CCLE, a meta-analysis investigated the impact of interactive shared reading interventions on preschoolers' and kindergarteners' oral language skills (Mol et al., 2009). All studies used randomization and control groups and implemented an intervention with interactive shared reading strategies to encourage children's active engagement, such as open-ended questions, prompts, comments, and positive reinforcement. On average, intervention programs comprised 42 shared reading sessions (range: 4–66 sessions). The average intervention effect was moderate, explaining about 6% of variance in vocabulary development. Moderator analyses indicated that the effect was larger when researchers conducted the intervention (k = 15, d = 0.79) in comparison to teachers conducting the intervention (k = 16, d = 0.35). Further moderator analyses were conducted, but due to the limited number of studies and several problems with confounds (e.g., between intervention dosage, group size, and intervener), their explanatory power is limited. A main limitation of this meta-analysis is again that

intervention studies did not control for the amount of shared reading in the non-treatment groups (Mol et al., 2009). Furthermore, studies often did not report any measures of implementation and treatment fidelity, which is especially important when evaluating the effectiveness of interventions that were conducted by teachers. In particular, most of the studies reported the intended treatment dosage, but none reported the effective treatment dosage (Mol et al., 2009).

Updating the evidence reported by previous meta-analyses, a recent meta-analysis investigated the combined effects of shared reading interventions in the HLE and CCLE on children's vocabulary skills (Noble et al., 2019). Interventions lasted mostly for 6 to 8 weeks (range: one week to seven months). The average intervention effect was small at posttest and non-significant at follow-up (see Table 5.1). A comparison between treatment group and passive control group yielded a larger posttest effect (k = 43; g = 0.26) than the comparison between treatment group and active control group (k = 12; g = 0.03, not significant). Other potential moderators, such as SES of participants, intervention duration, age of participants, and intervening person, were not related to intervention effects.

Of the 53 studies included in the meta-analysis, only 12 compared vocabulary development between a shared reading intervention group and an active control group (Noble et al., 2019). The authors conclude that more studies with an active control group participating in a non-language intervention are needed for an evaluation of the specificity and the magnitude of shared reading intervention effects. The medium effect sizes reported by previous meta-analyses might not represent specific shared reading intervention effects but could largely reflect non-specific intervention effects that are not attributable to shared reading activities. Moreover, studies should use an adequate intervention dosage of at least six months, include a follow-up assessment for the evaluation of sustained effects, and target a range of language outcomes to evaluate whether shared reading affects the development of different language skills (Noble et al., 2019).

In Germany, few intervention studies have investigated effects of shared reading on children's oral language skills, and most of them targeted children with below-average German language skills or multilingual children (e.g., Buschmann & Sachse; 2018; Ennemoser & Hartung, 2017; Ennemoser, Kuhl, & Pepouna, 2013; Hartung, 2015; see Egert, Galuschka, Groth, Hasselhorn, & Sachse, 2020, for a review). Three dialogic reading studies used randomization, at least one control

group, and research assistants as interveners. Dialogic reading was effective in fostering four- to six-year-olds' vocabulary and grammar skills (Ennemoser & Hartung, 2017; Ennemoser et al., 2013; Hartung, 2015). In addition, several intervention studies that implemented an interaction training for child care staff that uses similar communication strategies as dialogic reading reported some positive effects on children's oral language skills (Buschmann & Sachse, 2018). In sum, there is some preliminary evidence that dialogic reading is effective in fostering children's oral language skills in Germany (Egert et al., 2020).

5.3 What makes shared reading (more) effective?

In shared reading interventions, multiple communication strategies are typically combined that aim to foster oral language skills. For example, in dialogic reading interventions with five-year-olds, caregivers encourage children to participate by using completion, recall, and open-ended prompts, asking open-ended questions, and using distancing questions that relate storybook contents to children's own experiences (Zevenbergen & Whitehurst, 2003). Consequently, intervention studies that use several strategies cannot differentiate between the relative effects of single strategies. Results from naturalistic intervention studies as well as experimental studies concerning effects of shared reading quality can complement the previously reported meta-analytic evidence by providing insights concerning specific activities that have increased effects on oral language skills.

A systematic review examined which instructional strategies during shared reading interventions in naturalistic contexts fostered three- to six-year-old children's vocabulary development (Wasik et al., 2016). The review is based on 36 intervention studies that reported positive effects on word learning, published between 1994 and 2014. Studies were conducted in the HLE, the CCLE, or at school. Most interventions used three strategies: questioning as a means of promoting discussion of vocabulary and comprehension, defining words, and re-reading. Almost all studies used combinations of these and other strategies to foster word learning. Moreover, studies varied considerably in terms of intervention dosage, number of words targeted, length of intervention, and other methodological aspects. Therefore, it remains mostly unclear which strategies are particularly effective in promoting children's vocabulary development. As an exception, several studies found that interaction with an adult during shared reading is more effective than

non-interactive shared reading. Regardless of intervention strategies or dosage, children learned between 6% and 25% of the target words in most studies. The authors conclude that shared reading research is in need of more high-quality studies that are based on refined models of word learning. To facilitate the replication of studies, studies should provide enough details on intervention materials and implementation (e.g., treatment fidelity, role of attrition) as well as on experimenter-generated measures of language assessment. In addition, more studies that investigate effects of shared reading on oral language skills other than vocabulary are needed (Wasik et al., 2016).

A recent meta-analysis of 38 studies that were published between 1993 and 2017 investigated the effects of shared reading on two- to ten-year olds' word comprehension (N = 2,455; Flack et al., 2018). In contrast to intervention studies that typically last for several weeks or months, these studies mostly comprised of only few shared reading sessions in which focal experimental variables were manipulated (e.g., reading style, number of exposures to target words, number of target words). On average, children learned about 46% of the words they were exposed to, that is, about 3 out of 6 novel words that were on average presented during shared reading experiments. Moderator analyses revealed that children learned more words when instructors (teachers or experimenters) engaged in extratextual talk (e.g., asking questions, describing pictures) and when they were repeatedly exposed to new words (e.g., word repetition due to extratextual talk, repeated reading of the same storybook). Moreover, word learning was enhanced when studies used a larger number of novel words. By contrast, word learning was not moderated by instructing person (familiar teacher vs. experimenter; Flack et al., 2018).

5.4 Conclusions

Several meta-analyses of altogether 45 correlation studies and more than 50 intervention studies provide evidence for the claim that shared book reading has small to moderate effects on children's oral language skills. Evidence from correlational research brought up two important research gaps for early childhood research: To gain a better understanding of how print exposure is longitudinally related to language development, measures that assess preschoolers' storybook exposure more directly are needed. Moreover, for a comprehensive assessment of

literacy environments, reliable and objective measures that capture print exposure of age-diverse caregivers (e.g., adolescent siblings, parents, child care staff, grandparents) without age-bias are needed. Regarding intervention and experimental studies, there is converging evidence for the idea that encouraging children's active participation during shared book reading is more effective than non-interactive forms of book reading. There are, however, some concerns regarding the efficacy of interactive shared reading in general for fostering oral language skills (Noble et al., 2019; U.S. Department of Education, 2015). By contrast, several meta-analyses and reviews conclude that dialogic reading as a specific intervention method has positive effects on children's oral language skills (Egert et al., 2020; Mol et al., 2008, 2009; U.S. Department of Education, 2007).

Importantly, review studies of shared reading interventions have brought up several limitations that should be addressed by future research. First, studies need to use adequate control groups. Few studies have used active control groups, and even less studies have used a non-language intervention as alternative treatment. Only comparisons between shared reading interventions and non-language interventions allow an estimation of specific shared reading effects. Therefore, studies with active control groups are needed. Connected to this problem, most studies did not control for the amount of shared reading in control groups and outside of the intervention, which presumably also affect oral language development. Consequently, studies should take into account children's non-intervention storybook exposure when analyzing intervention effects. Second, most interventions lasted for less than two months. Longer interventions could result in larger and sustained effects. Therefore, studies should include some follow-up assessment. Third, the effects of dialogic reading were larger for three- and four-year-olds than five- and six-year-olds. Studies should explore how dialogic reading can be made more effective for children who are older than four years of age by facilitating and increasing children's engagement and targeting developmentally appropriate language skills.

Fourth, implementation in the CCLE with professionals often yielded smaller effects than researcher-conducted interventions. Moreover, in naturalistic settings, children typically learned less than 25% of the target words, indicating that shared reading interventions are less effective than word learning in more controlled experimental settings, in which children learn about half of the words.

Implementation quality is considered to be a central factor for effective interventions in the CCLE. Studies should use measures of implementation and treatment fidelity, such as the effective treatment dosage. Fifth, the evidence with respect to moderating effects of SES is inconclusive. One meta-analysis (Mol et al., 2008) found that children from low SES families benefit less from shared reading than children from middle SES families, whereas another meta-analysis (Noble et al., 2019) did not find that SES moderated intervention gains. More research addressing this question is needed. In addition, few studies have investigated whether intervention effects are moderated by individual differences, such as general cognitive abilities and previous storybook exposure, which are known to be connected to SES. Studies should investigate who benefits more from shared reading and how treatment effectiveness can be increased for non- and low-responders. Sixth, there is scarce evidence regarding effects of shared reading on oral language skills other than vocabulary. Interventions should target different oral language skills to investigate the versatility of shared reading for language fostering.

Seventh, almost all intervention studies used combinations of several strategies aiming to enhance oral language skills. To identify strategies that are particularly effective, studies should aim to vary strategy combinations systematically. Moreover, incorporating elements from experimental shared reading research into interventions could also help to increase their effectiveness. Eighth, refined models of language learning in early childhood could inform intervention practices and also provide orientation in terms of realistic effect sizes that intervention studies can aim for. Ninth, experimenter-generated intervention and language assessment materials are often not available or sufficiently described. To facilitate replication, materials should be made available, for example through repositories or archives open to the public. Tenth, with respect to German-speaking children, there is general lack of high-quality intervention studies that evaluate the effects of shared book reading on oral language skills.

From the viewpoint of the bioecological model of human development (see chapters 2.2 and 2.3), these limitations reveal important gaps in our knowledge about the interplay of environmental variables, person variables, and the proximal process shared reading and the effectiveness of shared reading interventions on language development. At the same time, intervention researchers call for more refined models of language learning because the language gains through shared

reading interventions often appear to be surprisingly small in relation to the typical growth of oral language skills in early childhood. To understand more exactly how shared reading affects children's language skills, intervention studies should take into account their cognitive development and the shared storybook reading they are exposed to in the HLE and CCLE. They represent important environmental influences as well as personal and social resources, such as prior experiences of shared reading activities with adults and peers and cognitive processing abilities, which can moderate intervention effects.

6 Objectives of the present dissertation

This dissertation operates within the framework of Bronfenbrenner's bioecological model of human development (cf. Tudge et al., 2009) that was summarized and applied to shared reading in chapter 2. It conceptualizes shared book reading as a proximal process that drives the development of preschoolers' oral language skills. Moreover, this dissertation investigates the roles of two microsystems in which caregivers and children regularly engage in interactive shared reading: the home literacy environment (HLE) and the child care literacy environment (CCLE). The studies are based on cross-sectional, interventional, and longitudinal data.

The present dissertation addresses three critical research questions that have emerged from the literature review in the previous chapters. The first research question is how young children's storybook exposure can be assessed directly and without cognitive ability confounds. Previous studies have used parents' responses in storybook title recognition tests as a proxy of preschoolers' storybook exposure. A measure for the assessment of both preschoolers' and caregivers' storybook exposure would allow a differentiation between their respective storybook exposure and how each is related to children's lower level language (LLL; such as vocabulary and grammar) and higher level language (HLL; such as comprehension monitoring and narrative comprehension) skills. Second, there is converging evidence that caregivers' use of dialogic communication strategies during shared reading facilitates children's engagement and benefits vocabulary development. Meta-analyses studies, however, report several methodological issues and modest effects of shared reading interventions on preschoolers' language. This brings up the question whether a refinement of intervention methods could increase effects on both LLL and HLL skills. Importantly, intervention effectiveness should be evaluated by a methodologically more rigorous study design than the designs used by many previous intervention studies. Third and connected to this, shared storybook reading in early childhood is represented in the *Home Literacy Model* (Sénéchal & LeFevre, 2002, 2014) as a process in which parents' reading to children affects their development of vocabulary skills. This representation likely oversimplifies the connection between shared reading and oral language development. The question is how shared reading can be conceptualized as an interactive process between

child, adult, and book that potentially has positive effects on children's LLL and HLL skills. Concerning these research questions, chapter 6.1 summarizes the desiderata derived from the literature review in previous chapters that are addressed in this dissertation. Chapter 6.2 provides an overview of the four studies that were conducted to address these desiderata and summarizes the overarching research aims of this dissertation.

6.1 Desiderata addressed in the present dissertation

First, there are desiderata concerning the assessment of literacy environments and shared reading activities of German-speaking caregivers and children. The review of assessment methods in chapter 4 has revealed a broad range of instruments that have been developed for different research questions in terms of shared reading in the HLE and the CCLE. Information from measures with different content focuses and strengths should be combined for an optimal assessment of literacy environments and shared reading activities. Recognition tests are objective, reliable, and cost-effective measures for the assessment of relative differences in preschoolers' shared reading experiences and caregivers' leisure reading of adult literature. For a comprehensive assessment, recognition tests can be combined with measures that provide a more concrete description, such as questionnaires or environment rating scales. Despite their methodological advantages, storybook title and author recognition tests have not yet been adapted for German-speaking caregivers and young children.

Second, there are desiderata regarding effects of shared reading on oral language development. Meta-analytic evidence (see chapter 5) indicates that there is scarce evidence concerning a) general effectiveness of shared reading interventions on the language development of German-speaking children, b) effects on language outcomes other than vocabulary skills, c) follow-up assessments of intervention effects, and d) the moderating role of individual differences (e.g., storybook exposure, verbal short-term memory, nonverbal IQ). Moreover, it is not clear whether intervention effects are specific or non-specific with respect to shared reading activities. In addition, dialogic reading interventions are considered to be effective in general, but effects on children older than 4 years were much smaller than effects on younger children. Therefore, dialogic reading should be adapted for the developmental level of older children and target both LLL and HLL skills. Finally,

there is a lack of intervention studies with typically developing children that investigate the usefulness of wordless picture books for fostering oral language skills. Related to this, the *Home Literacy Model* (Sénéchal & LeFevre, 2002, 2014) does not differentiate between child, parent, and storybook as literacy agents, even though each of them potentially contributes to the effectiveness of shared reading. The *Home Literacy Model* focuses on the amount of shared reading but does not incorporate characteristics of the three literacy agents or their interplay (see chapter 3.2). Moreover, the model does not differentiate between LLL and HLL skills as outcomes of shared reading, even though both sets of language skills are unique predictors of reading comprehension.

6.2 Study overview

To address these desiderata, four studies were conducted. Studies 1 and 2 report the development and validation of recognition tests for the assessment of storybook exposure and adult literature exposure in German-speaking participants. Both studies focus on the question how individual differences in the amount of reading experiences can be assessed in an objective and cost-effective way. Taking advantage of these new assessment methods, studies 3 and 4 investigate the potential of shared storybook reading in the HLE and the CCLE for fostering a broad range of oral language skills. Both studies test whether individual differences in preschoolers moderate the effects of shared reading. Whereas study 3 is based on cross-sectional data, study 4 uses a dialogic reading intervention and longitudinal data to investigate causal effects of shared storybook reading. Together, the studies use new assessment and intervention methods with the aim of obtaining evidence for the advancement of environmental early literacy models and pedagogical practices in early childhood education. The specific aims of the four studies and their connections are described in the following.

Study 1 aims to validate the newly developed German storybook title recognition test (TRT-VS) which measures the storybook exposure of four- to seven-year old children and their caregivers. In addition to a paper and pencil version for caregivers, this study uses an audio version of the TRT-VS in which preschoolers can respond to test items without external support. This study uses structural equation models to investigate the extent to which preschoolers' storybook exposure is related to their language skills. Study 1 also examines how storybook exposure is

related to more distal measures of shared reading, namely parents' socioeconomic status and the broader home literacy environment. Finally, this study seeks to determine how proximal and distal predictor variables can be combined to optimally capture connections between environmental variables and language skills.

Study 2 introduces the newly developed German Author Recognition Test (ART) which measures exposure to adult literature in 13- to 80-year-old readers. The ART is often used for assessing relative differences in leisure reading, which is a main contributor to print exposure. Print exposure is a main driver of caregivers' individual differences in language and reading skills, which in turn predict the language development of their children. Moreover, print exposure is a unique predictor of preschoolers' oral language skills after controlling for preschoolers' storybook exposure. The ART aims to measure the cumulative amount of reading experiences. Therefore, average ART scores of older adults should be higher than average ART scores of young adults and adolescents. However, life span studies have reported conflicting results regarding print exposure differences between young and older adults, with some studies reporting no differences between ART scores of young and older adults. Study 2 investigates whether the lack of age differences in ART scores reported in some studies can be explained by the use of ART versions that differed in author variables. This study uses explanatory item response analysis to analyze effects of author variables (author's mean publication year, book circulation frequency, and literary level) on author recognition probability. An unbiased assessment of print exposure between adolescence and old age is especially important when the age of family members and professional caregivers who communicate with preschoolers varies considerably (e.g., adolescent siblings, parents, child care staff, grand-parents).

Study 3 builds on results from study 1 and uses the TRT-VS as a measure of storybook exposure. It uses hierarchical linear models for analyzing the unique contributions of the HLE and CCLE to preschoolers' shared storybook reading experiences and language skills. First, this study investigates the relationships between the storybook exposure of preschoolers, parents, and child care staff. In particular, it tests the assumption that parents' storybook exposure is a close proxy of children's storybook exposure. In addition, this study investigates to which extent children's storybook recognition is confounded with their general cognitive

abilities. Second, this study examines the relative contributions of HLE, CCLE, and storybook exposure to different oral language skills. In particular, study 3 aims to clarify whether shared reading activities in the HLE and the CCLE predict both LLL skills (vocabulary, grammar) and HLL skills (comprehension monitoring, narrative comprehension).

Study 4 investigates the effects of a narrative dialogic reading intervention on preschoolers' vocabulary and narrative skills. This study uses a randomized pre-post between-subjects design with two follow-up measurement points. It investigates the effects of a six-month program that was administered in child care centers and the maintenance of effects until one year after the intervention. Narrative dialogic reading extends the dialogic reading framework by adding scripted narrative comprehension questions to the communicative practices with the aim of evaluating effects on both LLL and HLL skills. Instead of using storybooks with text, it modifies the regular dialogic reading approach by using wordless picture books, which increases the proportion of child talk in relation to caregiver talk, and thereby facilitates language learning. Study 4 compares the development of oral language skills between a dialogic reading intervention group, a music intervention group, and a no treatment group. This study design allows to determine whether dialogic reading intervention effects on oral language skills are the result of specific language-fostering contents or rather the result of providing some high-quality intervention, regardless of the contents. Moreover, this study examines who benefits most from narrative dialogic reading by investigating whether individual differences in children's cognitive abilities and storybook exposure moderate intervention effects on oral language development. Thereby, it also takes into account increases in oral language skills due to storybook exposure outside the intervention. In sum, study 4 evaluates the potential of narrative dialogic reading for fostering the development of LLL and HLL skills in typically developing, German-speaking preschoolers.

Taken together, studies 1 and 2 aim to develop and validate new recognition tests for German-speaking participants that allow an objective and cost-effective assessment of three key variables in the shared reading triad: preschoolers' storybook exposure, caregivers' storybook exposure, and caregivers' exposure to adult literature. Figure 6.1 summarizes the measures that are used in this dissertation. To capture the amount of shared storybook reading and related

literacy activities and resources in the HLE and the CCLE, this dissertation makes use of several input measures (SES, ART, caregiver storybook TRT, literacy environment questionnaires) and child storybook TRT as outcome measure.

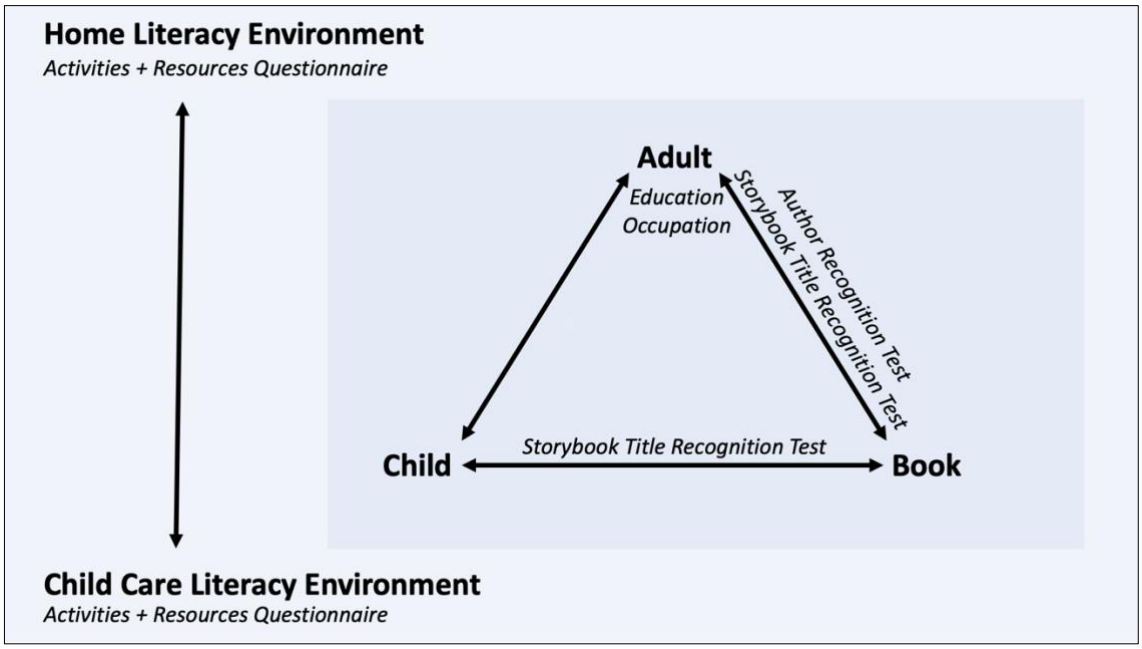

Figure 6.1. Measures for the assessment of literacy environments and shared book reading used in this dissertation.

Studies 3 and 4 aim to deepen our understanding of the systematic relationships between child, adult caregiver, and book during shared reading, conceptualized as a proximal process that facilitates oral language development. Therefore, they aim to identify key variables of the shared reading triad and their relationships to LLL and HLL skills. Consequently, studies 3 and 4 investigate whether some of the proposed relationships between literacy agents and language outcomes in the modified *Home Literacy Model* (see chapter 3.3) are supported by evidence from correlational and interventional data. In particular, this dissertation investigates relationships between children's storybook exposure and diverse language skills (vocabulary breadth and depth, grammar, comprehension monitoring, narrative comprehension and production skills) while taking into account the contributions of parents' SES, children's general cognitive abilities, and a range of early literacy activities and resources in the HLE and CCLE. Moreover, it examines the unique contributions of caregivers' storybook and adult literature exposure versus literacy activities and resources in the HLE and the CCLE to

children's storybook exposure as well as their relative contributions to LLL and HLL skills. Finally, it investigates the effects of a dialogic reading intervention that targets vocabulary and narrative skills by using scripted inferential and literal comprehension questions. To facilitate preschoolers' engagement during shared reading and increase language learning, the intervention uses wordless picture books that contain illustrations of low frequency words and clear-cut narrative structures. Figure 6.2 summarizes the key concepts that constitute the frame of the dissertation.

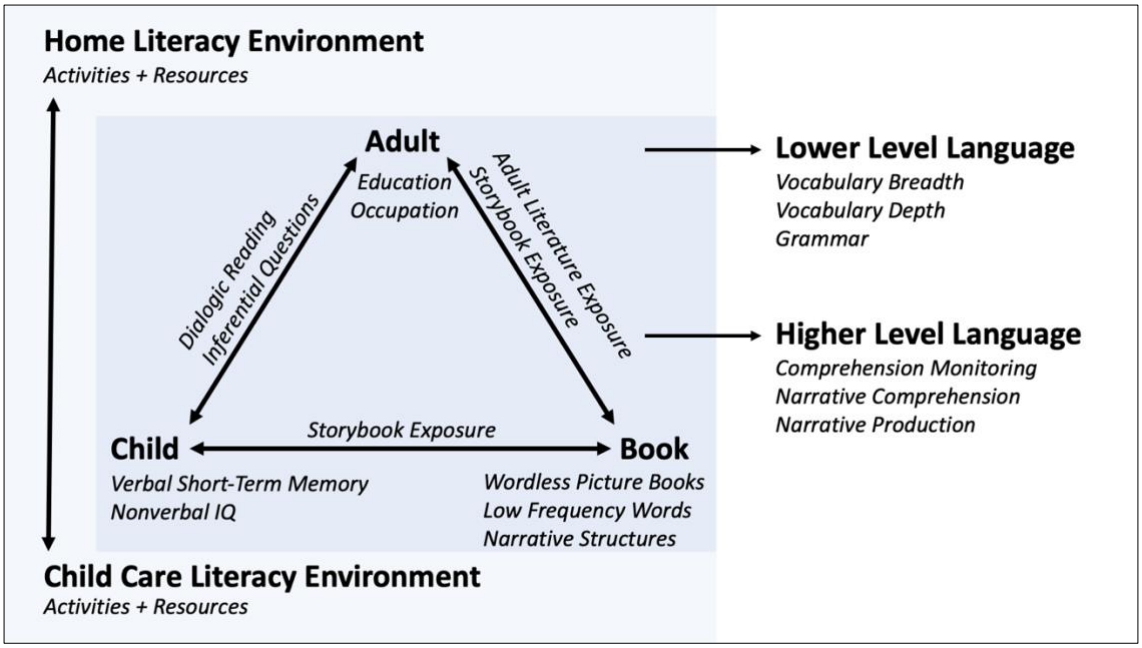

Figure 6.2. Overview of dissertation with person and book characteristics plus environmental, intervention, and language outcome variables.

Overall, this dissertation investigates the complexity and contributions of literacy environments and shared storybook reading to the development of oral language skills that are important for reading comprehension and successful learning in school. Table 6.1 summarizes the methods that were developed for this dissertation and the data and statistical analyses that were used.

Table 6.1
Overview of Developed Methods, Samples, and Statistical Analyses

Study 1	Study 2	Study 3	Study 4
Developed assessment and intervention methods			
Title Recognition Test (TRT) for German-speaking children (4–7 years) and caregivers	Author Recognition Test (ART) for German-speaking readers (13–80 years)	Picture naming task with low frequency words for preschoolers	Coding schemes for narrative comprehension and production tasks Narrative dialogic reading intervention with wordless picture books
Samples			
Sub study 1: 44 preschoolers and 48 young adults Sub study 2: 201 preschoolers + parents (MusiCo T1, 2015)	339 readers (13–77 years) from psycholinguistic studies and Frankfurt book fair (2016)	201 preschoolers + parents from 32 child care groups (MusiCo T1, 2015)	Pilot study for narrative production tasks: 30 university students Intervention study: 201 preschoolers + parents from 32 child care groups (MusiCo T1 to T4, 2015–2017)
Statistical methods for main analyses			
Structural equation modelling	Explanatory item response analysis	Hierarchical linear modelling	Hierarchical linear modelling

MANUSCRIPTS OF THE STUDIES

7 Der Titelrekognitionstest für das Vorschulalter (TRT-VS)

Erfassung des Lesevolumens von präkonventionellen Lesern und Zusammenhänge mit Vorläuferfertigkeiten des Lesens.

Lorenz Grolig, Caroline Cohrdes, & Sascha Schroeder

Diagnostica, 2017, Volume 63, Pages 309–319.

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Published online September 5 2017

Test materials are available at https://osf.io/s8vur/

7.1 Zusammenfassung

Studien haben gezeigt, dass bereits im Vorschulalter ein positiver Zusammenhang zwischen Lesevolumen und Sprachentwicklung besteht. Eine objektive und ökonomische Methode zur Erfassung des Lesevolumens sind Titelrekognitionstests. Hierbei geben die Teilnehmenden für eine Reihe von Buchtiteln an, ob ihnen diese bekannt sind. Um Ratetendenzen zu minimieren, enthält der Test auch fiktive Buchtitel. Wir beschreiben die Entwicklung des *Titelrekognitionstests für das Vorschulalter* (TRT-VS) und stellen anhand von 2 Validierungsstudien seine psychometrischen Eigenschaften vor. In Studie 1 untersuchen wir seine Reliabilität sowie Personen- und Itemkennwerte in einer Stichprobe von Kindern und jungen Erwachsenen. Studie 2 analysiert den Zusammenhang zwischen TRT-VS, häuslicher Lernumgebung und Vorläuferfertigkeiten des Lesens in einer Stichprobe von Vorschulkindern und deren Eltern. Die Studien belegen, dass der TRT-VS ein reliables Instrument zur Messung früher Leseerfahrungen ist und eine hohe Konstruktvalidität aufweist.

Abstract

Studies have established a positive correlation between print exposure and language development in kindergarten children. Title recognition tests allow an objective and efficient assessment of print exposure. Participants indicate for selected book titles whether they are known to them. To minimize guessing, the test also includes distractor items. We report results of 2 validation studies of the TRT-VS (*Title Recognition Test for Kindergarteners*), including its psychometric properties. Study 1 investigates its reliability and item parameters in a sample of children and young adults. In study 2, the TRT-VS showed moderate to strong correlations to phonological awareness and vocabulary in a sample of kindergarteners. In comparison, correlations between a home literacy environment questionnaire (HLE) and precursors of reading were substantially lower. The TRT-VS and the HLE were moderately correlated. In a structural equation model, the TRT-VS fully mediated the influence of the HLE on precursors of reading, indicating that the title recognition by children not only measures the quantity of home reading activities, but also their effects on language development. Taken together, the results suggest that the TRT-VS is a reliable and valid measure for the assessment of early reading activities, and the first instance of a title recognition test for preconventional readers that does not suffer from floor effects when completed by kindergarten children.

7.2 Einleitung

Metaanalysen zeigen einen positiven Zusammenhang zwischen dem Lesevolumen und den Lesefähigkeiten (Bus, van IJzendoorn & Pellegrini, 1995; Mol & Bus, 2011). Der Kontakt mit Büchern hat bereits in der frühen Kindheit einen positiven Einfluss auf die Sprach- und Leseentwicklung, da Kinder hierdurch einen größeren Wortschatz und eine bessere phonologische Bewusstheit erwerben (Aram, 2005; Niklas & Schneider, 2013), welche wiederum wichtige Prädiktoren der frühen Lesefähigkeiten sind (Ebert & Weinert, 2013; Ennemoser et al., 2012). Hinzu kommt, dass diese Leseerfahrungen nicht nur in sprachlicher Hinsicht eine Grundlage für eigenständiges Lesen schaffen, sondern auch das Interesse an Büchern nachhaltig wecken (Hume et al., 2015).

Obwohl der positive Einfluss früher Leseerfahrungen gut belegt ist, gibt es für den vorschulischen Bereich bislang kaum Ansätze, um diese zu erfassen. Im Folgenden stellen wir den *Titelrekognitionstest für das Vorschulalter* (TRT-VS) vor, mit dem durch Befragung der Eltern oder der Kinder Unterschiede im Lesevolumen von Vier- bis Siebenjährigen ökonomisch und objektiv erfasst werden können. Wie der *Kinder-Titelrekognitionstest für das Grundschulalter* (K-TRT; Schroeder, Segbers & Schröter, 2016) basiert der TRT-VS auf dem kognitionspsychologischen Ansatz von Stanovich und West (1989), der ursprünglich zur Untersuchung von umweltbedingten Unterschieden in der orthographischen Verarbeitung entwickelt wurde. Im Gegensatz zum K-TRT kann der TRT-VS jedoch bereits in der Übergangsphase von Kindergarten zu Grundschule eingesetzt werden.

Erfassung des Lesevolumens von präkonventionellen Lesern

Um Leseerfahrungen in der frühen Kindheit zu messen, werden Eltern häufig zur häuslichen Leseumwelt (HLE) befragt. Niklas und Schneider (2013) untersuchten den Einfluss der HLE auf Kindergartenkinder und verwendeten hierbei Fragen zu Ressourcen (z. B. „Wie viele Bücher oder Bilderbücher besitzt Ihr Kind?“) und Leseaktivitäten in der Familie (z. B. „Wie oft lesen Sie Ihrem Kind vor?“). HLE-Fragen lassen sich ökonomisch implementieren und sind Prädiktoren der phonologischen Bewusstheit sowie des Wortschatzes (Niklas & Schneider, 2013). Sie sind jedoch anfällig für soziale Erwünschtheit, da die Tendenz, mehr Leseaktivitäten anzugeben als tatsächlich vorhanden sind, bei Eltern von Vorschulkindern relativ stark ausgeprägt ist (DeBaryshe, 1995). Zudem wird

hierdurch die Leseumwelt im Kindergarten nicht erfasst, die aufgrund längerer Betreuungszeiten (Statistisches Bundesamt, 2016) in den letzten Jahren an Bedeutung gewonnen hat.

Titelrekognitionstests (TRTs) ermöglichen eine objektive und ökonomische Erfassung des Lesevolumens, indem Teilnehmende für eine Auswahl von Titeln angeben, ob ihnen diese bekannt sind. Neben realen Titeln werden auch erfundene Titel präsentiert, um für Ratetendenzen zu kontrollieren. Damit erfassen TRTs das gemeinsame Lesen mit den Eltern und im Kindergarten, aber auch, wie häufig ein Kind in seiner Freizeit darüber hinaus im Kontakt mit Büchern ist (z. B. Lesungen, Bibliotheken), was wiederum mit dem Lesevolumen korreliert (Cunningham & Stanovich, 1990). Das so erfasste Lesevolumen kann als proximale Outcome-Variable von verschiedenen Leseumwelten verstanden werden, während ein Fragebogen zur HLE hinsichtlich der Leseaktivitäten eine vergleichsweise distale Input-Variable darstellt. Aufgrund dieses Unterschieds sollten Titelrekognitionstests enger mit der Sprachentwicklung zusammenhängen als Fragen zur HLE. Metaanalysen weisen jedoch darauf hin, dass Rekognitionstests und HLE-Fragebögen ähnlich hohe Varianzanteile in phonologischer Verarbeitung und Wortschatz aufklären (Mol & Bus, 2011).

In diesen Studien wurden die Eltern befragt, welche Kinderbücher sie selbst kennen, und hiervon wurde auf das Lesevolumen der Kinder geschlossen. Da die Fremdbetreuung deutlich zugenommen hat, sollte die direkte Befragung der Kinder jedoch eine höhere Vorhersagekraft besitzen. Ein Ansatz besteht darin, Kindern die Titelseiten von Büchern zu präsentieren und nach dem Namen des Buches und dessen Inhalt zu fragen; ein Titel gilt als erkannt, wenn die wichtigsten Inhalte der Geschichte erinnert werden (Davidse, de Jong, Bus, Huijbregts & Swaab, 2011). Problematisch hieran ist, dass die kognitiven Anforderungen dieses Verfahrens jene eines Rekognitionstests bei Weitem übersteigen, was zu Bodeneffekten führt (Davidse et al., 2011; vgl. Sénéchal et al., 1996). Zudem ist eine Konfundierung mit Aufmerksamkeits- und Gedächtnisprozessen sowie dem Wortschatz wahrscheinlich. Um diese Probleme zu umgehen, werden den Kindern die Titel des TRT-VS auditiv in Form einer Entscheidungsaufgabe präsentiert. Diese Vorgehensweise stellt wesentlich geringere Anforderungen an die Aufmerksamkeits- und Gedächtnisleistung und sollte deshalb eine differenziertere Erfassung des Lesevolumens ermöglichen.

Entwicklung und Struktur des TRT-VS

Für die Titelauswahl wurden zunächst Informationen zu thematischen Präferenzen und beliebten Buchserien von Kindergartenkindern gesammelt (z. B. miniKIM-Studie; Medienpädagogischer Forschungsverbund Südwest, 2015). Darüber hinaus wurden Verkaufsstatistiken von Online-Buchhandlungen (z. B. amazon.de) sowie die Ausleihstatistiken einer großen Kinder- und Jugendbibliothek aus den Jahren 2013–2015 herangezogen (Dimakopoulos, 2015). Auf dieser Grundlage wurden Titel ausgewählt, deren Bekanntheit sich bei Vorschulkindern in Abhängigkeit von ihren Leseerfahrungen deutlich unterscheiden sollte. Diese Auswahl diskutierten wir mit einer Kinderbuch-Expertin von der Stiftung Lesen, mit auf Kinderbüchern spezialisierten Buchhändlerinnen und Buchhändlern sowie Erzieherinnen und passten die Liste den Expertenvorschlägen entsprechend an.

Schließlich ergab sich eine Auswahl von 30 Titeln, die sowohl klassische als auch aktuelle Titel beinhaltet. Tabelle A7.1 im Appendix A enthält alle Titel mit Merkmalen, die einen Einfluss auf den Bekanntheitsgrad haben können (Erscheinungsjahr, Amazon-Verkaufsrang und Verkaufspreis) sowie deren mittlere Erkennungsraten.

Es wurden zwei Versionen des TRT-VS erstellt (Version A und Version B). Hierfür wurden die 30 Titel per Zufall in drei Sets aufgeteilt. Jedes Set enthält zehn Titel. Zu jedem Original-Titel von Set 2 und Set 3 wurde ein Distraktor-Titel erfunden, der sich inhaltlich an den Original-Titel anlehnt (z. B. Original-Titel: „Bobo Siebenschläfer“, Distraktor-Titel: „Sepp Schlafnase“). Die Version A des TRT-VS enthält die 20 Original-Titel von Set 1 und Set 2 sowie die 10 Distraktor-Titel zu Set 3. Hingegen enthält die Version B die 20 Original-Titel von Set 1 und 3 sowie die 10 Distraktor-Titel zu Set 2. In der Instruktion wird darauf hingewiesen, dass der Test erfundene Titel enthält und Raten deswegen leicht erkannt werden kann (siehe Tabelle A7.2 im Appendix A).

Der Test hat keine Zeitbeschränkung und kann in Einzel- und Gruppensitzungen in drei bis fünf Minuten durchgeführt werden. Da Kinder im Alter von vier bis sieben Jahren in der Regel noch nicht hinreichend lesen können, werden ihnen die Titel des TRT-VS am Computer auditiv in pseudorandomisierter Reihenfolge präsentiert. Die Teilnehmenden geben über zwei Tasten an, ob sie den Titel kennen oder nicht. Der TRT-VS kann mit Erwachsenen auch als Papier- und Bleistift-Test

durchgeführt werden. In dieser Variante besteht er aus einer DIN A4-Seite, auf der die Items in der gleichen Reihenfolge wie in der PC-Variante angeordnet sind. Neben jedem Titel ist ein Kästchen, das angekreuzt werden soll, wenn der Titel dem Kind bekannt ist. Unbekannte Titel müssen also nicht aktiv zurückgewiesen werden. Wird ein Original-Titel ausgewählt, dann zählt dies als *Hit*. Wird hingegen ein Distraktor-Titel ausgewählt, dann zählt dies als *False-Alarm*. Um den korrigierten Testwert einer Person zu berechnen, wird die False-Alarm-Rate (Anzahl von False-Alarms geteilt durch die Anzahl möglicher False-Alarms) von der Hit-Rate (Anzahl der Hits geteilt durch die Anzahl möglicher Hits) abgezogen. Durch diese Korrektur wird verhindert, dass eine Person durch Raten einen hohen Testwert erzielt.

Ziele der Validierungsstudien

Zur Validierung des TRT-VS wurden zwei Studien durchgeführt. In Studie 1 wurden die Kennwerte von fünf- bis siebenjährigen Kindern und jungen Erwachsenen verglichen. In Studie 2 wurde in einer größeren Stichprobe von vier- bis sechsjährigen Vorschulkindern untersucht, ob das Lesevolumen ein signifikanter Prädiktor von Vorläuferfertigkeiten des Lesens ist, und in welcher Relation der TRT-VS zur HLE steht. Gemeinsam decken die Studien die Übergangsphase vom Kindergarten zur Grundschule ab.

7.3 Studie 1

Die erste Studie diente dazu, die Altersspezifität und Reliabilität des neu entwickelten Testverfahrens durch den Vergleich zweier Gruppen zu überprüfen, die hinsichtlich ihrer aktuellen Kinderbuch-Leseerfahrungen konträr sind: Fünf- bis Siebenjährige, die im Durchschnitt relativ viele Kinderbuchtitel kennen sollten, und kinderlose junge Erwachsene, die deutlich weniger mit aktuellen Kinderbuchtiteln vertraut sein sollten. Zusätzlich sollte untersucht werden, ob die Itemschwierigkeiten des TRT-VS mit Merkmalen der Bücher zusammenhängen, die einen Einfluss auf deren Verbreitung haben können.

Methode

Stichprobe

Insgesamt nahmen 92 Personen teil, davon 44 Kinder (23 Mädchen) und 48 Erwachsene (20 weiblich). Die Kinder wurden in vier Kindertagesstätten sowie drei Schulhorten in Berlin rekrutiert und nahmen mit dem schriftlichen Einverständnis

ihrer Eltern an der Studie teil. Sie waren zwischen 5.0 und 7.9 Jahren alt (M = 6.5; SD = 0.8) und besuchten entweder das letzte Kindergartenjahr oder die erste Klasse. Die Erwachsenen waren zwischen 20.3 und 36.0 Jahre alt (M = 29.2; SD = 4.2). Die Kinder erhielten für ihre Teilnahme ein Geschenk, Erwachsene eine Entschädigung von 20 Euro. Hinsichtlich des Geschlechts unterschieden sich die Altersgruppen nicht, $\chi_2(1, N=92) < 1$.

TRT-VS

Den Teilnehmenden wurde die Version A oder B randomisiert zugewiesen. Aufgrund eines Zuordnungsfehlers wurde in der Version B statt einem der Titel ein zusätzlicher Distraktor-Titel verwendet. Diese Version enthielt also nur 19 Titel, aber insgesamt 11 Distraktor-Titel. Da bei der Auswertung auf Anteilswerte zurückgegriffen wird, wirkt sich dieser Unterschied nicht auf die Vergleichbarkeit der beiden Versionen aus.

Statistische Analysen

Alle Analysen wurden mit dem Programm R durchgeführt (R Core Team, 2016). Zur Schätzung der internen Konsistenz wurden Cronbachs α und die Split-Half-Korrelation berechnet (Odd-Even-Split, korrigiert nach Spearman-Brown). Zur Überprüfung der Parallelität der Versionen A und B wurden paarweise t-Tests für unabhängige Stichproben berechnet. Geschlechts- und Altersgruppeneffekte wurden mittels Varianzanalysen überprüft. Für die Interpretation signifikanter Effekte wurden Effektstärken berechnet (partielles η_2 und Cohens d; Cohen, 1988). Die Schwierigkeit eines Items entspricht dem prozentualen Anteil der Teilnehmenden, welche diesen Titel beziehungsweise Distraktor ausgewählt haben (Lienert & Raatz, 1994).

Ergebnisse

Reliabilität

Die interne Konsistenz der Hit-Raten (HR) war für beide Versionen ausreichend, Cronbachs α: A: α = .72; B: α = .73. Die Reliabilität der korrigierten Testwerte (KT) wurde mittels Split-Half-Korrelation bestimmt und war für beide Versionen gleich hoch, A: r = .54; B: r = .52.

Personenkennwerte

Eine Zusammenfassung der Personenkennwerte für beide Versionen findet sich in Tabelle 7.1. Die Verteilung der durchschnittlichen Anzahl richtig erkannter Titel folgte der Normalverteilung (*M* = 9.45, *SD* = 3.12; Range = 1–17; Modus = 9; Median = 9). Distraktor-Titel wurden nur selten ausgewählt (*M* = 0.65; *SD* = 1.49) und die meisten Teilnehmenden (87 %) machten keinen oder nur einen Fehler. Es gab keine Unterschiede zwischen Version A und B hinsichtlich der HR, der False-Alarm-Rate (FA) sowie des KT, je $t(90) < 1$ (siehe Tabelle 7.1).

Tabelle 7.1
Deskriptive Kennwerte der Parallelversionen des TRT-VS in Studie 1 und Studie 2

		Deskriptive Kennwerte TRT-VS				
		Form	*N*	*M* HR (*SD*)	*M* FA (*SD*)	*M* KT (*SD*)
Studie 1	Kinder und junge Erwachsene	A	57	.48 (.17)	.06 (.12)	.42 (.17)
		B	35	.48 (.15)	.07 (.17)	.41 (.17)
Studie 2	Kinder	A	97	.55 (.16)	.17 (.22)	.38 (.21)
		B	104	.54 (.16)	.18 (.26)	.36 (.21)
	Eltern	A	142	.49 (.18)	.02 (.07)	.47 (.20)
		B	59	.44 (.15)	.02 (.05)	.43 (.17)

Anmerkung. HR: Hit-Rate; FA: False Alarm-Rate; KT: korrigierter Testwert.

Drei 2 (*Geschlecht*) x 2 (*Altersgruppe*) Varianzanalysen ergaben für HR, FA und KT einen Haupteffekt für den Faktor *Altersgruppe*, der dadurch bedingt war, dass Kinder für alle Maße höhere Kennwerte als Erwachsene aufwiesen (siehe Tabelle 7.2). Der Haupteffekt des Faktors *Geschlecht* und die Interaktion *Altersgruppe* x *Geschlecht* waren in allen drei Analysen nicht signifikant, jeweils $F(1, 88) < 2$.

Tabelle 7.2
Varianzanalysen zur Altersspezifität der Personenkennwerte in Studie 1

	Kinder (n = 44)	Junge Erwachsene (n = 48)	*F*	η_{p2}	*d*
Hit-Rate	0.57 (0.15)	0.39 (0.12)	37.23**	0.30	1.30
False Alarm-Rate	0.12 (0.18)	0.01 (0.05)	12.60**	0.13	0.76
Korrigierte Hit-Rate	0.45 (0.19)	0.38 (0.13)	4.50*	0.05	0.45

Anmerkung. HR: Hit-Rate; FA: False Alarm-Rate; KT: korrigierter Testwert.
*$p < .05$. **$p < .01$.

Itemkennwerte

Die Itemschwierigkeiten der Titel von Set 1 (siehe Tabelle A7.1), welche in beiden Versionen enthalten sind, korrelierten sehr hoch miteinander, $r = .95$, $t(8) = 8.62$, $p < .01$, während es keine Unterschiede zwischen den Itemschwierigkeiten der übrigen Titel gab, A: $M = .35$, $SD = .23$; B: $M = .33$, $SD = .35$; $t(17) < 1$. Darüber hinaus wurde überprüft, ob die Itemschwierigkeiten mit Verbreitungs-Indikatoren zusammenhängen (siehe Tabelle A7.1). Die Itemschwierigkeit hing signifikant mit dem logarithmierten Verkaufsrang zusammen, $r = -.55$, $t(27) = -3.39$, $p < .01$. Hingegen korrelierte die Itemschwierigkeit weder mit dem Erscheinungsjahr, $r = -.23$, $t(27) = -1.24$, $p = .23$, noch mit dem Verkaufspreis, $r = .06$, $t(27) < 1$.

Diskussion

Studie 1 belegt die Altersspezifität des TRT-VS hinsichtlich des Kinderbuch-Lesevolumens: Kinder erkannten mehr Titel als junge kinderlose Erwachsene. Dies galt sowohl für die unkorrigierten als auch für die korrigierten Testwerte. Gleichzeitig fiel die FA der Kinder etwas höher aus als bei jungen Erwachsenen, was darauf hinweist, dass die Kinder Distraktoren häufiger mit realen Buchtiteln verwechseln. Insgesamt ist die FA jedoch auch im Vergleich mit älteren Kindern eher gering (Cunningham & Stanovich, 1990). Es zeigte sich zudem, dass Itemschwierigkeit und Erscheinungsjahr nicht korrelierten. Dies kann darauf zurückgeführt werden, dass der TRT-VS viele bekannte Klassiker enthält, deren Bekanntheit weniger stark von aktuellen Entwicklungen auf dem Buchmarkt abhängt als die von Neuerscheinungen. Die Kennwerte sollten folglich gegenüber zeitbedingten Veränderungen robust sein. Der starke Zusammenhang zwischen der Itemschwierigkeit und dem logarithmierten Verkaufsrang weist deutlich darauf hin, dass häufig verkaufte Titel besser erkannt wurden als Bücher, die relativ selten verkauft werden und weniger im Umlauf sind. Es ist davon auszugehen, dass die Ergebnisse überregionale Gültigkeit haben. Weiterhin zeigen die Ergebnisse, dass die Itemschwierigkeiten wie intendiert nicht mit dem Verkaufspreis zusammenhängen und der TRT-VS hinsichtlich des sozioökonomischen Status eine geringe Selektivität aufweist.

7.4 Studie 2

Die Studie 1 hat erste Belege für die Reliabilität und Konstruktvalidität des TRT-VS erbracht. Unklar ist, ob er auch mit Außenkriterien zusammenhängt, die in

Studien zum Leseerwerb häufig eingesetzt werden, wie zum Beispiel Vorläuferfertigkeiten des Lesens (vgl. Mol & Bus, 2011) oder Fragen zur HLE. Der TRT-VS sollte mit der phonologischen Bewusstheit und dem Wortschatz höhere Korrelationen aufweisen als die HLE. Darüber hinaus nehmen wir an, dass der sozioökonomische Status einen Einfluss auf die HLE hat, die sich wiederum auf das Lesevolumen auswirken sollte. Der TRT-VS als proximaler Prädiktor sollte die Effekte der beiden distaleren Variablen mediieren.

Methode

Stichprobe

An der Studie nahmen 207 Vorschulkinder aus 15 Kindertagesstätten teil. Für fünf Kinder liegen nur wenige Daten vor, diese wurden deshalb von den Analysen ausgeschlossen. Von den verbleibenden 202 Kindern waren 90 weiblich. Das durchschnittliche Alter betrug 5.4 Jahre (*SD* = 0.38; Range = 4.58–6.58 Jahre).

Erhebungsinstrumente

Tabelle 7.3 fasst die theoretischen Wertebereiche, deskriptiven Kennwerte und Interkorrelationen der Variablen zusammen.

TRT-VS

Das *Lesevolumen der Kinder* wurde durch zwei Indikatoren erfasst: Erstens bearbeiteten die Kinder die computergestützte Variante (TRT-VS Kind), welche den gleichen Fehler enthielt wie in Studie 1. Den Kindern wurde eine Version des TRT-VS (A oder B) randomisiert zugeordnet. Zweitens bearbeiteten die Eltern die Fragebogen-Variante (TRT-VS Eltern). Ein Randomisierungsfehler hatte zur Folge, dass 38 Eltern, welche die Version B hätten bearbeiten sollen, stattdessen die Version A erhielten.

Leseumwelt und sozioökonomischer Status

Die häusliche Leseumwelt wurde durch zwölf Items erfasst, die auf dem Fragebogen von Niklas und Schneider (2013) basierten. Um auch für alleinerziehende Eltern einen Gesamtwert berechnen zu können, wurde das Item „Wie häufig liest ihr Partner?“ für alle Teilnehmenden durch das Item „Wie lange lesen Sie Ihrem Kind aus Büchern in einer Woche durchschnittlich vor?“ ersetzt. Die Minutenangabe wurde in eine fünfstufige Skala umgewandelt (0 = 0–30 Min., 1 =

31–75 Min., 2 = 76–120 Min., 3 = 121–165 Min., 4 = 166 und mehr Min.). Die Reliabilität der Skala war ausreichend (α = .70).

Der sozioökonomische Status (SÖS) wurde durch zwei Indikatoren erfasst: Erstens wurden anhand der beruflichen Tätigkeiten der Eltern für jedes Kind zwei ISEI-08-Werte gebildet (Ganzeboom & Treiman, 1996). Der höhere Wert wurde als HISEI-08-Score verwendet. Zweitens wurde der Mannheimer Sozialindex-Wert berechnet (vgl. Schöler et al., 2002), indem von jedem Elternteil der höchste Bildungsabschluss und die Berufstätigkeit ausgewertet wurden (Bildungsabschluss: 1 = kein Schulabschluss, 2 = 9 oder 10 Klassen, 3 = mehr als 10 Klassen; Berufstätigkeit: 1 = nicht erwerbstätig; 2 = in Teilzeit oder Vollzeit erwerbstätig). Um eine ausreichend Differenzierung zu gewährleisten, wurde eine weitere Kategorie eingeführt (4 = Hochschulabschluss). Die vier Werte wurden addiert und die Summe als Indexwert verwendet. Wenn nur für ein Elternteil Angaben vorlagen, wurden diese doppelt gewichtet.

Sprachvariablen

Die phonologische Bewusstheit wurde durch zwei Aufgaben erfasst: Erstens durch den Subtest Reimen des Potsdam-Illinois Test für Psycholinguistische Fähigkeiten (Esser & Wyschkon, 2010). Die Reliabilität des Tests war gut (α = .86). Zweitens durch eine Vokallängenaufgabe, bei der die Teilnehmenden entschieden, ob zwei auditiv präsentierte Pseudowortsilben gleich oder ungleich waren (vgl. Groth, Lachmann, Riecker, Muthmann & Steinbrink, 2011). Die Sprachstimuli wurden mit dem Text-to-Speech-Programm MBROLA (Dutoit, Pagel, Pierret, Bataille & Van der Vrecken, 1996) generiert und unterschieden sich nur in der Vokallänge. Die Reliabilität der Aufgabe war ausreichend (α = .64).

Auch für den Wortschatz gab es zwei Indikatoren: Erstens den Wortschatz-Test der Wechsler Preschool and Primary Scale of Intelligence - III (deutsche Version: Petermann, 2009), bei dem die Teilnehmenden 14 Begriffe definieren sollen. Die Reliabilität des Tests war ausreichend (α = .76). Zweitens wurde eine Aufgabe entwickelt, bei der aus Bilderbüchern entnommene Darstellungen von 15 Gegenständen nacheinander präsentiert wurden und benannt werden sollten. Die Titel dieser Bilderbücher sind nicht im TRT-VS enthalten. Mit dem Kindersprache-Korpus childLex (Schroeder, Würzner, Heister, Geyken & Kliegl, 2015) wurde

Tabelle 7.3

Theoretischer Range, Deskriptive Kennwerte und Interkorrelationen der Variablen in Studie 2

	Theoretischer Range		Deskriptive Kennwerte			Interkorrelationen und Reliabilität								
	Min.	Max.	*N*	*M*	*SD*	1	2	3	4	5	6	7	8	9
TRT-VS und Leseumwelt														
1. TRT-VS PC-Kind	-1	1	201	0.37	0.21	(.68)	.63	.56	.46	.45	.54	.61	.42	.34
2. TRT-VS FB-Eltern	-1	1	190	0.46	0.19	.44	(.72)	.54	.19	.39	.42	.62	.21	.15
3. Leseumwelt	0	42	191	32.40	4.42	.39	.38	(.70)	.25	.36	.43	.54	.50	.47
Sprachvariablen														
4. Vokallängen	0	24	201	16.37	3.38	.30	.13	.17	(.64)	.52	.47	.45	.30	.23
5. Reime	0	19	202	12.45	4.68	.34	.31	.28	.39	(.86)	.49	.49	.25	.31
6. Wörter definieren	0	28	202	13.07	5.10	.39	.31	.31	.33	.40	(.76)	.79	.34	.27
7. Bilder benennen	0	15	202	4.50	2.84	.43	.45	.38	.30	.38	.58	(.71)	.42	.38
Sozioökonomischer Status														
8. HISEI-08	16	90	195	60.53	16.58	.34	.18	.42	.24	.23	.29	.35	(1.0)	.62
9. MSI	4	12	190	10.53	1.59	.28	.13	.39	.18	.29	.24	.32	.62	(1.0)

Anmerkung. TRT-VS: korrigierter Testwert; HISEI-08: Highest International Socio-Economic Index of Occupational Status; MSI: Mannheimer Sozialindex. Alle Korrelationen über |r|=.16 sind statistisch signifikant (α = .05, zweiseitige Testung). Reliabilitäten sind in der Diagonale abgetragen. Für HISEI-08 und MSI wurde eine Reliabilität von 1 festgesetzt. In der unteren Dreiecksmatrix befinden sich die manifesten, in der oberen Dreiecksmatrix die minderungskorrigierten Korrelationen.

kontrolliert, dass es sich bei den Items (z. B. „Anorak“ oder „Ruderboot“) um niedrigfrequente Wörter handelt (normalisierte Lemma-Frequenz/Mio: M = 7.41; SD = 6.32). Wenn statt des Zielwortes ein ähnliches Wort genannt wurde (z. B. „Jacke“ bzw. „Boot“), wurde nach alternativen Bezeichnungen gefragt. Die Reliabilität des Tests war ebenfalls ausreichend (α = .71).

Durchführung

Die Erhebungen fanden in den Kindertagesstätten statt. Die Eltern stimmten der Teilnahme ihres Kindes schriftlich zu und füllten einen Fragebogen aus. Jedes Kind nahm an zwei Einzelsitzungen teil, in denen es Papier- und Bleistift-Aufgaben sowie Aufgaben am PC bearbeitete. Für ihre Studienteilnahme erhielten die Kinder ein Geschenk.

Statistische Analysen

Die Testverfahren wurden bis auf wenige Ausnahmen von allen Kindern vollständig bearbeitet. Zudem füllten einige Eltern den Fragebogen nicht vollständig aus, weshalb bei diesen Maßen eine geringe Anzahl von Antworten fehlt (Ausfall zwischen 2.0 % und 5.9 %; siehe Tabelle 7.2).

Reliabilität, Itemschwierigkeiten und die Parallelität der Versionen wurden analog zu Studie 1 überprüft. Die Überprüfung der Zusammenhänge zwischen den Prädiktoren und den Lese-Vorläuferfertigkeiten erfolgte über konfirmatorische Faktorenanalysen sowie Strukturgleichungsmodelle (Schumacker & Lomax, 2004). Hierfür wurde das R-Paket lavaan eingesetzt (Rosseel, 2012). Alle Indikatorvariablen wurden z-standardisiert. Um Fälle mit fehlenden Daten (insgesamt 2.2 % für alle aggregierten Variablen) in die Analysen einbeziehen zu können, wurde die Full-Information-Maximum-Likelihood-Methode verwendet (Arbuckle, 1996).

Ergebnisse

Reliabilität

Die interne Konsistenz des TRT-VS wurde für die computergestützte Kind-Variante und die Eltern-Variante (Fragebogen) für beide Versionen getrennt berechnet und war ausreichend (Cronbachs α: Kind – A: α = .68, B: α =.67; Eltern – A: α = .76, B: α = .67). Die Split-Half-Korrelation der korrigierten Testwerte war niedrig bis ausreichend (Kind – A: r = .55; B: r =.53; Eltern – A: r = .79, B: r = .68).

Personenkennwerte

Tabelle 7.1 fasst die Personenkennwerte zusammen. Für den TRT-VS Kind war die durchschnittliche Anzahl richtig erkannter Titel normalverteilt (M = 10.63, SD = 3.21; Range = 2–20; Modus = 11; Median = 11). HR, FA und KT unterschieden sich zwischen den Versionen nicht, jeweils t(199) < 1. Auch hinsichtlich des TRT-VS Eltern lag eine Normalverteilung der durchschnittlichen Anzahl erkannter Titel vor (M = 9.47, SD = 3.45; Range = 0–16; Modus = 12; Median = 10). Distraktor-Titel wurden sehr selten ausgewählt (M = 0.23; SD = 0.96). Auch hier gab es keinen Unterschied in HR, FA und KT zwischen den Versionen, jeweils t(188) < 1 (siehe Tabelle 7.1).

Itemkennwerte

Für beide Varianten des TRT-VS zeigte sich ein hoher Zusammenhang hinsichtlich der Itemschwierigkeiten des Set 1 der beiden Versionen, Kind: r = .995, $t(8)$ = 27.05, p < .01; Eltern: r = .98, $t(8)$ = 12.62, p < .01. Die mittlere Itemschwierigkeit der übrigen Titel unterschied sich zwischen beiden Versionen nicht, Kind, A: M = .46, SD = .25; B: M = .41, SD = .24, $t(17)$ < 1; Eltern, A: M = .37, SD = .25; B: M = .26, SD = .22, $t(17)$ < 1.

Als Nächstes wurde die Übereinstimmung der Itemkennwerte von Studie 1 und Studie 2 überprüft. Für beide Versionen zeigten sich hohe Korrelationen, A: r = .87, $t(18)$ = 7.32, p < .01; B: r = .84, $t(17)$ = 6.28, p < .01. Wie in Studie 1 korrelierten die Itemschwierigkeiten stark mit dem Verkaufsrang, r = -.67, $t(27)$ = -4.63, p < .01. Die Zusammenhänge mit den anderen Merkmalen waren hingegen nicht signifikant, jeweils $t(27)$ < 1.

Korrelationsanalysen und Strukturgleichungsmodelle

Der KT der Kinder und der Eltern korrelierte hoch miteinander, beide jedoch nur moderat mit dem Fragebogen zur HLE. Die KT korrelierten hoch mit allen Sprachvariablen. Der HLE zeigte das gleiche Korrelationsmuster, hier waren die Zusammenhänge jedoch wesentlich schwächer (vgl. Tabelle 7.3).

Mittels einer konfirmatorischen Faktorenanalyse wurde nun bestimmt, ob die beiden latenten Prädiktorvariablen TRT und HLE unterschiedliche Konstrukte erfassen. Der TRT-VS Kind und TRT-VS Eltern sowie zwei Item-Päckchen des HLE (HLE 1 bzw. HLE 2; Odd-Even-Split) wurden als Indikatoren verwendet. Der Fit des

Zwei-Faktor-Modells war gut, $\chi^2(1, N = 202) = 5.88$, $p = .015$, RMSEA (Root Mean Square Error of Approximation) = .155, CFI (Comparative Fit Index) = .964, SRMR (Standardized Root Mean Square Residual) = .027, und signifikant besser als der Fit des Ein-Faktor-Modells, $\Delta\chi^2(1, N = 202) = 11.62$, $p < .01$.

Um zu überprüfen, wie viel Varianz TRT und HLE in den latenten Sprachvariablen phonologische Bewusstheit (PB) und Wortschatz (WS) aufklären, wurden drei Strukturgleichungsmodelle verglichen: In Modell 1 wurde der TRT als alleiniger Prädiktor für die latenten Sprachvariablen aufgenommen, in Modell 2 war hingegen der HLE der einzige Prädiktor. Modell 3 enthielt beide Prädiktoren (TRT und HLE). In allen Modellen wurde für den SÖS kontrolliert. Tabelle 7.4 fasst die Modellparameter der drei Modelle zusammen.

Tabelle 7.4
Standardisierte Modellparameter (Standardfehler in Klammern) der Modelle 1-3

	Phonologische Bewusstheit			Wortschatz		
	Modell 1	Modell 2	Modell 3	Modell 1	Modell 2	Modell 3
TRT	.67*** (.12)	-	.68** (.19)	.76*** (.14)	-	.73** (.22)
HLE	-	.45** (.10)	-.02 (.16)	-	.57*** (.13)	.07 (.18)
R_2	.44	.20	.45	.58	.33	.61

Anmerkung. TRT: Titelrekognitionstest; HLE: Häusliche Leseumwelt. In allen Modellen wurde für den sozioökonomischen Status kontrolliert.
Güte von Modell 1: $\chi^2(14)_{N=202} = 20.572$, $p = 0.113$, RMSEA= 0.048, CFI= 0.984, SRMR= 0.033
Güte von Modell 2: $\chi^2(14)_{N=202} = 14.713$, $p = 0.398$, RMSEA= 0.016, CFI= 0.998, SRMR= 0.024
Güte von Modell 3: $\chi^2(25)_{N=202} = 36.339$, $p = 0.067$, RMSEA= 0.047, CFI= 0.979, SRMR= 0.035
**$p < .01$. ***$p < .001$.

Hinsichtlich der PB zeigten sowohl der TRT als auch der HLE einen starken Effekt, wenn sie die alleinigen Prädiktoren waren. Ein Vergleich zwischen den Regressionsgewichten zeigte, dass der TRT eine höhere Korrelation mit der PB aufwies als der HLE ($\Delta\beta = .22$, $t = 4.60$, $p < .01$). Zudem zeigte sich zwischen HLE und PB nur noch ein sehr geringer Zusammenhang, wenn beide Prädiktoren in das Modell aufgenommen wurden (Modell 3). Der Effekt des TRT blieb im Modell 3 hingegen mit unverminderter Stärke bestehen.

Bezüglich des WS zeigte sich das gleiche Ergebnismuster: TRT und HLE zeigten alleine jeweils starke Effekte. Wiederum wies der TRT eine höhere Korrelation mit dem WS auf als der HLE ($\Delta\beta = .19$, $t = 5.16$, $p < .01$). In Modell 3 war der Effekt des TRT weiterhin signifikant, der Effekt des HLE hingegen nicht. Ein Vergleich von Modell 1 und Modell 2 zeigte zudem einen substanziellen Unterschied

in der aufgeklärten Sprachvariablen-Varianz zugunsten des TRT, ΔR^2 (PB) = .24; ΔR^2 (WS) = .25.

Zuletzt wurde überprüft, ob der TRT als proximale Variable die Effekte der distaleren Variable HLE und des SÖS mediiert. Abbildung 7.1 zeigt das korrespondierende Strukturgleichungsmodell, welches einen guten Fit aufwies, $\chi^2(26, N = 202) = 36.40$, $p = .085$, RMSEA = .044, CFI = .981, SRMR = .035. Der SÖS war ein wichtiger Prädiktor für den HLE, welcher wiederum einen hohen Varianzanteil im TRT aufklärte. Wie erwartet, klärten HLE und SÖS keinen signifikanten eigenen Anteil in den Sprachvariablen auf.

7.5 Diskussion

Die Ergebnisse von Studie 2 replizieren die Befunde aus Studie 1: Sowohl das Korrelationsmuster mit den Indikatoren für die Verbreitung der Bücher als auch die Ausprägungen der Itemschwierigkeiten stimmen in hohem Maße überein. Ein Vergleich der Personenkennwerte zeigt zudem, dass die im Durchschnitt etwa ein Jahr älteren Kinder von Studie 1 einen etwas höheren korrigierten Testwert erreichen als die jüngeren Kinder von Studie 2; dies entspricht etwa einem Titel. Dieser Unterschied ist nicht nur durch eine höhere Hit-Rate bedingt, sondern auch auf eine geringere False-Alarm-Rate zurück zu führen. Dies weist darauf hin, dass mit zunehmendem Alter nicht nur die Titelkenntnis zunimmt, sondern auch die Fähigkeit, reale Titel von plausiblen, aber fiktiven Titeln zu unterscheiden. Wie sich in Studie 2 gezeigt hat, schmälert eine im Durchschnitt etwas höhere False-Alarm-Rate jedoch keinesfalls die Prädiktionskraft des TRT-VS, wenn diese in Form eines korrigierten Testwertes einbezogen wird. Im Gegenteil: Während die Metaanalyse von Mol und Bus (2011) beim Vergleich gematchter Studien keine Überlegenheit von Titelrekognitionstests fand, zeigt Studie 2, dass der TRT-VS gegenüber einem umfassenden Fragebogen etwa ein Drittel zusätzlicher Varianz in den Vorläuferfertigkeiten des Lesens aufklärt. Die Ergebnisse zeigen, dass der TRT-VS zur Erfassung des Lesevolumens von Vier- bis Siebenjährigen eingesetzt werden kann, und dies nicht nur durch die bislang übliche Befragung der Eltern, sondern erstmals auch durch eine direkte Befragung der Kinder. Die Testwerte der Kinder korrelieren in hohem Maße mit denen der Eltern, was für die Konstruktvalidität des

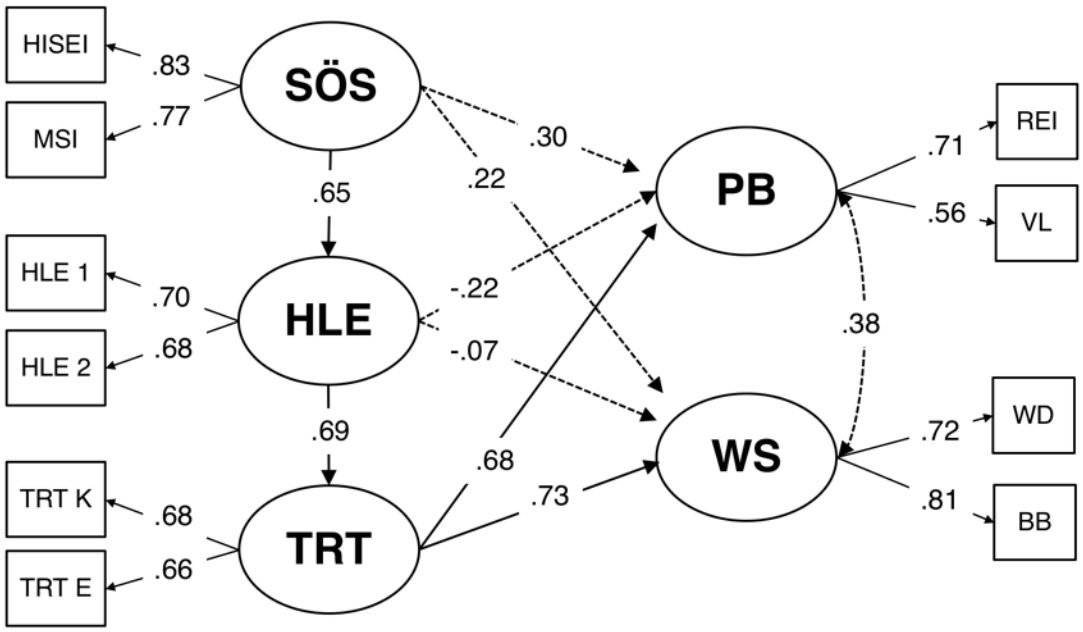

Abbildung 7.1. Strukturgleichungsmodell zur Vorhersage von Vorläuferfertigkeiten des Lesens durch sozioökonomischen Status (SÖS), häusliche Leseumwelt (HLE) und Lesevolumen (TRT).

Anmerkung. HISEI = Highest International Socio-Economic Index of Occupational Status, MSI = Mannheimer Sozialindex, TRT K = TRT-VS Kind, TRT E = TRT-VS Eltern, PB = Phonologische Bewusstheit, WS = Wortschatz, REI = Reime, VL = Vokallängen, WD = Wörter definieren, BB = Bilder benennen. Durchgezogene Modellpfade sind signifikant ($p < .01$), gestrichelte Modellpfade sind nicht signifikant ($p > .05$).

TRT-VS spricht. Dass hier kein perfekter Zusammenhang besteht, kann als Beleg für die Bedeutung außerfamiliärer Umwelten – insbesondere von Kindertagesstätten – für frühe Leseerfahrungen interpretiert werden. Wie in vorherigen Studien, korrelieren über den TRT-VS gemessene, frühe Leseerfahrungen mit den Lese-Vorläuferfertigkeiten phonologische Bewusstheit und Wortschatz (vgl. Davidse et al., 2011; Sénéchal et al., 1996). Des Weiteren weisen der TRT-VS und der HLE-Fragebogen eine moderate Korrelation auf, was wiederum mit bisherigen Ergebnissen übereinstimmt (Davidse et al., 2011; Sénéchal et al., 1996).

Der TRT-VS und der Fragebogen zur HLE erwiesen sich beide als Maße, mit denen der Einfluss früher Leseerfahrungen auf die Sprachentwicklung von Vorschulkindern erfasst werden kann. Die Strukturgleichungsmodelle zeigen jedoch, dass der TRT-VS einen bedeutsamen Teil der Unterschiede in den Sprachvariablen erklärt, während der Fragebogen im gleichen Modell keinen

eigenständigen Anteil zur Varianzaufklärung beiträgt. Dieser Befund deckt sich mit der Studie von Sénéchal und Kollegen (1996), in der Fragen zur HLE ebenfalls keine zusätzliche Varianz aufklärten, wenn ein Titelrekognitionstest in das Modell aufgenommen wurde.

Offensichtlich mediiert der TRT-VS den Einfluss, den sozioökonomischer Hintergrund und HLE auf die Sprachvariablen haben, vollständig. Dies ist plausibel, da der TRT als Outcome-Variable der Leseumwelt nicht nur in engem Zusammenhang mit Ressourcen und Leseaktivitäten in der Familie steht, sondern auch ein Maß dafür ist, welche Effekte die Sprach- und Leseförderung auf die Entwicklung eines Kindes hat, die nicht nur von Angeboten, sondern auch von den Verarbeitungsmöglichkeiten eines Kindes abhängen. Bei der direkten Befragung von Kindern dürften Unterschiede im TRT-VS folglich nicht nur Unterschiede in der Quantität des durch Bücher vermittelten sprachlichen Inputs widerspiegeln, sondern auch Unterschiede in der Qualität der sprachlichen Verarbeitung. Dies sollte sich wiederum auf die Entwicklung der beteiligten Sprachfähigkeiten auswirken, wodurch die Zusammenhänge stärker werden sollten.

Insgesamt weisen die Ergebnisse darauf hin, dass bei der Modellierung der Leseumwelt als Prädiktor für die Sprachentwicklung drei Ebenen differenziert einbezogen werden sollten, um eine optimale Varianzaufklärung zu erreichen: erstens der sozioökonomische Status, der hinsichtlich der Sprachentwicklung den geringsten inhaltlichen Bezug aufweist und somit eine breit gefasste Hintergrundvariable auf der Input-Seite darstellt; zweitens die HLE, die ebenfalls auf der Input-Seite zu verorten ist, jedoch einen direkten inhaltlichen Bezug zur Sprachentwicklung hat; drittens Titelrekognitionstests, die als proximale Outcome-Variablen verschiedener Leseumwelten von allen drei Maßen die größte inhaltliche Nähe zur Sprachentwicklung aufweisen.

Limitationen

Der TRT-VS ist ein Forschungsinstrument, dessen Kennwerte sich in Abhängigkeit von historisch-kulturellen Rahmenbedingungen verändern, wie es bei psychodiagnostischen Verfahren generell der Fall ist. Deshalb sollten zukünftige Studien überprüfen, ob es Abweichungen von den hier berichteten Item- und Personenkennwerten gibt. Sollten hier nach einigen Jahren größere Diskrepanzen auftreten, dann muss die Itemauswahl des TRT-VS aktualisiert werden. Dies ist mit

dem Rekognitionstest von Stanovich und West (1989) bereits mehrfach erfolgreich geschehen (vgl. Moore & Gordon, 2014).

Aufgrund der Höhe der Reliabilitäten eignet sich der TRT-VS für die Bestimmung relativer Unterschiede auf der Gruppen-, jedoch nicht auf der Individualebene. Die berichteten Kennwerte sollten entsprechend nicht als Norm- oder Kriteriumswerte interpretiert werden. Hinsichtlich der teilweise geringen Reliabiliätswerte sei zudem angemerkt, dass Rekognitionstests zur Messung des Lesevolumens häufig deutlich mehr Items verwenden als der TRT-VS. Der TRT-VS wurde jedoch bewusst mit dem Ziel einer kurzen Durchführung konstruiert, da dies bei der Testung von Vorschulkindern, deren Aufmerksamkeitsleistung relativ stark fluktuiert, eine zentrale Voraussetzung für eine ausreichende Durchführungsobjektivität ist. Zugleich sollten die Items des TRT-VS das heterogene Feld der Literatur für drei- bis achtjährige Kinder angemessen widerspiegeln, welches sich aus Klassikern und Neuerscheinungen zusammensetzt, die sich wiederum in ihrer Zielgruppe und ihrem Preis deutlich unterscheiden. Dies könnte ebenfalls eine Ursache für die im Vergleich geringeren internen Konsistenzen sein.

Zudem kann über den TRT-VS lediglich erfasst werden, welche deutschsprachigen Titel ein Kind kennt. Dies hat insbesondere dann Implikationen, wenn Kinder bilingual aufwachsen und ihre häuslichen Leseaktivitäten in einer anderen Sprache stattfinden. Doch so lange die Sprachentwicklung im Deutschen im Fokus steht, sollte dies unproblematisch sein. Zur Untersuchung von Fragestellungen, in denen die Entwicklung in mehr als einer Sprache von Interesse ist, sollten Rekognitionstests mit Titeln in den jeweiligen Sprachen eingesetzt werden.

In beiden Studien gab es Durchführungsfehler. Diese Abweichungen haben aufgrund der sehr hohen Übereinstimmung zwischen den verschiedenen eingesetzten Versionen und Varianten sowie ausreichender Zellenbesetzungen jedoch mit hoher Wahrscheinlichkeit nur sehr geringe Auswirkungen hinsichtlich der Beurteilbarkeit der Parallelität der Versionen.

Zusammenfassung und Ausblick

Der TRT-VS hat sich in beiden Studien als ausreichend reliables, valides Instrument zur Erfassung des Lesevolumens im Übergang vom Kindergarten zur Grundschule erwiesen. Der Test ermöglicht erstmalig die direkte Befragung der

Kinder, wodurch nicht nur frühe Leseaktivitäten, sondern auch deren Effekte auf die Sprachentwicklung erfasst werden können. Hierdurch stellt er eine sinnvolle Ergänzung der Methoden für die Untersuchung der frühen Leseentwicklung dar, die sich bislang auf Eltern-Fragebögen zur HLE beschränkten.

Der TRT-VS ist über unsere Homepage verfügbar und kann für wissenschaftliche Studien kostenlos genutzt werden. Er kann beispielsweise eingesetzt werden, um zu untersuchen, inwiefern Matthäus-Effekte in der Sprach- und Leseentwicklung durch Unterschiede im Lesevolumen und der HLE bedingt sind. So wurden viele der im TRT-VS enthaltenen Kinderbücher auch in anderen medialen Formen (Filme, Fernsehserien, Computerspiele) adaptiert. Dass die Vorhersagekraft des TRT-VS größer ist als die von anderen gängigen Maßen, spricht dafür, dass diese multimediale Verfügbarkeit die Validität des Verfahrens nicht mindert. Hier eröffnet sich die Möglichkeit, die Auswirkungen von verschiedenen Bildschirmmedien auf die Sprachentwicklung von Kindern mit Hilfe des TRT-VS zu untersuchen, um Klarheit darüber zu gewinnen, inwiefern sich der Gebrauch dieser Medien auf die Titelkenntnis auswirkt, und ob dies wiederum einen negativen oder positiven Effekt auf die Sprachentwicklung hat. Da diese Medien mittlerweile weithin verfügbar sind und im Alltag von Kindern an Bedeutung gewinnen, die Befunde hierzu jedoch uneindeutig sind (vgl. Ennemoser & Schneider, 2007), sollten zukünftige Studien diese Zusammenhänge genauer untersuchen.

Auch die Frage, in welchem Ausmaß Kindertagesstätten die sprachliche Entwicklung von Kindern durch Bücher effektiv fördern, könnte durch die Befragung der Kinder genauer bestimmt werden. Interessant wäre in diesem Kontext, welcher Anteil im Lesevolumen jeweils auf die HLE sowie die Anregungsqualität in der Kindertagesstätte zurückgeht, und wie sich dies wiederum auf die sprachliche Entwicklung auswirkt. Schließlich kann der TRT-VS auch zeitlich versetzt mit dem K-TRT kombiniert werden, um den Einfluss des Lesevolumens auf die Entwicklung von Sprach- und Lesefähigkeiten vom Vorschul- bis weit ins Grundschulalter hinein zu modellieren.

8 Print exposure across the reading life span

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The data, analysis files, and test materials are available via the Open Science Framework and can be accessed at https://osf.io/4hcwt/

8.1 Abstract

Leisure reading is a main contributor to print exposure, which is in turn related to individual differences in reading and language skills. The Author Recognition Test (ART) is a brief and objective measure of print exposure that has been used in reading research since the 1990s. Life span studies have reported contradicting results concerning age differences in print exposure, possibly due to the use of ART versions that differed regarding authors' mean publication year. We investigated effects of participant age and authors' mean publication year, literary level, and circulation frequency on author recognition probability between adolescence and old age (N = 339; age 13–77 years). An explanatory item response analysis showed that participant age and circulation frequency were positively related to recognition probability. Mean publication year was negatively related to recognition probability, indicating that recent authors who have been widely read for only a few years were less often recognized than classic authors who have been widely read for several decades. The relation between participant age and recognition probability was moderated by author variables. For classic authors, the recognition probability increased between adolescence and old age. By contrast, for recent authors, the recognition probability increased only between adolescence and middle age. Our results suggest that the mean publication year is a key author variable for the detection of print exposure differences between young, middle-aged and older adults. We discuss implications for author selection when updating the ART and for measuring print exposure in age-diverse samples.

8.2 Introduction

According to meta-analyses, print exposure is positively related to the language and reading skills of children, adolescents, and young adults (Mol & Bus, 2011). The frequency of leisure reading is an important source of differences in print exposure. To assess relative differences in the amount of leisure reading, print exposure checklists with author names or book titles are often used. Print exposure checklists only take a few minutes to administrate. They contain foil items that allow to control for social desirability in participant responses. Age-specific print exposure checklists have been developed for preschool children (e.g., Grolig, Cohrdes, & Schroeder, 2017), school children (e.g., Schroeder, Segbers, & Schröter, 2016) and college students (e.g., Stanovich & West, 1989). By contrast, little is known about leisure reading between middle adulthood and old age, and how it affects reading development. Moreover, studies have reported heterogeneous results regarding differences in exposure to written texts between young and older adults. The first aim of this study is therefore to investigate how print exposure accumulates across the reading life span.

Most studies investigating print exposure in adults use the Author Recognition Test (ART; Stanovich & West, 1989). In the ART, real authors have to be discriminated from fake authors. The ART has been used in many research fields, including reading and language research (e.g., Mol & Bus, 2011) and social cognition research (e.g., Mumper & Gerrig, 2017). To date, author names have been selected as author items for the ART based on how widely they are read (e.g., bestseller lists; Acheson, Wells, & MacDonald, 2008; Stanovich & West, 1989). In addition to the bestseller criterion, we propose that author item properties can be used for a further standardization of the item selection. Authors differ with regard to their works' mean publication year (i.e., the averaged publication year of the first and last published work of an author), literary level (highbrow vs. popular literature authors), and circulation frequency (e.g., how often they are borrowed from public libraries). The second aim of this study is to investigate how these author variables are related to author recognition probability and whether they moderate age trends in the ART.

Leisure Reading across the Life Span: Cognitive Correlates and Contradicting Evidence

Early engagement in intellectual activities, such as leisure reading, builds long-lasting habits and a densely-knitted neural network, which both protect cognitive functionality in old age (Stern, 2009). In young and older adults, leisure reading is related to crystallized abilities, such as cultural knowledge and vocabulary, but it is not related to fluid abilities, such as reasoning and working memory (Stanovich, West & Harris, 1995). In the course of adulthood, working memory performance peaks between 20 and 30 and begins to decline between 30 and 40, whereas performance in vocabulary peaks much later, between 50 and 70 (Hartshorne & Germine, 2015). Frequent leisure reading serves as a buffer against the negative consequences of working memory declines, facilitating word and sentence processing (Lowder & Gordon, 2017; Payne, Gao, Noh, Anderson, & Stine-Morrow, 2012), and thus sustaining high levels of reading comprehension in older adults. In addition, higher levels of literacy in late-life are associated with a later decline in cognitive functioning, even after controlling for early-life education (Sisco et al., 2013). Taken together, these studies indicate that leisure reading has positive effects on crystallized abilities and protects cognitive functioning in later life.

The extant evidence is inconclusive regarding the increase of print exposure between adolescence and old age. Two studies reported significant differences in the ART between young and older adults (Choi, Lowder, Ferreira, Swaab, & Henderson, 2017; Liu et al., 2016) and one study with 18- to 81-year-olds reported a large correlation between age and print exposure (Payne et al., 2014). By contrast, another study reported no print exposure differences between young and older adults (Stanovich et al., 1995), and a life span study with 18- to 65-year-olds reported a very small correlation between age and print exposure (West, Stanovich, & Mitchell, 1993). In sum, previous studies investigating print exposure between adolescence and old age have yielded conflicting results. The first aim of this study is therefore to explore differences in print exposure between adolescence and late adulthood.

Age Effects in the ART and Properties of Author Items

Diverging age effects are possibly due to the use of varying versions of the ART with different author items. How widely authors are read can change substantially within a few years, which also has consequences for their recognition rate in the ART. For example, changes in the author frequency in print and online media corpora are related to changes in the author item difficulty (Moore & Gordon, 2015). Studies by Stanovich and colleagues from the 1990s used the original ART (Stanovich & West, 1989), whereas more recent studies have used an updated version (Acheson et al., 2008). In the updated version, author items with recognition rates at floor or ceiling were removed and replaced by other author items which were assumed to provide more information on individual differences in print exposure. From the original ART, only 15 authors were retained and 50 authors were added (Acheson et al., 2008). Among these 65 authors, more than half are authors who have been read for several decades (e.g., F. Scott Fitzgerald, T.S. Eliot, and Virginia Woolf). We therefore refer to such authors as 'classic authors' as opposed to 'recent authors' who have been read for only a few years. This replacement of recent authors from the 1980s by classic authors could have influenced author recognition probability and resulted in the observed differential age effects in the ART.

More specifically, we propose that the author recognition probability varies as a function both of the mean publication year of an author's books and participant age. First, the longer the works of an author are available to the public, the more likely it is that readers discover the author. The mean publication year of an author's works reflects the time point when they became available to the public. Second, studies show that the amount of cultural activities and openness to new experiences decreases between middle adulthood and old age (Schwaba et al., 2018), suggesting that older adults seek less exposure to recent authors than young adults do. Moreover, experiences from adolescence and young adulthood are especially well retained in memory by adults, presumably due to cognitive changes and identity formation during these years (Rubin, Rahhal, & Poon, 1998). For these reasons, the mean publication year effect should be more pronounced in older readers than in younger readers.

In addition to the mean publication year, the literary level and the circulation frequency of authors' works are two variables that could also be differentially related to author recognition probability in age-diverse samples. With respect to literary level, most authors are primarily perceived either as creators of art (called highbrow literature) or as creators of literary entertainment, with less emphasis on the artistic value (called popular literature; see Kidd & Castano, 2017, for a discussion of this differentiation). In a study with young adults, the author recognition rate was similar for highbrow and popular literature authors (Kidd & Castano, 2017). The ART in the present study includes the same number of highbrow and popular literature authors which allows the investigation of the relation between literary level and author recognition probability across the reading life span. Regarding circulation frequency, a study with college students found that the number of author name occurrences in linguistic corpora was related to author recognition probability (Moore & Gordon, 2015). Thus, authors who appeared more often in texts were more likely to be recognized in the ART. To investigate the relation between the dissemination rate of authors' works and author recognition probability across the reading life span, we use loan statistics from the largest public library system in Germany as a measure of circulation frequency. In sum, the second aim of this study is to investigate how author mean publication year, literary level, and circulation frequency are related to author recognition probability, and whether this relation changes between adolescence and old age.

The Present Study

This study investigates differences in print exposure between adolescence and old age. Our first aim is to clarify the relation between age and print exposure across the reading life span. Our second aim is to investigate how author variables are related to author recognition probability, and whether they moderate the effect of age on author recognition probability. To our knowledge, no previous study has investigated the effect of the author mean publication year on author recognition probability. In addition to the focal author variable mean publication year, we also include the literary level (highbrow vs. popular literature) and the book circulation frequency as potential moderator variables of author recognition probability. Only two studies with undergraduate samples have investigated how item difficulty is

related to author frequency in corpora (Moore & Gordon, 2015) and literary level (Kidd & Castano, 2017). The overarching goal of this study is to clarify how print exposure increases between adolescence and old age and whether exposure to specific kinds of literature increases differently across the reading life span.

8.3 Method

Participants and Procedure

Data were collected in two contexts. We administered the ART in four small-scale, cross-sectional psycholinguistic studies to a total of 108 participants between summer 2016 and spring 2017. Seventy-eight participants were university students (50 female) and 30 participants were senior citizens (15 female). The age of the university students ranged between 18 and 34 years (M_{age} = 25 years, SD_{age} = 3.7 years). The age of the senior citizens ranged between 65 and 74 years (M_{age} = 69.3 years, SD_{age} = 3 years). All senior citizens had at least completed high school (6 high school degree, 3 undergraduate degree, 19 master's degree, and 2 doctoral degree). All participants were native speakers of German, had normal or corrected-to-normal vision, and reported no hearing, reading, or language difficulties. Written consent was obtained from all participants. They received monetary reimbursement for their participation.

In addition, 252 participants completed the ART during the Frankfurt book fair in 2016, which is a large consumer show that is visited by school classes, families, and senior citizens. Participants were asked to test their knowledge by completing a literary quiz. Subjects were eligible to participate in a lottery of ten book vouchers (10€ each). They were informed that they were taking part in a scientific study and that their responses to the literary quiz and their demographic information would be used for analyses. Participants were asked to mark author names that they recognized, and informed that guessing was easily detectable due to the inclusion of made-up author names. Twenty-one participants (8.3%) were excluded because they did not indicate their age or were not yet adolescents. Among the 231 participants (164 female) included in the final sample, age ranged between 13 and 77 years (M_{age} = 33.6 years, SD_{age} = 15.8 years). The sample included 43 adolescents (13 to 17 years old, M_{age} = 15.6 years, SD_{age} = 1.3 years), 92 young adults (18 to 35 years old, M_{age} = 24.2 years, SD_{age} = 4.9 years), 59 middle-aged adults (37 to 50 years

old, M_{age} = 45.3 years, SD_{age} = 3.9 years), and 37 older adults (51 to 77 years old, M_{age} = 58.1 years, SD_{age} = 7.1 years).

Average ART scores were not affected by administration context (see Appendix B). The data from the psycholinguistic studies and the book fair were therefore pooled for all analyses, resulting in a sample size of 339 participants. Overall, participant age ranged from 13 to 77 years (68% female). Table 8.1 summarizes age and gender characteristics of the sample.

Author Recognition Test

Each of the two parallel test forms of the German ART consists of 50 author items and 25 foil items (see Appendix B for test description and equivalence tests between test forms). In Appendix C, Table C8.1 summarizes three properties of the author items, which are described in the following (see Table C8.2 for information on foil items).

Mean publication year. We added the publication year of the first and the last work of an author as shown by the Catalogue of the German National Library and divided the result by two. Mean publication years ranged from 1792 to 2013 (M = 1990, SD = 35).

Literary level. The ART includes 37 popular literature authors (49.3%; e.g. thriller, crime, history, fantasy, romance, entertainment) and 38 highbrow authors (50.7%) as determined in a rating procedure. The first and third author of this study independently rated each author as predominantly highbrow or popular literature author. We calculated the interrater reliability and found a high agreement (97.3%; Cohen's κ = .95). Discrepancies were resolved by discussion.

Circulation frequency. We calculated how often the works of each author were borrowed from the largest German public library system between the years 2001 and 2015 (M. Seitenbecher on behalf of the Berlin public library, personal communication, December 6, 2015). The circulation frequency varied considerably (M = 1,884, SD = 2,054; range: 79–12,697).

Statistical Analyses

We adopted an explanatory item response analysis approach (De Boeck & Wilson, 2004). We analyzed participants' item responses as a function of age and author variables by using generalized linear mixed-effects models with a binomial distribution (*lme4* package by Bates, Maechler, Bolker, & Walker, 2015; De Boeck et

al., 2011). To reduce nonessential multicollinearity, we centered each continuous predictor variable. Log-transformed circulation frequency data were used in the analyses. To investigate linear and non-linear relations between age and print exposure, we included linear and quadratic effects of age in the model (Cohen, Cohen, West, & Aiken, 2003). As a measure of model fit, we calculated the variance explained by fixed effects (marginal R_2) and the variance explained by fixed and random effects (conditional R_2; Nakagawa, Johnson, & Schielzeth, 2017).

8.4 Results

Descriptive Statistics

On average, participants recognized 24.36 authors (*SD* = 11.96; range: 0–50). We calculated a corrected hit rate by subtracting the proportion of selected foils from the proportion of selected authors (see Table 8.1). In Appendix C, Table C8.1 summarizes the hit rate for each author. The mean number of selected foils was 0.45 (*SD* = 1.14; range: 0–12). Table C8.2 summarizes the false alarm rate of each foil item.

Table 8.1
Corrected Hit Rates for Groups in the German Author Recognition Test (ART)

	Age group				Gender	
	Adolescents	Young adults	Middle-aged adults	Older adults	Female	Male
N	43	170	59	67	229	110
Age range	13–17	18–35	36–50	51–77	13–77	13–74
M years	15.7	24.4	45.3	63.2	34.6	34.7
(*SD*)	(1.3)	(4.4)	(3.9)	(7.9)	(16.9)	(17.4)
M ART	.24	.42	.65	.59	.49	.43
(*SD*)	(.15)	(.20)	(.25)	(.20)	(.23)	(.26)

Note. Female and male participants are equally distributed across age groups, $\chi_2(3, N = 339) = 1.00$.

Explanatory Item Response Analysis

A generalized linear mixed-effects model with participant age and the author variables of mean publication year, literary level, and circulation frequency as fixed effects was fitted. The model also included interactions between age and author variables as fixed effects. The continuous variables age, mean publication year, and circulation frequency were centered. The categorical variable literary level was effect-coded. The model included random intercepts for participants and items.

Overall effects were tested by using contrast coding and the Anova function of the *car* package (Type 3 model comparison; Fox & Weisberg, 2011). For post hoc comparisons, we applied the glht function of the *multcomp* package (Hothorn, Bretz, & Westfall, 2008) by using cell means coding and single *df* contrasts. We chose the age points 15, 25, 45, and 65 for comparisons as these correspond to our samples' mean ages of adolescents, young adults, middle-aged adults, and older adults, respectively (see Table 8.11). We also included a point of comparison at age 75 for the oldest participants in our sample. Table 8.2 summarizes the effects of the model.

Main effects. The model showed a significant main effect of age, which we investigated by comparing the mean recognition probability between age points (see Figure 8.1a). Post hoc comparisons showed a significant increase of recognition probability from age 15 to age 25 (t = 8.83, p < .001) and from age 25 to age 45 (t = 11.73, p < .001). The main effect of age on recognition probability did not increase between the ages 45 and 65 (t = 0.53, p = .60), and there was a slight drop between ages 65 and 75, t = 2.50, p = .01. Overall, the recognition probability increased with age until age 45, where it reached a plateau that slightly dropped off after age 65.

There was a significant main effect of mean publication year (t = -4.61, p < .001), indicating that recognition probability decreased with increasing mean publication year. Additionally, there was a significant main effect of circulation frequency (t = 2.30, p = .02), indicating that recognition probability increased with increasing circulation frequency. The main effect of literary level was not significant, t = -1.19, p = .23.

Table 8.2
Mixed-effects Model of Author Recognition with Age, Author Variables, and their Interactions as Fixed Effects and Participants and Items as Random Intercepts

	df	χ^2	*p*
Fixed effects			
Intercept	1	7.78	< .01
Main effects			
Age	2	152.87	< .001
Mean Publication Year	1	22.28	< .001
Literary Level	1	1.41	.23
Circulation Frequency	1	5.29	.02
Interactions			
Age x Mean Publication Year	2	25.32	< .001
Age x Literary Level	2	81.07	< .001
Age x Circulation Frequency	2	55.74	< .001
Random effects			
Participants	1	3,057.60	< .001
Items	1	3,242.20	< .001
Marginal R^2		.25	
Conditional R^2		.66	

Note. Tests are based on Type III sum of squares and χ^2 values with Kenward–Roger *df*.

a.

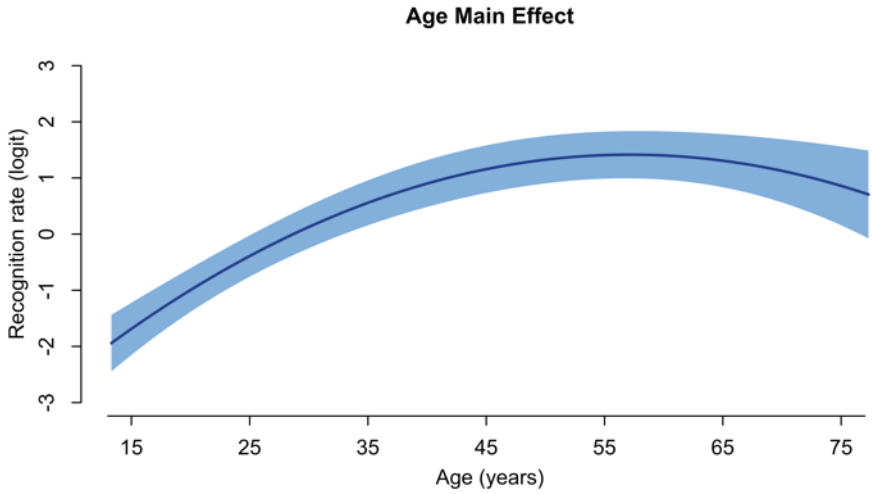
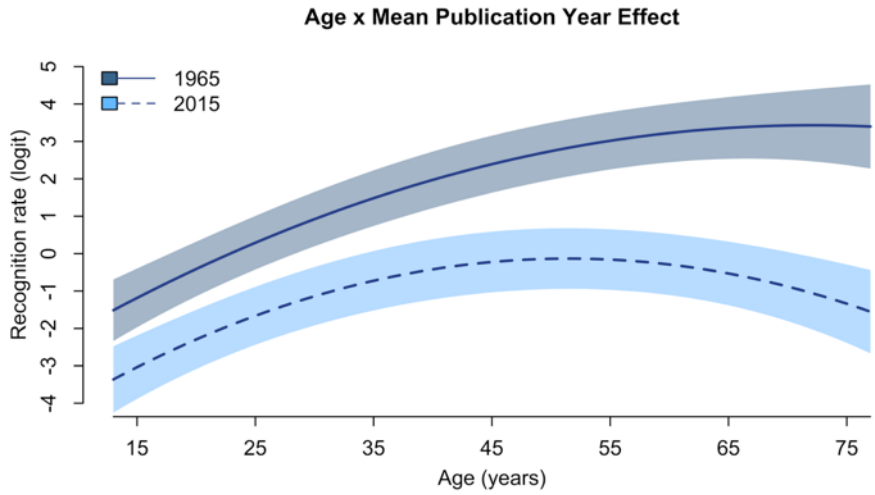
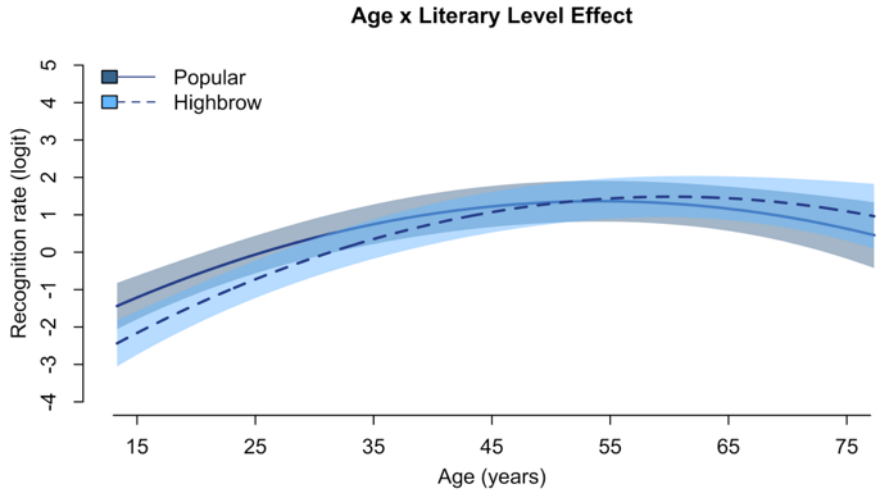


Figure 8.1. Mean probability of author recognition as a function of subject age (a) with 95% confidence intervals.

b.



c.



d.

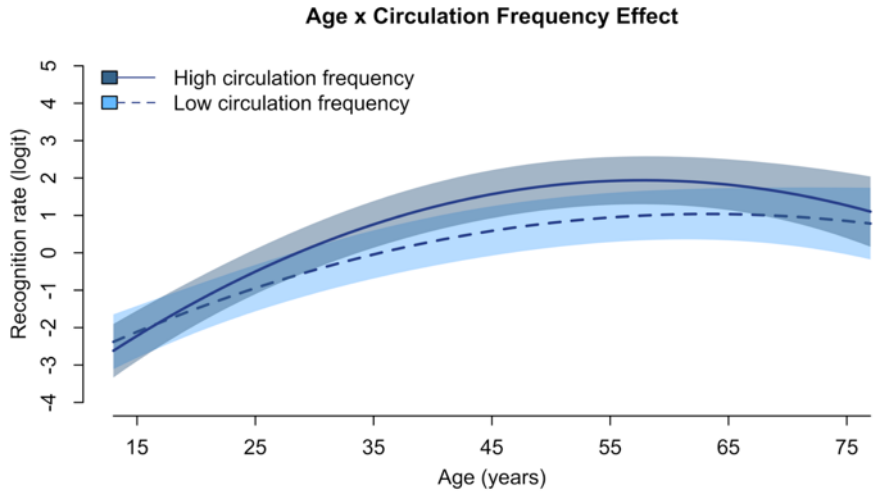


Figure 8.1 (continued). Mean author recognition rate as a function of mean publication year and subject age (b), as a function of literary level and subject age (c), and as a function of book circulation frequency and subject age (d) with 95% confidence intervals.

Interactions. There were significant interaction effects between age and mean publication year, age and literary level, and age and circulation frequency (see Figures 8.1b to 8.1d). To investigate these interactions, we tested the significance of the author variables at each age point (ages 15, 25, 45, 65, and 75). If contrasts indicated that the author variable effect was significant at more than one age point (e.g., at age 15 and at age 25), then we tested whether the author variable effect changed between ascending age points (e.g., author variable effect at age 15 versus effect at age 25) to compare the progression of the interaction effects.

Age x mean publication year. We compared the recognition probabilities for the mean publication years 1965 versus 2015. Post hoc comparisons showed that the recognition probability was different between 1965 and 2015 at ages 15, 25, 45, 65, and 75 all *t*s > 3.03, all *p*s < .01. At all age points, classic authors (mean publication year 1965) were more likely to be recognized than recent authors (mean publication year 2015). Further post hoc comparisons showed that this effect did not increase between ages 15 and 25 ($t = 1.60$, $p = .11$), but between ages 25 and 45 ($t = 2.57$, $p = .01$), between ages 45 and 65 ($t = 4.88$, $p < .001$), and between ages 65 and 75, $t = 4.50$, $p < .001$. Inspection of Figure 8.1b suggests an overall steeper increase of recognition probability for 1965 versus 2015. Post hoc comparisons confirmed this: The recognition probability for 1965 increased between ages 15 and 25, 25 and 45, and 45 and 65, all *t*s > 2.51, all *p*s < .05. The increase between ages 65 and 75, however, was not significant, $t = 0.46$, $p = .65$. For 2015, the recognition probability only increased between ages 15 and 25 ($t = 8.98$, $p < .001$) and ages 25 and 45 ($t = 10.33$, $p < .001$), but not between ages 45 and 65, $t = -1.84$, $p = .07$. Between ages 65 and 75, the recognition probability for 2015 decreased significantly, $t = -4.37$, $p < .001$.

Age x literary level. We compared the recognition probabilities for popular versus highbrow literature authors at ages 15, 25, 45, 65, and 75. Post hoc contrasts indicated that the recognition probability of highbrow versus popular literature authors differed at age 15 ($t = 3.00$, $p < .01$) and at age 25 ($t = 2.36$, $p = .02$). In contrast, the difference was not significant at age 45 ($t = 1.11$, $p = .27$), at age 65 ($t = 0.09$, $p = .93$), and at age 75, $t = -0.32$, $p = .75$. The interaction is shown in Figure 8.1c. From age 15 to age 25, readers recognize popular literature authors with a higher

probability than highbrow literature authors. Between middle age and old age, recognition probability is apparently not related to literary level.

Age x circulation frequency. We compared the recognition probabilities of authors with higher circulation frequency (+ 1 *SD*) versus lower circulation frequency (-1 *SD*) at ages 15, 25, 45, 65, and 75. Post hoc contrasts indicated that the recognition probability differences were not significant at age 15 (t = 0.51, p = .61) and at age 25, t = 0.98, p = .33. By contrast, the recognition probability difference was significant at age 45, t = 2.37, p = .02. Again, the recognition probability difference was not significant at age 65 (t = 1.67, p = .10) and at age 75, t = 0.53, p = .59. Thus, there was a significant recognition probability difference only for middle-aged readers, who were more likely to recognize authors with a higher circulation frequency than authors with a lower circulation frequency (see Figure 8.1d). In contrast, recognition probability was not related to circulation frequency for adolescents, young adults, and older adults.

In sum, our analyses indicate that (a) there is a positive, curvilinear relation between age and print exposure, and that this curve reaches a plateau around age 45 which slightly drops off again after age 65, (b) authors' mean publication year is negatively related to author recognition probability, with classic authors more likely to be recognized than recent authors, and (c) that age moderates the effects of mean publication year, literary level, and circulation frequency. Regarding interaction effects, the effect of mean publication year increased between ages 25 and 75. In contrast, the effect of literary level was only significant at ages 15 and 25, and the effect of circulation frequency was only significant at age 45. Taken together, our results suggest that item effects vary between adolescence and old age. The mean publication year effect is comparatively small for adolescents and young adults but increases significantly between ages 25 and 75.

8.5 Discussion

The present study investigated print exposure differences in a sample of 13- to 77-year-old readers. Our study extends previous research investigating age differences in author recognition probability (Stanovich et al., 1995) by analyzing how the relation between age and author recognition probability is moderated by author variables. We found a positive, curvilinear relation between age and print exposure and that the curve plateaus between age 45 and age 65, after which it

slightly drops off. In addition, author recognition probability was negatively related to mean publication year and positively related to circulation frequency. Importantly, the relation between age and print exposure was moderated by mean publication year, literary level, and circulation frequency.

Print Exposure in Life Span Studies: The Key Role of Authors' Mean Publication Year

Overall, print exposure increased between adolescence and old age, which is in line with the results of three previous studies (Choi et al., 2017; Lui et al., 2016; Payne et al., 2014). This result contrasts with two studies that did not find age differences in print exposure between young and older adults (Stanovich et al., 1995; West et al., 1993). Contrary to the assumption that print exposure accumulates throughout adulthood (Stanovich et al., 1995), we found a slight decline of the recognition probability curve between age 65 and age 75. This drop-off, however, was driven by older adults' lower recognition rates for recent authors (see Figure 8.1b). Our results suggest that older adults prefer to read classic authors and are less familiar with recent authors.

More importantly, we did not find an increase of print exposure between middle adulthood and old age (see Figure 8.1a), which can be explained by the interaction between age and mean publication year. In particular, between adolescence and old age, the recognition probability for classic authors was higher than the recognition probability for recent authors (see Figure 8.1b). The likelihood of recognizing classic authors increased between adolescence and old age, but the likelihood of recognizing recent authors only increased between adolescence and middle age. This differential trajectory could be related to decreases in the amount of cultural activities and openness to new experiences between middle adulthood and old age (Schwaba et al., 2018). In line with this interpretation, a life span study has found that less openness to new experiences is related to a lower reading frequency (Kraaykamp & van Eijck, 2005). Another explanation for this pattern of results is that the years between adolescence and middle adulthood are formative regarding cognitive and cultural identity development, resulting in a heightened memory for experiences from this life phase (Rubin et al., 1998).

The shape of the interaction between mean publication year and age explains why studies from the 1990s did not find print exposure differences between age

groups whereas more recent studies consistently report a positive correlation between print exposure and participant age. In the present study, the recognition probability curve for the mean publication year 1965 is based on classic authors. This curve increases between adolescence and old age. Similarly, studies that used an updated ART version with a large proportion of classic authors (Acheson et al., 2008) also reported positive correlations between age and print exposure. By contrast, the recognition probability curve for the mean publication year 2015 is based on recent authors. This curve increases between adolescence and middle adulthood, and then decreases slightly. Similarly, studies that used the original ART with a large proportion of recent authors (Stanovich & West, 1989) did not report print exposure differences between young and older adults.

Implications, Limitations, and Conclusion

Our results imply, first, that author variables should be used for the item selection in the ART because they are related to author recognition probability even after controlling for age effects. The differential mean publication year effect increased between ages 25 and 75, which explains previous contradicting results regarding the relation between age and print exposure. Revisions of the ART should report author variables and test the equivalence of measurement properties. In the long term, this will lead to a better comparability of ART versions and a better replicability of results across time and cultures.

Second, the interaction between participant age and mean publication year implies that there is a connection between the mean publication year of author items and the reading experience they measure. Selecting more authors with a high mean publication year optimizes the estimation of recent reading experiences between adolescence and middle adulthood. At the same time, such a focus on recent authors could result in an underestimation of older adults' print exposure because they are presumably less likely to read books from recent authors. On the other hand, selecting more authors with a low mean publication year might result in an underestimation of young and middle-aged adults' recent reading experiences. As a solution to this predicament, life span studies could use comprehensive recognition checklists with authors from the last three or four decades. ARTs that are tailored to participants' reading preferences explain additional variance in outcome measures over and above ARTs that are not adapted to their reading

preferences (Mar & Rain, 2015; Martin-Chang, Kozak, & Rossi, 2019; Spear-Swerling, Brucker, & Alfano, 2010). An ART version for life span studies could be constructed by selecting and combining author items from previous ART versions (Acheson et al., 2008; Moore & Gordon, 2015; Stanovich et al., 1989). Including the mean publication year as a continuous variable in moderation analyses would allow an investigation of current versus earlier reading experiences on cognitive outcome measures.

A third implication of our results is that, between middle age and old age, readers are less likely to gain new vocabulary and cultural knowledge from reading recent authors than adolescents and young adults. This should be taken into account when assessing crystallized abilities. For life span studies, vocabulary test items could be selected on the basis of the word frequency in book corpora that comprise the works of ART authors from different decades. This approach would both minimize age biases and allow the investigation of word learning from book reading in different life phases.

Regarding limitations, the authors included in the original ART (Stanovich & West, 1989) were almost exclusively popular literature authors. By contrast, the ART in this study contains about 50% of highbrow literature authors, some of which are commonly read at school and college. Our results, however, show that at ages 15 and 25, readers are more likely to recognize popular literature authors than highbrow literature authors (see Figure 8.1c). Popular literature is usually read during leisure time. Therefore, the estimation of students' print exposure in the present study is probably not unduly biased by in-school reading. Moreover, our results are based on cross-sectional data and we therefore cannot differentiate between age and cohort effects. Future studies with cohort-sequential designs that incorporate longitudinal data from different cohorts would be ideal to disentangle these effects. Future studies could also use print exposure scores for different decades to investigate their respective effects on reading and language skills, which would shed further light on how individual differences in these skills develop across the reading life span.

In conclusion, this study found that print exposure differed significantly between adolescence and old age. This difference depended on the authors' mean publication year, and to a smaller degree also on the literary level and circulation

frequency of authors' books. The recognition probability of classic authors increased throughout adolescence and old age whereas the recognition probability of recent authors increased only between adolescence and middle adulthood. This differential effect explains why ART versions with a larger proportion of classic authors produced significant age differences in print exposure whereas ART versions with a larger proportion of recent authors did not produce age differences. Consequently, the mean publication year of an author's works, along with other author variables such as literary level and circulation frequency, should be taken into account when updating the ART.

9 Effects of preschoolers' storybook exposure and literacy environments on lower level and higher level language skills

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9.1 Abstract

The development of preschoolers' language skills is influenced by literacy environments and individual differences in storybook exposure. Extant research is limited as most studies (a) investigate the effects on lower level language (LLL; e.g., vocabulary, grammar), but not the effects on higher level language (HLL; e.g., comprehension monitoring, narrative comprehension), and (b) focus on shared reading in the home literacy environment (HLE), but not on the child care literacy environment (CCLE) and the child as active literacy agent. We addressed these two gaps. First, we investigated the contributions of the HLE and the CCLE to the storybook exposure of 201 German preschoolers (M_{Age} = 5;5 years). A multilevel model showed that parents' storybook exposure was the most important predictor of children's storybook exposure. By contrast, child care workers' storybook exposure was not a significant predictor. Second, we explored the unique contributions of HLE, CCLE, and preschoolers' storybook exposure to LLL and HLL skills. Multilevel models showed that children's storybook exposure explained unique variance not only in LLL skills, but also in HLL skills. Literacy environments explained additional variance in LLL skills. In sum, our results suggest that literacy environments are differentially related to children's storybook exposure and language skills. Our finding that children's storybook exposure was a unique predictor of vocabulary, grammar, comprehension monitoring, and narrative comprehension indicates that shared book reading has the potential to foster a range of early literacy skills which predict reading comprehension.

9.2 Introduction

Reading comprehension difficulties in primary school can often be traced back to poor oral language skills which were already present at school entry (Nation et al., 2010). About 10% of primary school children develop reading difficulties due to poor language comprehension (Catts, Compton, Tomblin, & Bridges, 2012). Comprehension comprises several components. Vocabulary and grammar are important for processing on the word and the sentence level, and thus labelled as lower level language skills (LLL skills). Skills such as comprehension monitoring and narrative comprehension are necessary for the further integration of propositions and the formation of a situation model, and thus labelled as higher level language skills (HLL skills; Cain, Oakhill, & Bryant, 2004). Vocabulary and grammar in kindergarten are predictors of reading comprehension in primary school (Muter, Hulme, Snowling, & Stevenson, 2004). Studies indicate that HLL skills are concurrent and longitudinal predictors of early reading comprehension over and above LLL skills (Catts et al., 2015; Lepola et al., 2012; Kim, 2014; Silva & Cain, 2015).

Shared storybook reading potentially benefits LLL and HLL skills. Numerous studies indicate that storybooks are important for vocabulary development, presumably because they provide linguistic diversity (Montag, Jones, & Smith, 2015). Intervention studies show that shared reading benefits preschoolers' acquisition of HLL skills (Lever & Sénéchal, 2011; Zevenbergen, Whitehurst, & Zevenbergen, 2003). However, it is unclear whether shared storybook reading at home and at the child care center is related only to vocabulary, or to different language skills. Children in Germany experience shared reading both in the home literacy environment (HLE) and the child care literacy environment (CCLE), but it is unknown to which extent different literacy agents (e.g., parents, child care workers, children) contribute to LLL and HLL skills.

Most kindergarten children regularly experience shared storybook reading in the HLE and in the CCLE (Davidse, de Jong, Bus, Huijbregts, & Swaab 2011; Wirts et al., 2017). However, it is unclear how effective shared storybook reading is in these two settings regarding children's storybook exposure, which can be measured by a storybook title recognition test. Storybook title recognition tests are based on the rationale that a person who participates in more storybook reading activities should

know more storybook titles and thus recognize more titles in a list of selected storybook titles than a person who participated in fewer storybook reading activities. To control for guessing, storybook title recognition tests also comprise foil titles (Sénéchal et al., 1996).

A differentiation of the relations between literacy agents and preschoolers' language skills can contribute to the advancement of early literacy models (e.g., the *Home Literacy Model* by Sénéchal & LeFevre, 2014) and early language education programs (Anders, Rossbach, & Tietze, 2016). Consequently, the first aim of our study is to identify which literacy environments are particularly important for preschoolers' storybook exposure. The second aim of this study is to investigate the unique contributions (a) of preschoolers' storybook exposure and (b) of the HLE and the CCLE to preschoolers' LLL and HLL skills.

Literacy Environments and Children's Storybook Exposure

Preschoolers rely mostly on adults for storybook reading. Even though enrollment is voluntary in Germany, 94% of the three to five-year-olds attend a child care center, where they spend a significant proportion of their time (in average 35 hours per week; Statistische Ämter des Bundes und der Länder, 2016). Surveys show that most child care workers read to children on a daily basis (Wirts et al., 2017), and also that most parents read daily to their children (Davidse et al., 2011; Phillips & Lonigan, 2009; Sénéchal et al., 1996; Sénéchal, Pagan, Lever, & Ouellette, 2008). Children experience a comparable amount of shared reading in these literacy environments, but the reading situations are very different. For example, parents often read to one child, but child care workers usually read to small groups of children (Wirts et al., 2017) which may reduce its effectiveness. Parents adjust literacy activities to the development of their children's skills (Sénéchal & LeFevre, 2014), but for child care workers, it may be difficult to adjust their shared reading activities to the needs of all children. In the CCLE, shared reading provides less individual interaction time than in the HLE, and thus may be less beneficial for language development. In sum, shared reading in the HLE is probably more effective than shared reading in the CCLE. We assessed preschoolers' effective exposure to storybooks with an audio storybook recognition test (Grolig et al., 2017). The first aim of our study is to investigate whether shared reading in the HLE is more strongly related to preschoolers' storybook exposure than shared reading in the CCLE.

Relations of Children's Storybook Exposure and Literacy Environments to LLL and HLL Skills

Many studies have investigated the connection between shared reading and language skills. In a meta-analysis, Mol and Bus (2011) note as a main limitation that most of the studies used parents' storybook exposure or a parent questionnaire to assess shared reading and related this to children's language skills. Two shortcomings of these measures could diminish the correlations between shared reading and children's language skills. First, it is doubtful that parents' storybook exposure is an adequate proxy of children's shared reading experiences. For example, parents might recognize a storybook title because they saw it in a bookshop, or from their own childhood experiences. In addition, children experience shared reading activities not only at home, but also in other literacy environments such as the child care group. Second, parents tend to overstate the amount of shared reading activities at home because most of them are aware that reading to children is socially desirable (DeBaryshe, 1995). A few studies have circumvented these methodological issues and assessed shared reading by using tasks which allowed them to ask children directly about their storybook knowledge (Davidse et al., 2011; Sénéchal et al., 1996; Zhang et al., 2017).

To shed light on the relations of children's storybook exposure and literacy environments to LLL and HLL skills, we first discuss studies which employed child-completed storybook knowledge tasks. We then turn to studies which used adult-completed storybook recognition tests or literacy questionnaires as proxies of shared reading in order to investigate the relation of the HLE and the CCLE to preschoolers' language skills. Our study aims to extend this evidence by determining the unique contributions of preschoolers' storybook exposure, HLE, and CCLE to different language skills.

Children's storybook exposure and language skills. Two studies used a storybook knowledge task (Davidse et al., 2011; Sénéchal et al., 1996) in which children were presented illustrations and asked to name the book's title. To ensure that children were not guessing, they were asked to report some of the specifics (e.g., characters' names, plot). Similarly, Zhang and colleagues (2017) used a storybook knowledge task in which children were asked to freely recall as many storybook titles as possible and to provide basic information on each story. The correlations

between children's storybook knowledge and vocabulary were moderate to strong, and storybook knowledge was a unique predictor of vocabulary, explaining a substantial amount of unique variance. Storybook knowledge explained between 6% and 36% of variance in vocabulary, depending on the inclusion of other variables in the models (e.g., control variables such as age, socioeconomic status, verbal short-term memory, and nonverbal intelligence, see Davidse et al., 2011; Sénéchal et al., 1996; numerous literacy environment variables, see Zhang et al., 2017).

To our knowledge, no previous study has investigated the relations between children's performance in a storybook exposure task and children's language skills aside from vocabulary. From a corpus linguistics perspective, storybooks exhibit many characteristics which suggest that their use in shared reading sessions has the potential to foster grammar, comprehension monitoring, and narrative comprehension skills. Storybooks contain much more low frequent words than average child-directed speech (Massaro, 2015; Montag et al., 2015) and feature complex grammatical forms which rarely occur in child-directed speech outside shared book reading situations (Cameron-Faulkner & Noble, 2013). They also possess diverse narrative structures which could foster children's comprehension monitoring and narrative comprehension skills (Connor et al., 2014; Pantaleo & Sipe, 2012). Consequently, this study examines the relations between preschoolers' storybook exposure and different LLL and HLL skills.

Literacy environments and children's language skills. In a meta-analysis, Mol and Bus (2011) found that parents' storybook exposure and HLE questionnaires explained the same amount of variance in preschoolers' vocabulary skills. A title recognition test is a relatively narrow measure of shared reading activities in comparison to literacy environment questionnaires, whose items usually touch not only on shared reading, but also on other literacy activities and resources which are more remotely related to shared reading (e.g., Niklas & Schneider, 2013). The results of Mol and Bus (2011) suggest that the general HLE and the specific shared reading activities are of comparable importance for vocabulary skills. Both parents' storybook exposure and HLE questionnaires are not only proxies of shared reading but are also positively related to parental literacy (Sénéchal et al., 1996; Sénéchal, et al., 2008; Weigel et al., 2005). As adults' literacy is positively related to adults' vocabulary skills (Mol & Bus, 2011; Stanovich, West, & Harrison, 1995), this has

presumably consequences for the linguistic characteristics of everyday communication, which has a significant impact on children's language development at home (Rowe, 2012). This plausibly explains why both narrow and broad measures of shared reading in the HLE predict preschoolers' vocabulary skills.

Whereas many studies have found a positive relation between the HLE and vocabulary (see Mol & Bus, 2011), few studies have investigated the relations of the HLE with preschoolers' LLL and HLL skills besides vocabulary. Weinert and Ebert (2013) found a positive relation between syntactic comprehension growth and the HLE of German preschoolers. In a study with four-year-old Canadian children, parents' storybook exposure was a unique predictor of morphological comprehension but did not predict syntactic comprehension or narrative abilities (Sénéchal, Pagan, Lever, & Ouellette, 2008). In contrast, a Dutch study found that shared reading and storytelling at home predicted narrative comprehension in 4-year-olds (Leseman et al., 2007). As a composite score of reading and storytelling activities was used, it is unclear whether the positive relation to narrative comprehension was primarily due to shared reading or storytelling. To the best of our knowledge, no previous study has examined the relation between comprehension monitoring and the HLE. In sum, there is scarce and conflicting evidence concerning the relations between shared reading at home and language skills other than vocabulary.

Few studies have examined the concurrent contributions of the HLE and the CCLE to children's LLL skills. Even though title recognition tests should reflect the amount of shared reading provided by a child care worker, they have to date not been used in this context. Instead, to capture the literacy activities and resources in a child care group, questionnaires are often used (e.g. Hachfeld & Anders, 2016; Tietze, Schuster, Grenner, & Rossbach, 2007). A German large-scale study found that the CCLE does not have a significant effect on the growth of vocabulary (Ebert et al., 2013) or grammar skills (Weinert & Ebert, 2013), but the HLE was positively related to the growth of both skills. The authors assume that the low average quality and a restricted variance of the CCLE are the reasons for the lack of positive effects (Ebert et al., 2013; Weinert & Ebert, 2013). In contrast, a U.S. study (Weigel et al., 2005) found that the frequency of reported literacy activities at home and in the child care group was about equally high. Over and above the effects of the HLE, the frequency

of preschool teachers' literacy activities was a significant predictor of vocabulary skills growth, but did not predict grammar skills growth (Weigel et al., 2005). To our knowledge, relations between CCLE variables and HLL skills have not been investigated. Overall, previous studies suggest that the CCLE in Germany is not related to children's LLL skills, even though there is evidence linking an enriched CCLE to children's vocabulary skills. Moreover, little is known about the relation between HLE and LLL and HLL skills besides vocabulary. This study thus aims to determine the unique contributions of the HLE and the CCLE to LLL and HLL skills over and above preschoolers' storybook exposure.

The Present Study

The purpose of this study is to enhance our understanding of the relations between preschoolers' literacy environments, their storybook exposure, and a variety of their language skills. Three interconnected questions guide our analyses.

First, our study examines how literacy environments are related to preschoolers' storybook exposure. Considering that most parents and child care workers read daily to children (Davidse et al., 2011; Sénéchal et al., 1996; Wirts et al., 2017), we hypothesize that both literacy environments will explain a significant amount of variance in preschoolers' storybook exposure. Due to structural differences in the shared reading situations, we hypothesize that parents' storybook exposure will explain more variance than child care workers' storybook exposure.

Second, we investigate the relations of preschoolers' storybook exposure with LLL skills and HLL skills. On the basis of previous studies (Davidse et al., 2011; Sénéchal et al., 1996; Zhang et al., 2017), we hypothesize that preschoolers' storybook exposure is related to vocabulary. In addition, as storybooks contain complex language and narration (Cameron-Faulkner & Noble, 2013; Massaro, 2015; Montag et al., 2015; Pantaleo & Sipe, 2012), we expect that preschoolers' storybook exposure is also related to grammar and HLL skills.

Third, we investigate whether the HLE and the CCLE explain unique variance in HLL and LLL skills above preschoolers' storybook exposure. Due to connections between adults' print exposure, their vocabulary skills, and characteristics of their oral communication (Mol & Bus, 2011; Rowe, 2012; Stanovich et al., 1995), we hypothesize that shared reading in the HLE and the CCLE explains unique variance in vocabulary skills. To account for general cognitive and socioeconomic differences,

we include age, verbal short-term memory, nonverbal intelligence, and socioeconomic status as control variables in all analyses.

9.3 Method

Participants and Procedure

Data were collected as part of a larger project investigating transfer effects of early music education on cognitive development ("MusiCo"). We recruited 201 children in their last kindergarten year prior to school entry from 32 child care groups (90 girls; M_{age} = 5 years 5 months, SD = 4.4 months). Parental consent was obtained for all children. We assessed preschoolers' LLL skills (picture naming, explaining concepts, and syntactic integration), HLL skills (comprehension monitoring, narrative comprehension), storybook exposure, nonverbal IQ, and verbal short-term memory. Parents completed a questionnaire about the HLE, the socioeconomic background, and a storybook exposure checklist. Child care workers completed a questionnaire about the CCLE and a storybook exposure checklist.

Skills Assessment

Vocabulary: Picture naming. We developed a picture naming task by selecting 15 low frequent nouns (normalized lemma frequency/million: M = 7.41; SD = 6.32) from the corpus *childLex* (Schroeder, Würzner, Heister, Geyken, & Kliegl, 2015). We selected 15 corresponding pictures of these objects from 15 different picture books. Children were asked to name the objects by the target words (for example, "anorak" or "rowboat"). If they produced words that were similar to the target words (for example, "jacket", "boat"), they were asked to produce alternative labels for the object until they produced the target word, or until they could not think of any more alternative label. Children received one point for each target word, and zero points for a similar word.

Vocabulary: Explaining concepts. Participants were asked to explain 14 concepts (vocabulary subtest of the German Wechsler Preschool and Primary Scale of Intelligence; Petermann, 2009). Children received up to two points for each item. Scoring was based on the precision of the children's explanation. Two points were awarded for one or two essential semantic features, or at least two important, but not essential semantic features which demonstrated that the child had a comprehensive understanding of the concept. One point was awarded for an

important, but not essential semantic feature, or for an appropriate example which demonstrated that the child had a proper, but not comprehensive understanding of the concept.

Syntactic integration. Children listened to 16 sentences from the syntax subtest of the German reading comprehension test ProDi-L (Richter, Isberner, Naumann, & Kutzner, 2012). Participants decided whether a sentence was grammatically correct or incorrect. Seven sentences were grammatically correct. Nine sentences were incorrect regarding tense, word order, or case. Children received one point for each correct answer.

Comprehension monitoring. Participants listened to 16 short stories that consisted of two sentences each (selected from the comprehension monitoring subtest of ProDi-L, Richter et al., 2012). The combination of sentences was either plausible or implausible. Participants decided whether both sentences went together or not. The sentences of seven items had a temporal or causal connection. Nine items' sentences were not interconnected. Children received one point for each correct answer.

Narrative comprehension. We used a task that was developed by Paris and Paris (2003) and adapted by Silva and Cain (2015). It consisted of three parts: First, children were asked to look through a wordless picture book (*Frog on His Own*; Mayer, 1973). Second, children were asked to tell the story with the picture book as a prompt. Third, nine narrative comprehension questions were asked. Five questions tapped implicit information and thus required inference generation skills (dialogue, feelings, prediction, and theme). Four questions tapped information that was explicitly stated in the picture book but had to be integrated across pages (characters, setting, problem identification, and resolution). Answers were transcribed and coded according to the scheme of Silva and Cain (2015). Children received one point if their answer contained the requested element (e.g., plausible thoughts). If the answer also contained an elaboration of the element (e.g., the cause of the thoughts), children received an additional point. Twenty percent of participants' responses were coded by a second rater to determine the interrater reliability.

Children's storybook exposure. Children completed an auditory version of the title recognition test for preschoolers (TRT; Grolig et al., 2017), which is an adaptation of the title recognition test by Sénéchal and colleagues (1996). The TRT

consists of 20 real titles and 10 foils. Children indicated via computer button press whether they recognize a title. A corrected score was computed by subtracting the proportion of selected foils from the proportion of selected titles. None of the books used for the picture naming task was used in the TRT.

Literacy Environment Measures

Home literacy environment. Parents completed a HLE questionnaire for preschool age (Niklas & Schneider, 2013). Items cover heterogeneous aspects of the HLE, including literacy resources (number of books and children's books owned by the household, newspaper subscription), literacy activities (shared reading frequency, age when shared reading started), parental literacy (parents reading frequency), and TV consumption.

Child care literacy environment. Child care workers completed an adapted version of the K2ID questionnaire (Hachfeld & Anders, 2016; based on KES-R; Tietze et al., 2007). The items cover various aspects of the CCLE, in particular literacy resources (e.g., picture books, storybooks, books for children learning to read; 0 = *not available*, 1 = *available to less than half of the children*, 2 = *available to half of the children*, 3 = *available to nearly all of the children*) and literacy activities (e.g., reading aloud, storytelling in the group, language games; 0 = *never*, 1 = *less often than once a month*, 2 = *once a month*, 3 = *every other week*, 4 = *once a week*, 5 = *multiple times per week*, 6 = *daily)*.

Storybook exposure of parents and child care workers. To estimate storybook exposure as a more narrow measure of shared reading, parents and child care workers also completed the TRT-VS (Grolig et al., 2017). They indicated on a printed checklist whether they recognized a title. As in the computer version, a corrected score was calculated by subtracting the proportion of selected foils from the proportion of selected titles. Importantly, storybook exposure of parents and child care workers is an indirect measure of preschoolers' storybook exposure in comparison to the direct recognition of storybook titles by preschoolers. Due to a large conceptual overlap between the variables and their common use of the recognition method, all three variables are labelled as storybook exposure.

Control Variables

Nonverbal IQ. Children completed the subtests Classifications, Matrices, and Completing Sequences from the Culture Fair Intelligence Test (German version of the CFT 1-R; Weiß & Osterland, 2013). The raw scores were added to form a single scale.

Verbal short-term memory. Children completed a standardized digit span forward test (BUEVA; Esser, 2002). If children solved an item in the first attempt, they received two points. If they solved an item in the second attempt, they received one point.

Socioeconomic status. The parental occupation was coded according to the ISEI manual (Ganzeboom & Treiman, 1996). The higher score was used as indicator of the socioeconomic status.

Statistical Analysis

All analyses were conducted with the software *R* (R Core Team, 2017). There were zero to seven missing values per measure (total of 2.8% missing data, see Table 9.1). To examine the relations between literacy agents' variables and language skills, we first estimated correlations between all variables. The measures in this study exhibited reliability differences that can bias the estimation of relations between variables (Schmidt & Hunter, 1999). Therefore, we also report attenuation-corrected correlations, which estimate the correlation between two measures as if both had a reliability of 1. It is calculated by dividing the observed correlation coefficient of measures A and B by the product of the square roots of the reliability estimates of measures A and B (Cohen et al., 2003). Attenuation-corrected correlations were estimated by using the correct.cor function from the *psych* package (Revelle, 2017). Second, to explore the relations between preschoolers' storybook exposure, literacy environments, and language skills, we fitted multilevel models with the package *lme4* (Bates, Maechler, Bolker, & Walker, 2015). To account for child care group differences, each model included random intercepts for the child care groups (Bliese & Ployhart, 2002). In order to avoid loss of statistical power and minimize bias due to missing data (Peugh & Enders, 2004), we used the package *pan* for multiple imputation (Zhao & Schafer, 2016) to create 100 complete datasets, which were then used for parallel analyses. The final parameter estimates and inferences were then calculated across the imputed datasets according to Rubin's rules with the package *mitml* (Grund, Lüdtke, & Robitzsch, 2016).

9.4 Results

Descriptive Statistics

Table 9.1 provides descriptive statistics and reliability coefficients for all measures before the imputation procedure. Children's mean scores in standardized measures (explaining concepts, nonverbal IQ, and digit span) were similar to the tests' mean scores, indicating an averagely developed sample. The mean HLE and CCLE scores approached the ceiling, indicating that most of the children experienced comparatively enriched literacy environments at home and at the child care center. Child care workers recognized more storybook titles than parents, and parents recognized more storybook titles than children. All variables were normally distributed. Internal consistencies (Cronbach's alpha) of the tasks were good or acceptable, with the exception of comprehension monitoring (α = .56). The interrater reliabilities for the narrative comprehension task items were good.

Correlations and Data Reduction

Table 9.2 displays the manifest and attenuation-corrected correlations between child, parent, and child care worker variables. The pattern of significant versus non-significant correlations was very similar for manifest and attenuation-corrected correlations. In addition, the pattern of correlations between comprehension monitoring and parent as well as child care worker variables was comparable to the pattern of correlations between the other language skills and the environmental variables.

Most of the parent variables and child variables were significantly related to the language skills. The HLE questionnaire and parent storybook exposure were moderately correlated to picture naming and explaining concepts. Parent storybook exposure was moderately correlated to syntactic integration, and the correlation between the HLE questionnaire and syntactic integration was small. Child storybook exposure was moderately correlated with all five language skills (picture naming, explaining concepts, syntactic integration, comprehension monitoring, and narrative comprehension). Concerning child care worker variables, there were merely two significant, albeit small correlations: The CCLE questionnaire was

Table 9.1
Descriptive Statistics for Child, Parent, and Child Care Worker Variables

Variable (max. score)	*N*	*M*	*SD*	Range	Skew	Kurtosis	Reliability
Child							
Storybook exposure (1)	200	0.37	0.21	-0.16–0.75	-0.71	-0.38	.68
Parent							
HLE questionnaire (42)	191	32.40	4.42	12–40	-1.25	2.49	.70
Storybook exposure (1)	194	0.55	0.20	0–0.85	-0.82	0.04	.73
Child care worker							
CCLE questionnaire (51)	26	41.50	4.37	28–48	-1.25	1.64	.71
Storybook exposure (1)	32	0.67	0.13	0.25–0.85	-1.19	1.51	.73
Control variables							
Age (months)	201	65.08	4.43	55–79	0.09	-0.60	-
Nonverbal IQ[a] (80)	201	48.56	5.70	35–71	0.40	0.76	.94[c]
Verbal short-term memory[a] (80)	200	49.99	8.33	29–64	-0.21	-0.85	.90[c]
Socioeconomic status (90)	194	60.59	16.60	16–89	-0.45	-0.19	-
Lower level language skills							
Picture naming (15)	201	4.50	2.85	0–12	0.35	-0.61	.71
Explaining concepts[b] (19)	201	10.30	2.71	3–16	-0.25	-0.35	.88[d]
Syntactic integration (16)	201	9.91	2.84	3–16	0.03	-0.79	.60
Higher level language skills							
Comprehension monitoring (16)	201	10.55	2.28	5–16	-0.09	-0.79	.56
Narrative comprehension (18)	197	8.84	2.94	1–16	-0.26	-0.13	.72-.95[e]

Note. Raw scores are displayed if not otherwise noted. Internal consistency (Cronbach's alpha) is displayed as measure of reliability if not otherwise noted.
[a]Standardized score (means of 50, standard deviation of 10). [b]Standardized score (means of 10, standard deviation of 3).
[c]Reported re-test reliability. [d]Reported split-half reliability. [e]Reliability coefficients for single items: Cohen's Kappa.

Table 9.2
Correlations between Literacy Agents Variables, Children's Language Skills, and Control Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Child														
1. Storybook exposure	(.68)	.57	.64	.09	-.14	.00	.31	.28	.41	.62	.49	.63	.52	.38
Parent														
2. HLE questionnaire	.39	(.70)	.52	.26	.01	-.10	.15	.20	.50	.54	.43	.35	.40	.16
3. Storybook exposure	.45	.37	(.73)	.04	.00	-.05	.19	.04	.19	.61	.41	.47	.39	.17
Child care worker														
4. CCLE questionnaire	.05	.16	.02	(.71)	.47	-.17	.02	.01	.17	.31	.28	.09	.02	.03
5. Storybook exposure	-.09	.03	.01	.31	(.73)	-.04	-.05	.05	.14	.06	.05	-.03	.02	.00
Control variables														
6. Age	.00	-.08	-.04	-.19	-.03	(1.0)	-.07	-.07	-.10	.20	-.06	.26	.19	.12
7. Nonverbal IQ	.25	.12	.16	.04	-.03	-.07	(.94)	.32	.20	.21	.33	.24	.33	.11
8. Verbal short-term memory	.22	.16	.03	.15	.10	-.07	.29	(.90)	.23	.26	.35	.26	.24	.34
9. Socioeconomic status	.34	.42	.16	.14	.15	-.10	.19	.22	(1.0)	.42	.34	.25	.32	.15
Lower level language skills														
10. Picture naming	.43	.38	.44	.22	.06	.17	.17	.21	.35	(.71)	.67	.66	.54	.33
11. Explaining concepts	.38	.34	.33	.22	.01	-.06	.30	.31	.32	.53	(.88)	.59	.54	.44
12. Syntactic integration	.40	.23	.31	.02	.01	.20	.18	.19	.19	.43	.43	(.60)	.64	.42
Higher level language skills														
13. Comprehension monitoring	.32	.25	.25	.01	.01	.14	.24	.17	.24	.34	.38	.37	(.56)	.35
14. Narrative comprehension	.29	.12	.13	.00	-.01	.11	.10	.30	.14	.26	.38	.30	.24	(.85)

Note. HLE, home literacy environment; CCLE, child care literacy environment. Reliabilities are displayed in the diagonal in parentheses. For Age and Socioeconomic status, a reliability of 1 was assumed. Manifest correlations are displayed below the diagonal; attenuation-corrected correlations are displayed above the diagonal. Correlation estimation between child care group-level variables and individual-level variables takes the multilevel data structure into account by adding group as a random effect in the correlation model. All correlations larger than |.13| (child and parent variables) and |.21| (child care worker variables) are significant ($\alpha = .05$, two-tailed).

correlated with both vocabulary measures (picture naming, explaining concepts). In contrast, child care worker storybook exposure was not related to any of the language skills.

To reduce the number of outcome measures, we inspected the correlations between language skills. All language skills were significantly interrelated. The moderate to small correlations indicated a modest amount of overlap. The correlation between picture naming and explaining concepts was comparatively strong (r = .53), and the two variables were z-standardized and averaged to form a vocabulary composite.

Multilevel Analyses

To determine the relations between child storybook exposure, literacy environments, and language skills, we conducted multilevel regression analyses in which we controlled for age, nonverbal IQ, verbal short-term memory, and socioeconomic status. The models included random intercepts for the child care groups to account for the dependency of observations within a child group.

Relations of literacy environments to children storybook exposure. We investigated the contributions HLE and CCLE variables to child storybook exposure. A multilevel regression model with HLE questionnaire, parent storybook exposure, CCLE questionnaire, and child care worker storybook exposure as fixed effects was fitted. Table 9.3 summarizes the results of this model.

In line with our first hypothesis, parent storybook exposure was the most important predictor, explaining about 10% of unique variance in child storybook exposure. Contrary to our expectation, child care worker storybook exposure was not related to children's storybook exposure. Socioeconomic status was the sole control variable to explain unique variance in children's storybook exposure. A very low intra-class correlation indicated that differences in child storybook exposure were not due to differences in child care groups that were not accounted for by the child care worker variables. The inclusion of interaction terms did not improve the model fit. The results suggest that parent storybook exposure, a proxy of shared reading in the HLE, is more closely related to child storybook exposure than child care worker storybook exposure which is not a significant predictor of child storybook exposure.

Table 9.3
Multilevel Analysis of Literacy Environments Variables as Predictors of Storybook Exposure

	Children's storybook exposure		
Fixed effects	*B*	*SE*	R_2 unique
Parent			
HLE questionnaire	0.006	0.003	.01
Storybook exposure	0.364**	0.069	.10
Child care worker			
CCLE questionnaire	0.001	0.004	.00
Storybook exposure	-0.145	0.116	.00
Control variables			
Age	0.002	0.003	.00
Nonverbal IQ	0.004	0.002	.01
Verbal STM	0.003	0.002	.01
Socioeconomic status	0.002**	0.001	.03
Fixed effects R_2		.33	
Random effects (ICC)		.00	

Note. STM, short-term memory; HLE, home literacy environment; CCLE, child care literacy environment; ICC, intraclass correlation.
* $p < .05$. ** $p < .01$.

Relations of children's storybook exposure and literacy environments to LLL and HLL skills. We determined the amount of unique variance explained by child storybook exposure, HLE questionnaire and CCLE questionnaire in LLL skills (vocabulary, syntactic integration) and HLL skills (comprehension monitoring, narrative comprehension). For each of the four language skills, a multilevel regression model with child storybook exposure, HLE questionnaire, parent storybook exposure, CCLE questionnaire, and child care worker storybook exposure as fixed effects was fitted. Table 9.4 summarizes the results.

In line with our second hypothesis, child storybook exposure was significantly related to vocabulary, syntactic integration, comprehension monitoring, and narrative comprehension. Child storybook exposure explained between 2% and 5% of unique variance in language skills.

We found partial support for our third hypothesis in that unique vocabulary variance was explained by parent storybook exposure (5%) and the CCLE questionnaire (4%). Additionally, parent storybook exposure was a unique predictor of syntactic integration, explaining 2% of unique variance. Contrary to our

Table 9.4

Multilevel Analyses of Literacy Environment Variables and Children's Storybook Exposure as Predictors of Language Skills

	Lower level language skills						Higher level language skills					
	Vocabulary			Syntactic integration			Comprehension monitoring			Narrative comprehension		
Fixed effects	*B*	*SE*	$R_{2\ unique}$	*B*	*SE*	$R_{2\ unique}$	*B*	*SE*	$R_{2\ unique}$	*B*	*SE*	$R_{2\ unique}$
Child												
Storybook exposure	0.816**	0.266	.02	0.232**	0.064	.05	0.118*	0.054	.02	0.175**	0.065	.03
Parent												
HLE questionnaire	0.041	0.013	.01	0.003	0.003	.00	0.004	0.003	.01	0.001	0.003	.00
Storybook exposure	1.217**	0.283	.05	0.167*	0.066	.02	0.064	0.057	.00	0.033	0.070	.00
Child care worker												
CCLE questionnaire	0.047**	0.020	.04	0.004	0.004	.00	0.000	0.003	.00	0.002	0.004	.00
Storybook exposure	0.190	0.253	.00	0.015	0.112	.00	0.019	0.089	.00	0.008	0.121	.00
Control variables												
Age	0.040**	0.012	.04	0.007**	0.003	.03	0.003	0.002	.01	0.004	0.003	.01
Nonverbal IQ	0.016	0.010	.01	0.002	0.002	.00	0.004*	0.002	.02	0.000	0.002	.00
Verbal STM	0.970**	0.253	.02	0.105	0.059	.01	0.060	0.049	.00	0.194**	0.059	.05
Socioeconomic status	0.007*	0.003	.03	0.000	0.001	.00	0.001	0.001	.00	0.000	0.001	.00
Fixed effects R_2		.43			.24			.21			.16	
Random effects (ICC)		.06			.02			.00			.04	

Note. STM, short-term memory; HLE, home literacy environment; CCLE, child care literacy environment; ICC, intraclass correlation.

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

expectation, the HLE questionnaire and child care worker storybook exposure were not significant predictors of vocabulary skills. The fixed effects explained overall between 16% and 43% of variance in the language skills. The random effects of child care group explained a modest amount of variance in language skills (0-6%). The inclusion of interaction terms did not improve the models' fits.

The results indicate that children's storybook exposure is related not only to vocabulary, but also explains a significant amount of unique variance in grammar, comprehension monitoring, and narrative comprehension. Moreover, the results suggest that parents' storybook exposure and literacy activities in the CCLE explain a significant amount of variance in children's vocabulary skills over and above children's storybook exposure.

9.5 Discussion

The present study addressed two gaps in shared reading research. First, we investigated the contributions of the HLE and the CCLE to preschoolers' storybook exposure. The results of our study provide new evidence that preschoolers' recognition of storybook titles (a measure of storybook exposure) depends substantially on parents' storybook exposure, but not on child care workers' storybook exposure. Second, we determined the unique contributions of children's storybook exposure, the HLE, and the CCLE to LLL and HLL skills. Our study adds to previous research that (a) preschoolers' storybook exposure is a unique predictor not only of vocabulary skills, but also predicts grammar, comprehension monitoring, and narrative comprehension skills, (b) over and above children's storybook exposure, parents' storybook exposure and CCLE questionnaire are unique predictors of vocabulary skills, and (c) over and above children's storybook exposure, parents' storybook exposure is also a unique predictor of grammar skills.

Children's Storybook Exposure and Literacy Environments

Parents' storybook exposure explained about 10% of unique variance in children's storybook exposure. This result is in line with previous studies which showed that parents' storybook exposure was moderately correlated to children's storybook knowledge (Sénéchal et al., 1996; Zhang et al., 2017). Contrary to our expectation, the storybook exposure of child care workers and preschoolers was not related. This is surprising because child care workers' storybook exposure should reflect the amount of shared reading in the CCLE in a similar way like parents'

storybook exposure reflects the amount of shared reading in the HLE. Even though child care workers and parents report daily shared reading activities, shared reading in a child care group is plausibly less effective than shared reading with individual children, especially regarding the learning of a comparatively abstract concept such as a storybook title. Support for this interpretation comes from a meta-analysis of dialogic reading intervention studies which concludes that effects on vocabulary skills are larger for interventions that target individuals than for small or large groups (Mol, Bus, de Jong, & Smeets, 2008; but see Marulis & Neuman, 2010, for further discussion of this topic). Moreover, child care workers are presumably exposed to storybooks in many other contexts than shared reading in the child care group. For example, child care workers can learn about storybooks during their professional training, through their colleagues, and while reading to their own children. Our results suggest that child care workers' storybook exposure, as measured by the title recognition test, might not be a proximal indicator of shared reading activities in the child care group. In sum, our study shows that preschoolers' storybook exposure is significantly related to parents' storybook exposure. The moderate correlation between the two variables, however, indicates that using parents' storybook exposure as a proxy of children's shared reading experiences in the HLE might constrain the explanatory power of storybook exposure for literacy development.

Relations of LLL and HLL Skills to Children's Storybook Exposure and Literacy Environments

Children's storybook exposure explained unique variance in vocabulary skills. This finding is in line with previous studies which used a recall task as proxy of preschoolers' storybook exposure (Davidse et al., 2011; Sénéchal et al., 1996; Zhang et al., 2017). Children's storybook exposure was also a unique predictor of grammar, comprehension monitoring, and narrative comprehension. Our findings contrast in part with the results of a previous study (Sénéchal et al., 2008) which did not find that storybook exposure explained unique variance in narrative abilities. The divergent results are plausibly due to different measures of preschoolers' storybook exposure. This study used an audio recognition test with preschoolers, which is a direct measure of storybook exposure. In contrast, Sénéchal and colleagues (2008) used a parent storybook recognition checklist as a proxy of children's storybook

exposure. In our study, the overlap between children's and parents' storybook exposure is significant, but not very high, which means that parents' storybook exposure is a rather rough proxy of preschoolers' storybook exposure. As reported by Sénéchal and colleagues (2008), parents' storybook exposure was not a significant predictor of narrative comprehension in this study. In addition, the results of our study partly disambiguate the results of Leseman and colleagues (2007) by providing evidence that preschoolers' storybook exposure is a unique predictor of narrative comprehension. Whether storytelling in the HLE is also uniquely related to narrative comprehension remains to be investigated. In sum, we found that children's recognition of storybook titles, a proxy measure of shared reading, explains unique variance in comprehension monitoring and narrative comprehension. Our study expands previous research by showing that preschoolers' storybook exposure is related not only to LLL skills, but also to HLL skills, which highlights the potential of storybooks for the fostering of different language skills.

Regarding the contributions of literacy environments to preschoolers' language skills, we found that parents' storybook exposure explained unique variance in vocabulary and grammar skills over and above children's storybook exposure. This suggests that, in addition to a connection between shared reading at home and LLL skills via children's storybook exposure, there are presumably other, even more indirect connections between shared reading at home and LLL skills. Specifically, as parental literacy is positively related to both storybook print exposure (Sénéchal et al., 1996) and adult verbal abilities (Stanovich et al., 1995), this should result in linguistic differences in parent-child everyday communication which also influence children's language development (cf. Sénéchal et al., 2008). As children acquire new words and grammatical structures through exposition to parent speech (Rowe, 2012), these aspects of the HLE plausibly influence children's vocabulary and grammar skills in addition to the direct influence of shared reading.

Why did parents' storybook exposure explain unique variance in LLL skills, but not in HLL skills? In contrast to LLL skills, the acquisition of HLL skills probably depends not only on implicit influences such as speech exposition, but also on explicit expert modelling during shared reading. Studies show that dialogic reading interventions, in which instructors make use of open-ended questions to foster

children's comprehension skills, improve the oral narrative construction of preschoolers (Lever & Sénéchal, 2011; Zevenbergen et al., 2003). Thus, storybook-centered communication between parents and children presumably also helps children to develop their HLL skills, which in turn should foster children's skills to detect inconsistencies and recall important story information. Similarly, children's recognition of storybook titles is presumably promoted by extratextual talk which puts storybook contents into a meaningful broader context and highlights the storybook title as an essential feature of a book, which should make storybook titles more memorable. Thus, extratextual talk during shared reading is presumably more closely related to preschoolers' acquisition of HLL skills and recognition of storybooks than to preschoolers' acquisition of LLL skills.

In contrast to parents' storybook exposure, child care workers' storybook exposure was not related to children's language skills. This could be due to title recognition tests not being suitable for the assessment of shared reading in early childhood education, or due to a lesser degree of shared reading effectiveness in the CCLE group context. The unique contribution of the CCLE questionnaire to children's vocabulary skills suggests that the provision of various literacy activities and literacy materials in the CCLE is more strongly related to children's vocabulary skills than child care workers' storybook exposure. Overall, parents' storybook exposure and the CCLE questionnaire each explained about 4% of unique variance in preschoolers' vocabulary skills, suggesting that both HLE and CCLE are involved in preschoolers' vocabulary learning to a similar degree. This finding contrasts with a German study which did not find a positive relation between the CCLE and vocabulary skills (Ebert et al., 2013), but accords with the findings of a U.S. study (Weigel et al., 2005). The discrepancy can be resolved by differences in the average CCLE quality. In contrast to Ebert and colleagues (2013) who reported a low average CCLE quality, the amount of literacy activities and resources in the CCLE was comparatively high both in our study and in the U.S. study (Weigel et al., 2005). This suggests that only a highly enriched CCLE can contribute to preschoolers' vocabulary skills in addition to the HLE. This interpretation is supported by studies which have found that high-quality preschools, but not low-quality or medium-quality preschools had a positive effect on the language development in addition to the home learning environment (e.g., Melhuish et al., 2013).

Limitations, implications, and future directions

Among the limitations of our study, the most important pertain to the questions how differences in storybook title recognition emerge in early childhood, and how this relates to LLL and HLL skills acquisition. We cannot determine which causal mechanisms are involved in these processes because our study is correlational. Longitudinal and experimental studies should investigate how child characteristics, language skills, and parent-child interactions influence the effectiveness of shared reading regarding preschoolers' recognition of storybook titles and their acquisition of HLL skills. Disentangling the cognitive, attentional, motivational, and emotional processes involved in preschoolers' storybook title memorization should be particularly informative for shared reading research because, as our results suggest, some of these processes are presumably also essential for the acquisition of HLL skills. Audio recognition tests offer a new opportunity to study how print exposure and the development of different language and reading skills are reciprocally connected from early childhood on (cf. Mol & Bus, 2011).

In addition, the internal consistencies of some measures used in this study were comparatively low. Young children differ substantially in their ability to self-regulate during testing (Ponitz, McClelland, Matthews, & Morrison, 2009). Therefore, tests should be brief to ensure that the reliability of the assessment is not biased by differences in attention. Due to this constraint, the number of items per measure is limited, which constrains internal consistency. Even though the measures used in this study were brief, the items still covered heterogeneous aspects of the constructs with the aim of capturing the construct breadth adequately. For example, storybook exposure was assessed by a short title recognition test with 20 items, which included classic and new children's books of highly varying linguistic and narrative complexity (e.g., "The Very Hungry Caterpillar" vs. "The Gruffalo") which were written for three to eight-year-old children. Thus, the tests we used provide sufficient objectivity and content validity, but at the expense of the internal consistency. However, the correlation patterns of attenuation-corrected versus uncorrected measures were very similar. This implies that our main conclusions about the relationships between shared reading and language measures are not affected by the comparatively lower reliabilities of some

variables. Future studies should use more reliable measures, in particular for comprehension monitoring, to avoid reliability problems.

Our results encourage a new perspective on the *Home Literacy Model* (Sénéchal & LeFevre, 2014), which posits that preschoolers' shared book reading at home is related to the development of language skills, independent leisure-time reading, and primary school reading skills. The findings of our study suggest two extensions which could further improve the model's prediction of reading skills by shared reading experiences in early childhood.

First, our results suggest that parents' and children's storybook exposure is significantly related, but they do not represent the same construct (see Zhang et al., 2017, for a similar finding). As parents learn about storybooks in many situations other than shared reading with their children (e.g., newspapers and blogs, library visits, online book shops, and shared reading when they were children), they recognize, on average, more storybook titles than children do. Thus, parents' storybook exposure reflects, in addition to shared reading with their own children, numerous behaviors and preferences which are related to parents' reading habits, and thus to their language and communication skills, which in turn also influence their children's language acquisition. Parents' storybook exposure determined only a part of children's storybook exposure. As children's storybook exposure was the only variable to be significantly related to HLL skills, both learning HLL skills and recognizing storybook titles presumably require activities which foster children's engagement and participation during shared reading, such as extratextual talk. In turn, children's language development could influence the amount and quality of shared reading in time if their language skills are related to their preference for shared reading over other activities, and their capabilities for actively co-creating a shared reading situation which serves their needs. Taking into account the reciprocal relations between parents' and children's storybook exposure during the transition from preschool to primary school, and their relations to the development of early literacy skills, would enhance our understanding of the interplay between the three factors during reading acquisition.

Second, our results suggest that parents' storybook exposure and children's storybook exposure are differentially related to LLL and HLL skills. Specifically, parents' storybook exposure was related to LLL skills, but children's storybook exposure was related both to LLL and HLL skills. As a consequence, children and

parents should be conceptualized as related, but separate literacy agents in the *Home Literacy Model*.

In sum, the present study highlights the potential of storybooks for the fostering of a variety of language skills. It extends previous research by showing that a direct measure of children's storybook exposure, an audio recognition test, is related not only to vocabulary and grammar skills, but also to comprehension monitoring and narrative comprehension skills. Our results suggest that shared reading at home is more closely related to preschoolers' storybook title recognition and grammar skills than shared reading in the child care group, indicating a higher effectiveness of shared reading in the HLE than in the CCLE for these outcome variables. By contrast, parents' storybook exposure (a proxy of shared reading at home) and the broader CCLE were similarly strong related to preschoolers' vocabulary skills. Both literacy environments are equally important for this foundational language skill if the CCLE is highly enriched. In our study, parents' storybook exposure showed merely partial overlap with children's storybook exposure, which apparently limited its predictive power regarding HLL skills. The use of a storybook exposure measure which tests children's storybook recognition directly appears to assess aspects of shared reading which are not covered when parents complete storybook recognition checklists.

10 Narrative dialogic reading with wordless picture books: A cluster-randomized intervention study

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10.1 Abstract

Shared reading has the potential to promote a wide range of language skills that are important for reading acquisition. Dialogic reading interventions in preschool facilitate the acquisition of vocabulary and narrative production skills, but it is unclear (a) whether dialogic reading can also foster inferential and literal narrative comprehension and (b) whether intervention effects are maintained until the beginning of formal reading instruction. To close these two gaps, we designed and conducted a low-dose narrative dialogic reading intervention with wordless picture books. On the child care center level, 201 German preschoolers (Mage = 5;5 years) were randomly assigned to the dialogic reading group, an alternative treatment group, or a no treatment group. Hierarchical linear models showed positive effects of dialogic reading on inferential and literal narrative comprehension and on vocabulary depth and breadth. The effect on inferential narrative comprehension was maintained five months after posttest. Overall, our findings indicate that even a small amount of narrative dialogic reading has small, albeit mostly short-term effects on narrative comprehension and vocabulary skills. We conclude that narrative dialogic reading is a promising approach for supporting the development of preschoolers' inferential skills. Long-term intervention studies are needed for the evaluation of long-term effects.

GENERAL DISCUSSION

11 Shared storybook reading and the development of oral language skills

This chapter summarizes the main results from the four studies on which this dissertation is based (chapter 11.1) and discusses the dissertation's overall theoretical and practical implications as well as implications for pedagogical practice and policy (chapter 11.2). It points out limitations and directions for future research (chapter 11.3) and draws final conclusions (chapter 11.4).

11.1 Summary of main results

A sizable body of studies documents that shared storybook reading is a key activity for vocabulary acquisition in early childhood. In four studies, the present dissertation has addressed research gaps that are pivotal for advancing environmental models of literacy development and for language education practice. I developed and validated recognition tests for the objective assessment of shared storybook reading and adult leisure reading, and I investigated their relationships with questionnaire measures and preschoolers' lower level language (LLL) and higher level language (HLL) skills. To explore the potential of shared storybook reading for fostering preschoolers' oral language skills, I also developed a narrative dialogic reading intervention with wordless picture books that was employed in an intervention study in order to gain new insights regarding the implementability and individual effectiveness of dialogic reading as well as the specifity, magnitude, and sustainability of intervention effects on vocabulary and narrative skills.

The *Home Literacy Model* (Sénéchal & LeFevre, 2002, 2014) oversimplifies the roles and interplay of children, caregivers, and storybooks in shared reading activities. Due to linguistic characteristics of storybooks and extratextual talk, shared reading has the potential to facilitate the acquisition of different oral language skills that in turn predict reading comprehension in primary school. Therefore, this dissertation has aimed to scrutinize which LLL and HLL skills can be fostered through shared storybook reading. Studies 1 and 2 established the methodological basis by validating two recognition tests that measure exposure to storybooks and adult literature, respectively. Studies 3 and 4 investigated effects of shared storybook reading in the home literacy environment (HLE) and the child care literacy environment (CCLE) on preschoolers' LLL and HLL skills.

In study 1, a newly developed storybook title recognition test (TRT-VS; adapted from Sénéchal et al., 1996) for four- to seven-year-old children and their caregivers was validated. Each of the two parallel test forms consists of 20 titles of popular storybooks and, in order to control for guessing, ten fake storybook titles. Psychometric analyses, correlation analyses, and structural equation models indicated that the TRT-VS is an objective, reliable, and valid test for assessing storybook exposure in preschoolers and their parents. The TRT-VS can be completed by preschoolers as an audio decision task, allowing a direct estimation of their storybook exposure. In a structural equation model, a latent TRT variable (child TRT-VS and parent TRT-VS) explained about 46% of variance in phonological awareness skills and about 53% of variance in vocabulary skills. In the same model, a latent SES and a latent HLE questionnaire variable did not explain a significant amount of variance in these early literacy skills. Thus, the storybook TRT is a proximal measure of shared reading experiences that can be used for investigating the relation between shared storybook reading and the development of oral language skills. Consequently, the TRT-VS was used in study 3 as a measure of the storybook exposure of preschoolers, parents, and child care workers. In study 4, the TRT-VS was used to control for children's non-intervention storybook exposure and to evaluate whether effects of the narrative dialogic reading intervention are moderated by non-intervention storybook exposure.

Study 2 validated a newly developed author recognition test (ART; adapted from Stanovich & West, 1989) for 13- to 80-year-old readers. Each of the two parallel test forms consists of 50 names of bestselling authors and 25 fake author names. Psychometric analyses and an explanatory item response analysis showed that the ART is an objective, reliable, and valid measure for the assessment of print exposure across the reading life span. Therefore, the German ART can be used for the assessment of caregivers' leisure reading amount. In study 2, the print exposure of readers increased with age. Moreover, author recognition probability was negatively related to the author mean publication year. Most importantly, participant age moderated the effect of author mean publication year on author recognition probability: The recognition probability of classic authors increased between age 15 and age 65. By contrast, the recognition probability of recent authors increased only between age 15 and age 45 and did not change between age 45 and age 65. This indicates that the mean publication year is a key author variable

in the ART that should be taken into account when print exposure is assessed in age-diverse reader populations, especially if readers older than 45 years participate.

Study 3 examined to which extent different measures of shared reading and literacy environments contribute to preschoolers' storybook exposure and their LLL and HLL skills. Parents' storybook exposure explained about 10% of variance in preschoolers' storybook exposure. Three measures explained unique variance in vocabulary skills: a questionnaire that assesses activities and resources in the CCLE, parents' storybook exposure, and children's storybook exposure. By contrast, only parents' and preschoolers' storybook exposure explained unique variance in grammar skills. Finally, preschoolers' storybook exposure was the only unique predictor of the HLL skills comprehension monitoring and narrative comprehension. Interaction terms between parent and child care worker variables did not account for a significant amount of variance in children's storybook exposure or oral language skills, suggesting that the contributions of the two literacy environments are additive rather than multiplicative.

Study 4 tested the effects of a narrative dialogic reading intervention on different vocabulary and narrative skills of five-year-olds. Drawing on results from experimental shared reading research, the intervention was modified to increase children's engagement, provide stimulation on different levels of comprehension, and facilitate the acquisition of narrative skills. For the assessment of narrative comprehension and production skills, we developed coding schemes based on wordless picture books (see Appendix D). The intervention had small short-term effects on LLL and HLL skills, and the effect on one HLL skill (inferential narrative comprehension) was maintained after five months. Comparisons between the dialogic reading group, the music treatment group, and the no treatment group yielded that the music treatment did not improve oral language skills. Thus, the effects were specifically due to the contents of the dialogic reading intervention. Individual differences in children's non-intervention storybook exposure and cognitive abilities were also significant predictors of language development but did not moderate intervention gains. There were no transfer effects on narrative production skills. Together, the results provide new evidence that narrative dialogic reading can be used to foster both LLL and HLL skills in typically developing children.

11.2 Implications of the dissertation

This chapter discusses implications of the present dissertation in terms of shared storybook reading assessment (chapter 11.2.1), effects of print exposure and dialogic reading on oral language skills (chapter 11.2.2), and models of shared book reading (chapter 11.2.3). Finally, it discusses implications regarding pedagogical practice and early childhood education policy (chapter 11.2.4).

11.2.1 Assessment of exposure to storybooks and adult literature

Results from study 1 demonstrate that the storybook title recognition test (TRT) is a valid measure for the assessment of parents' storybook exposure, which is typically taken as a proxy of children's storybook exposure. Crucially, evidence from studies 1, 3, and 4 documents that, if the storybook TRT is implemented as an audio decision task, it is also a valid measure for the direct assessment of preschoolers' storybook exposure. Moreover, in study 3, preschoolers' recognition of storybooks was not related to their nonverbal IQ or verbal short-term memory, suggesting that general cognitive abilities are probably not a confound in this assessment method. Previous studies lacked a direct test of this assumption (Mol & Bus, 2011). Therefore, this method for a direct assessment of children's storybook exposure is particularly useful for determining the relation between shared reading experiences and oral language development.

Moreover, child care workers recognized more storybook titles than parents or children in study 3. However, contrary to expectation, the storybook TRT score of child care workers was not related to children's storybook exposure or oral language skills. Thus, the storybook TRT is possibly not a proxy of child care workers' shared reading activities in the child care center, presumably because child care staff is exposed to storybooks in many other contexts other than work. An alternative explanation for this lack of effects is that shared reading in the child care center is less effective than shared reading at home, which is presumably connected to preschoolers' memorization of storybook titles.

In terms of the author recognition test (ART), study 2 confirms that, between adolescence and old age, exposure to adult literature is positively related to reader age. The results, however, also reveal that this is only true for classic authors, who are often part of school reading curricula. By contrast, the recognition probability of recent authors, who are generally not read at school, only increased between ages

15 and 45, but not between ages 45 and 65. Considering that the ART is based on the assumption that leisure reading is the primary driver of individual differences in adults' language and reading abilities (Stanovich & West, 1989), this finding calls into question whether the initial conception of the ART is adequate for assessing print exposure in age-diverse samples. Originally, the ART focused on recent authors and did not contain classic authors. Our results explain why life span studies that used this ART version did not find differences between ART scores of young and older adults. Moreover, results from study 2 imply that revisions of the ART in which most of the author items are changed can alter its assessment focus from recent authors to classic authors, with the latter being more strongly related to the participants' education than the former. This would increase the overlap between the readers' education and their ART scores, reducing the validity of the ART as a measure of print exposure that is a proximal predictor of reading and language development. In comparison, education level is a more distal predictor of reading and language development. Taking into account author variables, in particular the mean publication year, appears to be crucial when updating the ART and measuring print exposure in age-diverse samples. Our results suggest that this will lead to a better comparability between ART versions from different decades and cultures and to a more exact estimation of print exposure. This will improve the reproducibility of research that uses the ART to account for individual differences in reading experience.

Overall, with respect to research methods, the development and validation of a storybook TRT and an ART for German-speaking participants is an important outcome of this dissertation. The recognition tests can be used as brief and objective tools for the assessment of children's and caregivers' storybook exposure and caregivers' exposure to adult literature, respectively. Test materials have been made publicly available (Grolig, Cohrdes, Tiffin-Richards, Schröter, Trautwein, & Schroeder, 2018). The storybook TRT has already been used in several early childhood studies (Blatter, Willard, & Leyendecker, 2018; Niklas, Lehrl, Berner, Nürnberger, & Grolig, 2019; Niklas, Wirth, Drescher, Guffler, & Ehmig, 2018; Schmalz, Mehlhase, Moll, Schulte-Körne, & Wang, 2019). For example, in a study with four-year-old children from bilingual low income families, the TRT showed good psychometric properties and was a unique predictor of children's language

skills. It explained 15% of variance in vocabulary skills over and above SES, language use in the family, and a home literacy environment questionnaire (Blatter et al., 2018).

11.2.2 Effects of book reading on preschoolers' oral language skills

Results from study 3 provide evidence that parents' TRT score predicts children's LLL skills. Importantly, a direct measure of children's storybook exposure explained additional variance in LLL skills. Moreover, previous studies have found that parents' exposure to adult literature, as measured by the ART, explains an additional 7% of variance in children's vocabulary skills above TRT or HLE questionnaire measures (Mol & Bus, 2011). To test whether the German ART (Grolig, Tiffin-Richards, & Schroeder, in press) explains incremental variance above parents' and children's storybook exposure, we conducted additional analyses for which we used the same parent and child data as in study 3 (see Appendix E). However, as we had developed the ART only by summer 2016, parents did not complete this test until the first follow-up measurement of the intervention study, which was in autumn 2016. Therefore, only 133 parents completed the ART (corrected hit rate: M = 0.45, SD = 0.24). Parents' exposure to adult literature was moderately correlated with their exposure to storybooks, r = .40, $t(132) = 5.00$, $p <$ .001.

We conducted additional regression analyses in which age, nonverbal IQ, verbal short-term memory, and socioeconomic status were included as control variables. First, we tested whether parents' exposure to adult literature explained unique variance in children's storybook exposure. The regression analysis showed that parental exposure to adult literature did not explain additional variance in children's storybook exposure (B = -0.092, SE = 0.077, $t(126) = -1.16$, p = .95) above parents' storybook exposure (see Table E12.1). Second, we tested whether parents' exposure to adult literature explained unique variance in children's oral language skills. Regression analyses showed that parental exposure to adult literature explained unique variance in children's vocabulary skills (B = 0.111, SE = 0.054, $t(119) = 2.07$, p = .04) and grammar skills (B = 0.209, SE = 0.065, $t(124) = 3.19$, $p <$ .01) above parents' storybook exposure and children's storybook exposure. By contrast, parental exposure to adult literature did not explain unique variance in children's comprehension monitoring (B = 0.042, SE = 0.058, $t(125) = 0.73$, p = .47)

and narrative comprehension (B = 0.026, SE = 0.065, t(123) = 0.40, p = .69) above parents' storybook exposure and children's storybook exposure (see Table E12.2). Consequently, the combination of storybook TRT and ART can be used to maximize the amount of variance in children's LLL skills that is explained by children's home literacy environment.

In study 4, a narrative dialogic reading intervention increased preschoolers' vocabulary and narrative comprehension skills. Therefore, adding narrative comprehension questions and using wordless pictures books are two promising approaches for adapting dialogic reading for typically developing children who are older than four years of age. Individual differences did not moderate intervention gains, suggesting that this shared reading format provides appropriate learning opportunities to children with varying general cognitive abilities and prior shared reading experiences. The advantage of the narrative dialogic reading group over comparison groups, however, was short-lived, a finding that cautions against exaggerated expectations about the sustainability of effects by short-term interventions. Long-term intervention studies with a higher intervention dosage are needed to evaluate the long-term effects of dialogic reading on oral language skills and reading comprehension in primary school. Finally, by using wordless picture books, our study provides first evidence that effects of dialogic reading on vocabulary and narrative skills are attributable to extratextual talk rather than linguistic properties of the text in storybooks. Concerning the triad model of language learning through shared reading that was presented in chapter 3.2, our results imply that reducing the intermediary activity of the caregiver between book and child during shared reading by omitting reading aloud from the shared storybook reading and using only pictorial information does not decrease intervention effectiveness.

11.2.3 Environmental models of shared storybook reading

A series of structural equation models in study 1 indicated that the latent variables socioeconomic status (SES), home literacy environment (HLE), and storybook exposure are all substantially related to children's language skills. The final model (see Figure 7.1) suggests that HLE mediates the relation between SES and language skills, and that storybook TRT mediates the relation between HLE and language skills. This finding is in line with the bioecological model of oral language

development through shared reading (see chapter 2.3) positing that shared reading is a proximal process that drives oral language development, whereas the relation between distal variables located in a microsystem (such as the HLE) or in an exosystem (such as the SES) and developmental outcomes, such as oral language, should be less pronounced. Considering that the HLE questionnaire included a range of different literacy activities (frequency and duration of shared reading activities in a week, frequency of parental leisure reading, amount of parent and child TV time, child independently looking at picture books) and resources (number of books and children's books in household) but did not explain additional variance in language skills, our findings underline the central role of shared storybook reading for oral language development.

With reference to the *Home Literacy Model* (Sénéchal & LeFevre, 2002), results from study 3 and additional analyses (see Appendix E) suggest that four modifications are warranted. Figure 11.1 illustrates these modifications and summarizes relationships between print exposure variables and oral language skills.

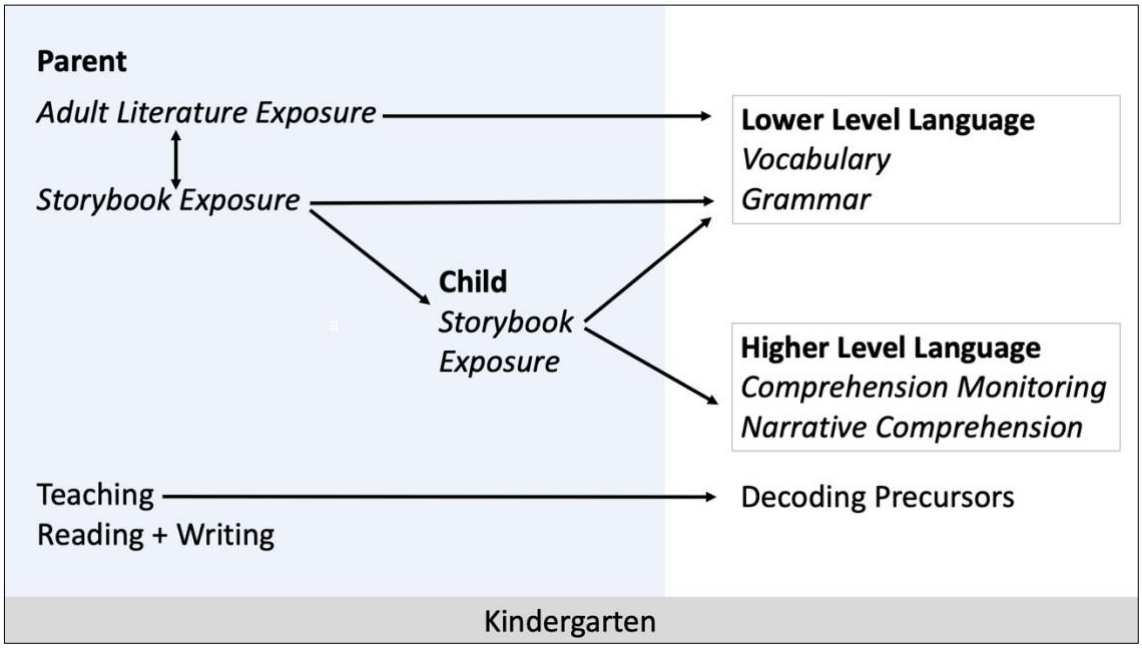

Figure 11.1. Differentiation of literacy agents and oral language skills in the part of the *Home Literacy Model* (Sénéchal & LeFevre, 2002) that represents informal home literacy activities before school entry.

First, the original model states that children's exposure to books before school entry is important for the development of oral language skills. Our results imply that parents' and children's storybook exposure should be conceptualized as two interdependent shared reading variables. Parents' storybook TRT is a measure of the amount of shared reading activities that is provided to children at home. Therefore, parents' storybook exposure represents a proximal environmental input variable regarding the development of oral language skills and children's storybook exposure. Second, results from additional analyses that were summarized in chapter 11.2.2 show that parents' exposure to adult literature and their exposure to storybooks are moderately correlated. More importantly, results from additional regression analyses imply that there are at least two routes through which parental book reading can have an impact on oral language skills – either through shared reading activities during which children are exposed to book language and engage in extratextual talk with caregivers, or more indirectly through the complexity of parents' language, which depends on their exposure to adult literature.

Third, children's storybook exposure was the only shared reading variable that explained a significant amount of variance in preschoolers' comprehension monitoring and narrative comprehension, showing that shared storybook reading is not only related to preschoolers' LLL skills, but also to HLL skills. Therefore, a differentiation between LLL and HLL skills in the Home Literacy Model is warranted. Fourth, in contrast to parents' storybook TRT, children's TRT is a measure both of the sum of shared reading activities in different social contexts (e.g., home, child care center) and children's capabilities to process this language input and engage in a meaningful communication with caregivers and peers. Therefore, children's storybook exposure represents a proximal environmental output variable regarding shared storybook reading that is more closely related to oral language skills than other measures of storybook or print exposure. Importantly, a direct assessment of preschoolers' storybook exposure appears to capture aspects of shared storybook reading that are related to HLL skills in addition to LLL skills. The results of study 4 suggest that children's HLL skills benefit from dialogic reading interventions in which caregivers use a range of communication strategies to encourage children's active engagement and facilitate language learning. Presumably, this

communication style during shared storybook reading also facilitates children's title memorization.

11.2.4 Pedagogical practice and education policy

The results of this dissertation confirm that preschoolers' shared storybook reading is substantially connected to their oral language development. Children who grow up in literacy environments that rarely provide shared storybook reading and related early literacy activities are more likely to lag behind in their oral language development compared to peers who regularly experience shared storybook reading. After several years, differences in oral language skills due to different amounts of storybook exposure can be substantial (DeBaryshe, 1993; Farrant & Zubrick, 2013). Review studies are unambiguous in that children benefit in particular from interactive forms of storybook reading (see chapters 5.2 and 5.3). Dialogic reading provides a set of communication strategies that can be used to increase children's engagement and language learning. Results from study 4 provide first evidence that narrative dialogic reading is a promising approach for fostering the language skills of typically developing German-speaking children. The research assistants who conducted the narrative dialogic reading intervention in child care centers reported good adherence to the intervention program and a high involvement and responsiveness of children during the shared reading sessions. Furthermore, the average attendance rate (81% of sessions) was satisfactory and only 1% of the participating children dropped out between pretest and posttest. Moreover, comparisons with the music treatment and no treatment groups showed that the effects of the dialogic reading intervention were specific and most likely not attributable to general intervention effects. Finally, dialogic reading uses a small number of communication principles that guide the interaction and the extratextual talk. These principles can be taught to caregivers with a reasonable effort (see Dowdall et al., 2019, for a recent meta-analysis). Further studies should investigate whether an intervention implementation by child care staff in child care centers with a lower stimulation quality of the literacy environment than in our study will also have positive effects on children's language development. Moreover, sustained efforts over a longer period of time are probably needed to bring about long-term effects. Finally, the implementation quality of interventions led by child care staff should be sufficiently monitored because the lack of effects by early literacy

programs on literacy skills has been attributed to low implementation quality, among other reasons (e.g., Gasteiger-Klicpera et al., 2010; Roos et al., 2010; Wolf et al., 2011).

Findings from this dissertation also highlight the importance of considering children's active role in shared reading situations. Educational methods that make use of the interplay between children and caregivers are likely to be more effective than educational approaches to shared reading that focus on child or caregiver. For example, the Heidelberg interaction training for language promotion in early childhood settings is a professional development program by which dialogic reading principles can be successfully translated into routine interactions between child care staff and children (Buschmann & Sachse, 2018). Investigating the transformation of these interactions from a practitioner perspective would allow to adjust communicative practices to developmental levels and needs in the course of early childhood. Results from this dissertation show that shared storybook reading is not only related to vocabulary, but also to grammar, comprehension monitoring, and narrative comprehension skills, which are known to be important for later reading comprehension. Being aware of and understanding the relation between oral language skills and reading comprehension can also inform caregivers' selection of children's books for shared reading and guide how they engage in extratextual talk with children.

Due to a lack of intervention studies comparing the efficacy of single shared reading strategies, evidence from experimental shared reading research can also inform pedagogical practice, even though the ecological validity of these studies is often even lower than those of intervention studies conducted by researchers. Nevertheless, there is some preliminary evidence supporting the claim that using wordless picture books can increase children's engagement during shared reading (Chaparro-Moreno et al., 2017; Muhinyi & Hesketh, 2017). Results from our intervention study suggest that wordless picture books are (at least) equally suitable for shared reading as storybooks with text. More research comparing dialogic reading with different book genres and formats (e.g., narrative vs. informational books; wordless books vs. books with text) is needed for understanding the potentially moderating role of book characteristics concerning the impact of shared reading on oral language development.

In study 3, both storybook exposure at home and literacy activities and resources in the child care group were unique contributors to children's vocabulary skills. According to the self-report questionnaires, literacy environments at home and at the child care center provided many activities and resources that are connected to early literacy development. This suggests that the average quality of the HLE and CCLE was higher than the average quality of German child centers reported in some previous studies (Ebert et al., 2013; Weinert & Ebert, 2013). Considering that these studies did not find a positive relation between the CCLE and children's language skills, this suggests that improving the CCLE could result in positive effects on children's language skills, and maybe even compensatory effects if the HLE provides little stimulation for language learning. Evidence from dialogic reading intervention studies (Ennemoser & Hartung, 2017; Ennemoser et al., 2013; Grolig, Cohrdes, Tiffin-Richards, & Schroeder, 2020; Hartung, 2015) and programs that aim to integrate dialogic reading practices in daily activities (Buschmann & Sachse, 2018) suggests that a systematic and more frequent use of these communication strategies could help to increase the language-related process quality in German child care centers.

With respect to educational policy, correlational and interventional results from this dissertation indicate that promoting shared reading in early childhood literacy environments (e.g., home, child care center, primary school) could be an effective means of reducing disparities in language and reading skills encountered between children from families with differing socioeconomic status (Bos et al., 2017). Results from studies 3 and 4 show that a high quality child care literacy environment and the provision of interactive shared reading at the child care center are positively associated with preschoolers' oral language skills. A German survey about early literacy activities, however, found that in many child care groups less than half of the children was engaged in the daily shared storybook reading sessions (Wirts et al., 2017). Also, child care staff used dialogic reading techniques and engaged in extratextual talk with children in only 60% of these sessions (Wirts et al., 2017). Therefore, evidence from this dissertation highlights the potential of increasing the amount and quality of shared storybook reading in child care centers for fostering young children's oral language skills. Educational policy should strive to create professional development opportunities and working conditions for child

care staff that enable them to increase the amount and quality of early literacy activities.

11.3 Limitations and future directions

In addition to the limitations of the studies that were discussed in chapters 7 to 10, there are more general limitations to this dissertation. First, the present dissertation focuses on cognitive development, even though many studies have reported that shared reading is also positively associated with psychosocial development (see Xie, Chan, Ji, & Chan, 2018, for a meta-analysis). In particular, future studies could investigate how shared reading affects children's cognitive as well as motivational and emotional development, the latter also being important for reading development (e.g., Lepola et al., 2016; see also chapter 3.2). Second, the socioeconomic status of children and parents in studies 1, 3, and 4 was mostly middle class. Related to this, among the 15 child care centers that agreed to participate in the intervention study, high quality child care centers are presumably over-represented in comparison to the average quality of child care centers in Germany (cf. Ebert et al., 2013; Weinert & Ebert, 2013). Thus, the sample of child care centers, children, and parents appears to be rather homogeneous, which limits the generalizability of our findings. Further research with children from more diverse socioeconomic backgrounds and child care centers is needed to test whether findings are replicable in a more representative sample. Third, even though 27% of the children spoke two languages (see chapter 10.3 for details), there were too few bilingual children in each treatment condition for conducting additional analyses of intervention effectiveness in bilingual children. More studies are needed that investigate intervention effects on bilingual children (cf. Pollard-Durodola et al., 2016) because these children are on average more likely to have poorly developed German language skills and are therefore at a higher risk for reading comprehension problems (Bos et al., 2017).

Fourth, preschoolers' recognition of storybook titles was a unique predictor of oral language skills above effects of the HLE and the CCLE in study 3 and above intervention effects of dialogic reading in study 4. Results from study 3 provide some evidence that this measure of preschoolers' storybook exposure is not confounded with verbal short-term memory or nonverbal intelligence. Additional experimental studies could help to identify characteristics of children and books as

well as shared reading formats that facilitate memorization of storybook titles (e.g., a comparison of dialogic reading vs. reading aloud; see chapter 3.2 for potential moderators), in particular because they are potentially also beneficial for the acquisition of higher level language skills. Fifth, no observation or linguistic measure of shared reading interactions was used in this study. There are presumably reciprocal longitudinal connections between children's language learning and shared reading processes, such as the linguistic complexity of children's and caregivers' utterances or the proportion of child talk in relation to caregiver talk. Nevertheless, the input and outcome measures of shared storybook reading used in this dissertation explained substantial portions of variance in oral language skills. For a deeper understanding of interactional changes in shared reading, however, future research should aim to incorporate observational or linguistic measures.

Sixth, to investigate the proposed reciprocal connections between changes in print exposure, oral language, and reading comprehension (cf. Mol & Bus, 2011), cross-lagged panel studies that span a large part of early childhood are needed. In a study with Finnish children, leisure reading and reading comprehension were positively associated between ages 7 and 16 (Torppa et al., 2019). More specifically, poorer reading comprehension and reading fluency in Grades 1 to 3 predicted less leisure reading, whereas from Grade 6 on, more leisure reading was longitudinally related to better reading comprehension (Torppa et al., 2019). Future studies should investigate whether shared reading experiences before school entry predict independent reading and reading comprehension in primary school. This would also allow to investigate the question whether early shared reading experiences are related to later reading motivation, and whether the typically observed decline in reading motivation in primary school can be diminished by providing sufficient rewarding reading experiences to young children before they become independent readers.

Seventh, with respect to environmental models, the present dissertation focused on contributions of the microsystems HLE and CCLE. Regarding potential relationships between HLE and CCLE which would constitute a mesosystem, we did not find relationships between the amount of shared reading in the two literacy environments. Moreover, preschoolers' amount of non-intervention storybook exposure did not moderate intervention effects. Further research could investigate whether there are connections between HLE and CCLE regarding other variables of

the shared reading process (e.g., interactional quality). Finally, proximal processes in microsystems have been identified as main drivers of development (Bronfenbrenner & Morris, 2006), which is why this dissertation did not investigate how the most remote environmental system, the macrosystem, is related to oral language development. Studies comparing the institutional impact on language development between countries with different educational policies could investigate whether the macrosystem is significantly related to children's oral language development.

11.4 Conclusion

This dissertation investigated how shared storybook reading is related to oral language development in early childhood. The overarching aim was to examine effects of shared reading as a proximal developmental process on lower level language and higher level language skills. In a modified *Home Literacy Model*, this process was represented by a shared reading triad of child, caregiver, and book. To allow a differentiation of child and caregiver as literacy agents, two new measures of children's and caregivers' amount of reading experiences were developed and validated. Results from correlational and interventional studies support a differentiation between parents and children as interdependent literacy agents whose reading experiences are differentially related to children' s lower level and higher level language skills. A differentiation between these two sets of language skills is also supported by the results of an intervention study where narrative dialogic reading with wordless picture books had a positive impact on vocabulary and narrative skills. Concerning the significance of book characteristics for language learning through shared reading, the intervention study also provides first evidence that extratextual talk (rather than linguistic text characteristics) could be a key variable for explaining the effects of dialogic reading on oral language skills. Altogether, these modifications to the *Home Literacy Model* can further our understanding of connections between shared reading experiences before school and reading comprehension development in primary school.

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APPENDIX

Appendix A – Items and instructions for title recognition test (TRT-VS)

Tabelle A7.1

Titel, Erscheinungsjahr, Lesealter, Verkaufsrang und Preis der Bücher im TRT-VS. Verteilung der Titel (T) und Distraktor-Titel (DT) auf die Versionen A und B sowie Hit- und False Alarm-Raten in Studie 1 (Kinder und Erwachsene) und Studie 2 (Kinder)

						Version		Studie 1		Studie 2	
	Titel	Jahr	Alter[a]	Rang[b]	Preis[c]	A	B	A	B	A	B
						Set 1					
T:	Der Grüffelo	1999	4	102	8.95	T	T	0.73	0.63	0.78	0.81
T:	Der kleine Drache Kokosnuss	2002	4	1045	14.99	T	T	0.59	0.49	0.90	0.94
T:	Die kleine Prinzessin	1994	3	34124	9.95	T	T	0.34	0.29	0.37	0.37
T:	Die kleine Raupe Nimmersatt	1969	2	137	6.95	T	T	0.86	0.94	0.88	0.91
T:	Die Olchis	1990	3	2987	12.00	T	T	0.50	0.49	0.60	0.73
T:	Jim Knopf und Lukas der Lokomotivführer	1960	8	5437	14.99	T	T	0.75	0.94	0.57	0.59
T:	Lieselotte	2006	4	3514	5.90	T	T	0.13	0.11	0.29	0.31
T:	Petterson und Findus	1984	4	604	12.95	T	T	0.93	0.89	0.90	0.91
T:	Prinzessin Lillifee	2004	3	2116	4.95	T	T	0.80	0.94	0.68	0.73
T:	Weißt du eigentlich, wie lieb ich dich hab?	1990	4	13927	5.95	T	T	0.45	0.40	0.36	0.38
						Set 2					
T:	Bobo Siebenschläfer	1986	2	4599	5.99	T	DT	0.23	0.08	0.37	0.19
DT:	Sepp Schlafnase										
T:	Briefe von Felix: Ein kleiner Hase auf Weltreise	1994	4	6967	12.95	T	DT	0.63	0.03	0.51	0.19
DT:	Karte von Max										
T:	Conni	1992	3	205	3.99	T	DT	0.59	0.03	0.90	0.17
DT:	Kahira										
T:	Der kleine Rabe Socke	1996	2	2513	14.95	T	DT	0.61	0.11	0.79	0.24
DT:	Der große Dino Domino										
T:	Der Regenbogenfisch	1992	3	2664	15.95	T	DT	0.59	0.11	0.62	0.24
DT:	Die bunte Katze										
T:	Die kleine Motzkuh	2000	3	3335	10.00	T	DT	0.11	0.06	0.18	0.24
DT:	Der freche Luchs										
T:	Erdbeerinchen Erdbeerfee	2011	3	22927	9.99	T	DT	0.04	0.11	0.26	0.26
DT:	Die Weiden-Elfe										
T:	Frederick und seine Mäusefreunde	1967	4	15777	14.90	T	DT	0.23	0.06	0.27	0.16
DT:	Friedhelm und die Fuchsbande										
T:	Willi Wiberg	1974	4	7554	12.95	T	DT	0.32	0.06	0.51	0.11
DT:	Hans Grünhaus										

Tabelle A7.1 (Fortsetzung)

Titel, Erscheinungsjahr, Lesealter, Verkaufsrang und Preis der Bücher im TRT-VS. Verteilung der Titel (T) und Distraktor-Titel (DT) auf die Versionen A und B sowie Hit- und False Alarm-Raten in Studie 1 (Kinder und Erwachsene) und Studie 2 (Kinder)

T:	Zilly, die Zauberin	1989	4	2488	12.95	T	DT	0.14	0.11	0.24	0.12
DT:	Matze, der Magier										
						Set 3					
T:	Das kleine Ich bin ich	1972	3	25189	14.95	DT	T	0.11	0.14	0.29	0.22
DT:	Ich werde immer größer										
T:	Die kleine Hummel Bommel	2015	4	2088	12.95	DT	T	0.04	0.08	0.11	0.22
DT:	Silas der Schmetterling										
T:	Elmar	1989	4	3342	5.90	DT	T	0.00	0.28	0.11	0.28
DT:	Rüdiger das Rhinozeros										
T:	Henriette Bimmelbahn	1957	4	4080	4.50	DT	T	0.14	0.08	0.17	0.30
DT:	Lotte Lokomotive										
T:	Lauras Stern	1996	3	2660	12.95	DT	T	0.02	0.83	0.08	0.85
DT:	Lone und der Mond										
T:	Mama Muh	1993	4	12414	12.00	DT	T	0.04	0.28	0.20	0.46
DT:	Papa Pferd										
T:	Na klar, Lotta kann Rad fahren	1972	4	1610	12.90	DT	T	0.04	0.19	0.14	0.30
DT:	Annes Fahrrad										
T:	Räuber Hotzenplotz	1962	6	1538	11.99	DT	T	0.05	1.00	0.16	0.78
DT:	Leon der Langfinger										
T:	Superwurm	2012	4	14853	12.95	DT	T	0.09	0.06	0.19	0.30
DT:	Die Riesen-Schildkröte										
T:	Vom kleinen Maulwurf, der wissen wollte, wer ihm auf den Kopf gemacht hatte	1989	2	1646	5.00	DT	T	0.05	-	0.20	-
DT:	Vom kleinen Seeigel, der wissen wollte, wer ihn gepiekst hatte										

Anmerkungen: [a]Nach Verlagsangaben. [b]Amazon-Gesamtverkaufsrang, Stand: 27.05.2015. [c]In Euro.

Tabelle A7.2
Instruktionen für Erwachsene und Kinder des Titelrekognitionstests für das Vorschulalter (TRT-VS)

Instruktion für Erwachsene	„Im Folgenden sehen Sie eine Liste mit den Titeln von 30 Bilderbüchern. Manche Titel beziehen sich auf populäre Kinderbücher, andere Titel sind frei erfunden. Bitte lesen Sie sich die Liste durch und kreuzen Sie an, welche Titel Ihr Kind nach Ihrer Einschätzung kennt. Bitte kreuzen Sie nur die Titel an, die Ihrem Kind bekannt sind. Entscheiden Sie sich bitte spontan und ohne Hilfsmittel zu benutzen oder Ihr Kind zu fragen.“
Instruktion für Kinder	„Du hörst gleich die Namen von einigen Büchern. Einige Buchnamen gibt es wirklich, andere sind erfunden. Hör genau hin, wie jeder einzelne Name heißt. Wenn du den Namen von dem Buch kennst, dann drücke auf die grüne Taste. Wenn du den Buchnamen nicht kennst, dann drücke auf die rote Taste. Rate nicht, sondern drücke nur dann die grüne Taste, wenn du den Buchnamen wirklich kennst. Vergiss nicht, dass einige Namen erfunden sind. Raten kann deswegen leicht erkannt werden.“

Appendix B - Description of the German author recognition test (ART)

The German ART comprises 75 fiction authors with at least one bestselling book between the years 2003 and 2015 (Spiegel bestseller list, 2016; see Appendix B). Of the 75 authors, 34 authors were originally published in another language, most of them in English. Only fiction authors were included because the recognition of fiction authors is more strongly correlated to self-reported reading time than the recognition of nonfiction authors (Acheson et al., 2008). As the test aims to measure reading during leisure time, the selected authors are mostly not part of school reading curricula in Germany. We included a few authors who are generally read at school and thus would be recognized by almost every participant (e.g., Heinrich Böll, Rainer Maria Rilke) so that participants with low print exposure would not be discouraged from completing the test. Moreover, we included both popular literature and highbrow literature authors because they are differentially related to social cognition (Mumper & Gerrig, 2017). Our selection included 37 popular literature authors (49.3%; e.g. thriller, crime, history, fantasy, romance, entertainment) and 38 highbrow literature authors (50.7%).

To control for guessing, the ART also includes 50 foil items serving as distractors (see Appendix C). The ART consists of two parallel test forms (forms A and B, see Appendix B). The 75 author items were randomly assigned to one of three item sets (set 1, 2, or 3). Form A consists of the author item sets 1 and 2; form B consists of the author item sets 1 and 3. Consequently, both test forms share 25 author items which serve as anchor items that allow the estimation of a latent print exposure variable across both test forms (Embretson & Reise, 2000). Each test form has 25 additional, unique author items. Foil items were randomly assigned to one test form. Overall, each form comprises 50 author items (25 popular literature authors, 25 highbrow literature authors) and 25 foil items.

ART Parallel Forms Comparisons

The corrected hit rate was similar in both forms, A: M = .46, SD = .24; B: M =.49, SD = .25; $t(337) = -1.10$, p = .27. The false alarm rate did not differ between forms, A: M = .02, SD = .05; B: M =.02, SD = .04; $t(337) = 0.37$, p = .71. The split half reliability of the corrected scores was similarly high for both forms (A: r = .94, B: r = .95). Our analyses indicated that the psychometric properties did not differ between forms A and B.

Comparison of ART Scores between Samples

The corrected hit rate was comparable for young adults in both samples, psycholinguistic studies sample: M = .39, SD = .19; book fair sample: M = .44, SD = .21, $t(168) = 1.49$, p = .14. For older adults, the corrected hit rate was similar in both samples, psycholinguistic studies sample: M = .54, SD = 0.19; book fair sample: M = .62, SD = 0.21, $t(65) = 1.65$, p = .10. As the differences were not statistically significant, data from the two samples were jointly analyzed.

Appendix C – Author and foil items of author recognition test (ART)

Table C8.1
Author Items and Item Characteristics of the German Author Recognition Test

Author	Literary level	Mean publication year	Public library circulation frequency	Hit rate (%)
		Set 1 (Forms A and B)		
Bertolt Brecht	highbrow	1950	6,419	91.0
Thomas Mann	highbrow	1928	5,709	89.5
J. R. R. Tolkien	popular	1982	2,789	88.9
Agatha Christie	popular	1952	12,697	83.4
Ken Follett	popular	1996	1,811	82.8
Rainer Maria Rilke	highbrow	1908	3,604	81.9
Frank Schätzing	popular	2004	1,333	61.2
T. C. Boyle	highbrow	2004	3,682	61.2
Siegfried Lenz	highbrow	1983	732	59.8
Nele Neuhaus	popular	2010	392	58.0
Isabel Allende	highbrow	2000	1,178	56.9
Stefan Zweig	highbrow	1942	2,964	52.2
Paulo Coelho	popular	2006	630	51.3
Nick Hornby	popular	2005	843	48.7
Elfriede Jelinek	highbrow	1992	4,584	41.4
Haruki Murakami	popular	2004	2,962	39.4
Wolfgang Herrndorf	highbrow	2006	79	34.4
Patricia Highsmith	popular	1978	2,620	33.2
Philip Roth	highbrow	1986	4,074	32.1
Paul Auster	highbrow	2000	2,952	29.2
Alice Munro	highbrow	1998	1,267	27.4
Jan Weiler	popular	2010	86	26.8
Judith Hermann	highbrow	2007	606	19.5
Rita Falk	popular	2013	431	19.2
Wolf Haas	popular	2005	1,096	12.2

Table C8.1 (continued)
Author Items and Item Characteristics of the German Author Recognition Test

Author	Literary level	Mean publication year	Public library circulation frequency	Hit rate (%)
		Set 2 (Form A)		
Theodor Fontane	highbrow	1876	1,817	90.6
Heinrich Böll	highbrow	1976	2,282	81.2
Rosamunde Pilcher	popular	2001	266	80.3
Donna Leon	popular	2004	1,787	70.0
Stieg Larsson	popular	2006	533	69.5
John Grisham	popular	2004	1,842	68.6
Henning Mankell	popular	2004	2,448	65.9
Nicholas Sparks	popular	2006	676	56.5
Ingeborg Bachmann	highbrow	1962	4,193	50.2
Hakan Nesser	popular	2006	2,815	46.6
Bernhard Schlink	highbrow	2000	1,086	45.3
Hans Magnus Enzensberger	highbrow	1986	1,148	39.5
Ingrid Noll	highbrow	2003	811	39.0
Elizabeth George	popular	2002	1,754	37.2
Juli Zeh	highbrow	2008	311	36.8
Ian McEwan	highbrow	1999	2,033	33.6
Rafik Schami	highbrow	1996	927	33.2
Orhan Pamuk	highbrow	2003	783	30.9
Diana Gabaldon	popular	2004	810	22.9
E. L. James	popular	2012	405	22.9
Fred Vargas	popular	2008	2,746	21.1
Iny Lorentz	popular	2010	571	20.2
Imre Kertesz	highbrow	2003	216	17.9
Siri Hustvedt	highbrow	2004	951	16.6
Alex Capus	popular	2006	570	13.0

Table C8.1 (continued)
Author Items and Item Characteristics of the German Author Recognition Test

Author	Literary level	Mean publication year	Public library circulation frequency	Hit rate (%)
		Set 3 (Form B)		
Friedrich Schiller	highbrow	1792	1,783	92.5
Hermann Hesse	highbrow	1936	9,295	87.5
Charlotte Link	popular	2000	2,232	80.8
Günter Grass	highbrow	1986	1,174	79.2
Dan Brown	popular	2008	225	75.8
Patrick Süskind	highbrow	1994	647	75.8
John Irving	highbrow	1998	2,126	65.8
Umberto Eco	highbrow	1993	3,261	61.7
Stephenie Meyer	popular	2011	890	60.0
Jojo Moyes	popular	2009	82	57.5
Kerstin Gier	popular	2006	296	49.2
Salman Rushdie	highbrow	1999	1,996	46.7
Nora Roberts	popular	2003	3,586	43.3
Arthur Schnitzler	highbrow	1916	2,212	40.0
Martin Suter	popular	2006	95	40.0
Wladimir Kaminer	highbrow	2008	842	38.3
Herta Müller	highbrow	2000	1,483	34.2
Michel Houellebecq	highbrow	2007	1,622	34.2
Daniel Kehlmann	highbrow	2006	1,307	33.3
Sven Regener	popular	2007	294	27.5
Jonathan Franzen	highbrow	2008	633	24.2
Andreas Franz	popular	2004	1,710	23.3
Ruth Rendell	popular	1996	2,700	22.5
Heinz Strunk	popular	2010	229	19.2

Note. Raw circulation frequencies are reported.

Table C8.2
Foil Author Items of the German Author Recognition Test

Form A		Form B	
Foil author	False alarm rate (%)	Foil author	False alarm rate (%)
Elsbeth Stern	4.9	Gregory E. Cox	5.0
Boris Egloff	4.0	Ira H. Bernstein	4.2
Gregory Francis	4.0	Michael Eid	3.3
Thomas Rammsayer	3.6	Martin Hautzinger	3.3
Rick Dale	3.6	Dale Barr	3.3
Roselind Lieb	3.1	Chris Donkin	3.3
Jürgen Margraf	2.7	Michael D. Lee	3.3
Guido Hertel	2.2	Karl Christoph Klauer	2.5
Jürgen Hoyer	2.2	Aljoscha Neubauer	2.5
Amy H. Criss	2.2	Franzis Preckel	1.7
Manfred Amelang	1.8	Oliver Wilhelm	1.7
Detlef Rost	1.8	David A. Balota	1.7
Patrick Bonin	1.8	Richard R. Plant	1.7
Lara L. Jones	1.8	Richard M. Shiffrin	1.7
Christoph Perleth	1.3	Pernille Hemmer	1.7
Brian MacWhinney	1.3	Andre Beauducel	0.8
Peter Borkenau	0.9	Elmar Brähler	0.8
Kurt Hahlweg	0.9	Eibe-Rudolf Rey	0.8
Eric-Jan Wagenmakers	0.9	Bettina Hannover	0.8
Gabriele Helga Franke	0.9	Christiane Spiel	0.8
James S. Adelman	0.4	Lutz F. Hornke	0.0
Melvin Yap	0.4	Jerome Busemeyer	0.0
Andrew M. Olney	0.0	Tal Yarkoni	0.0
Mark W. Greenlee	0.0	Mark Steyvers	0.0
Joseph Magliano	0.0	Ying Alison Cheng	0.0

Note. Names were taken from the editorial boards of *Behavior Research Methods,* Volume 48, and *Diagnostica,* Volume 62.

Appendix D – Supplementary materials for narrative dialogic reading study

Table D10.1

Books Used in the Dialogic Reading Intervention

Author	Title and publisher
Badel, R. (2013).	*Der fette Fang [The big catch].* Wuppertal: Hammer.
Becker, A. (2015).	*Die Reise [The journey].* Hildesheim: Gerstenberg
Becker, A. (2016).	*Die Suche [Quest]*. Hildesheim: Gerstenberg
Briggs, R. (2005).	*Der Schneemann [The Snowman].* Hamburg: Aladin.
Haughton, C. (2015).	*Psst! Wir haben einen Vogel [Shh! We Have a Plan].* Frankfurt: Fischer.
Heidelbach, N. (2007).	*Ein Buch für Bruno [A book for Bruno].* Weinheim and Basel: Beltz.
Holzwarth, W. & Strozyk, T. (2015).	*Mag ich! Gar nicht! [Don't like it! Not at all!].* Leipzig: Klett.
Mitgutsch, A. (2012).	*Mein großes Winter-Wimmelbuch [My big winter wimmelbook].* Ravensburg: Ravensburger.
Mitgutsch, A. (2015).	*Mein Wimmelbuch: Komm mit ans Wasser* [*My Wimmelbook: Come with us to the water*]. Ravensburg: Ravensburger.
Muller, G. (2000)	*Was war hier bloß los? [What happened here?].* Frankfurt: Moritz.
Muzo (2011).	*Gute Reise, kleine Wolke [Safe journey, little cloud].* Baar: Aracari.
Sendak, M. (1967).	*Wo die wilden Kerle wohnen [Where the wild things are].* Zurich: Diogenes.
Riphagen, L. (2011)	*So ein Tohuwabohu! [Animals Home Alone].* Cologne: Boje.
Rodriguez, B. (2008).	*Der Hühnerdieb [The chicken thief].* Wuppertal: Hammer.
Rodriguez, B. (2012).	*Das Hühnerglück [The lucky chicken].* Wuppertal: Hammer.
Schössow, P. (2010).	*Meehr!! [Mooore!!].* Munich: Hanser.
Tolman, M. & Tolman, R. (2010).	*Das Baumhaus [The tree house].* Berlin: Berlin Press.
Wiesner, D. (2007).	*Strandgut[Flotsam].* Hamburg: Carlsen.
Wiesner, D. (2014).	*Herr Schnuffels [Mr Wuffles!].* Hamburg: Aladin.

Table D10.2

Items of the Vocabulary Breadth Test

Number	Item
1	Segelschiff [sailing ship]
2	Laterne [lantern]
3	Wasserschlange [water snake]
4	Vollmond [full moon]
5	Ruderboot [rowboat]
6	Krake [octopus]
7	Heißluftballon [hot-air balloon]
8	Seetang [seaweed]
9	Strickleiter [rope ladder]
10	Anorak [anorak]
11	Labyrinth [maze]
12	Iglu [igloo]
13	Strandkorb [beach chair]
14	Tipi [tepee]
15	Kescher [landing net]

Table D10.3

Stimuli for Narrative Production Task by Measurement Point

		Main Ideas		
Measurement point	Book	Total	Inferential	Literal
Pretest	Frog on his own	32	12	20
Posttest	Frog, where are you?	42	15	27
Follow-Up I	Robot-bot-bot	30	11	19
Follow-Up II	One frog too many	37	14	23

Note. Number of items is displayed.

Narrative comprehension: Questions and examples

Story: "Frog on His Own" (Pretest)

Coding scheme from: Silva, M., & Cain, K. (2015). The relations between lower and higher level comprehension skills and their role in prediction of early reading comprehension. *Journal of Educational Psychology*, *107*, 321–331. doi:10.1037/a0037769
Coding scheme available at http://supp.apa.org/psycarticles/supplemental/a0037769/a0037769_supp.html

Story: "Frog, where are you?" (Posttest)

1. Characters: Who are the characters in the story? (Explicit)
2-point response: states that characters are a boy, his dog, and a frog
1-point response: includes two of three main characters
0-point response: provides only one character or response inappropriate
2. Setting: Where does this story happen? (Explicit)
2-point response: includes multiple scenarios
1-point response: includes one scenario
0-oint response: no answer or an inappropriate setting
3. Initiating Event: What do you think happens here? Why is this an important part of the story? (Explicit)
2-point response: the initiating event is identified and connected to other events/pages
1-point response: the initiating event is identified but it is not connected to other events/pages
0-point response: no answer or an the initiating event was not identified
The picture: The boy and the dog lie sleeping in bed. The frog climbs out of the jar.
4. Problem: If you were telling your friend this story, what would you say is going on now? Why did this happen? (Explicit)
2-point response: identifies the problem and also a connection to other events/pages of the story
1-point response: identifies the problem but it is not connected to other events/pages
0-point response: no answer or the problem was not identified
The picture: The boy looks into a boot to check whether the frog is there. The dog searches the frog in a jar.
5. Dialogue: What do you think the boy would be saying here? Why would you say that? (Implicit)
2-point response: includes an appropriate dialogue that can be connected to other events/pages
1-point response: includes an appropriate dialogue but it is not connected to other events/pages
0-point response: no answer or an inappropriate dialogue
The picture: The boy and the dog stand on a meadow. The boy makes a funnel with his hands and calls something.

6. Thoughts: What do you think the young boy is thinking here? Why would he think that? (Implicit)
2-point response: an appropriate thought is inferred and connected to other events/pages
1-point response: includes an appropriate thought but it is not connected to other events/pages
0-point response: no answer or an inappropriate thought
The picture: The boy is holding his nose. A rodent looks out of an earth hole. In the background, the dog barks at a bee hive.
7. Feelings: What do you think the boy is feeling here? Why do you think so? (Implicit)
2-point response: an appropriate feeling is identified and connected to other events/pages
1-point response: an appropriate feeling is identified but it is not connected to other events/pages
0-point response: no answer or not feelings are identified
The picture: The deer stops shortly before a cliff. The boy and the dog fall down. The boy stretches his arms and has an open mouth.
8. Resolution: What happened here? Why does this happen? (Explicit)
2-point response: identifies the resolutions and it is connected to other events/pages of the story
1-point response: identifies the resolution but no connection to other events/pages is provided
0-point response: no answer or the resolution is not identified
The picture: The boy and the dog climb over a tree. Behind, they find the frog and his family. A small frog jumps near the boy.
9. Prediction: This is the last picture of the story. What do you think happens next? Why do you think so? (Implicit)
2-point response: is related to the events of the story but goes beyond the picture (the last picture of the story)
1-point response: is based only on the information of the last picture
0-point response: no answer or prediction is given
The picture: The boy and the dog leave the frog family. The boy waves goodbye to the frog family. He is holding a small frog in his other hand.
10. Theme: Think about everything that you learned from reading this book. What advice would you give to the boy or the frog so that the same thing doesn't happen again? Why would you say that? (Implicit)
2-point response: provides integration of multiple events of the story
1-point response: uses information of only one aspect of the story
0-point response: no answer or inadequate answer

Story: "Robot-bot-bot" (Follow-Up I)

Coding scheme from: Paris, A. H., & Paris, S. G. (2003). Assessing narrative comprehension in young children. *Reading Research Quarterly*, *38*, 36–76. doi:10.1598/rrq.38.1.3 (Appendices B and C)

Story: "One frog too many" (Follow-Up II)

1. Characters: Who are the characters in the story? (Explicit)
2-point response: states that characters are a boy, his dog, a turtle, a big frog, and a small frog
1-point response: includes three of five main characters
0-point response: provides only two characters or response inappropriate
2. Setting: Where does this story happen? (Explicit)
2-point response: includes multiple scenarios
1-point response: includes one scenario
0-point response: no answer or an inappropriate setting
3. Initiating Event: What do you think happens here? Why is this an important part of the story? (Explicit)
2-point response: the initiating event is identified and connected to other events/pages
1-point response: the initiating event is identified but it is not connected to other events/pages
0-point response: no answer or an the initiating event was not identified
The picture: The boy has opened the parcel and takes out the small frog. The big frog looks away. He is angry.
4. Problem: If you were telling your friend this story, what would you say is going on now? Why did this happen? (Explicit)
2-point response: identifies the problem and also a connection to other events/pages of the story
1-point response: identifies the problem but it is not connected to other events/pages
0-point response: no answer or the problem was not identified
The picture: The big frog pushes the small frog from the turtle's back. The small frog is surprised and falls onto the ground.
5. Dialogue: What do you think the boy would be saying here? Why would you say that? (Implicit)
2-point response: includes an appropriate dialogue that can be connected to other events/pages
1-point response: includes an appropriate dialogue but it is not connected to other events/pages
0-point response: no answer or an inappropriate dialogue
The picture: The boy stands with one foot on the raft. The big frog sits onshore and looks angrily away from the boy. The boy is angry with the big frog. The other animals sit on the raft.
6. Thoughts: What do you think the young boy is thinking here? Why would he think that? (Implicit)
2-point response: an appropriate thought is inferred and connected to other events/pages.
1-point response: includes an appropriate thought but it is not connected to other events/pages.
0-point response: no answer or an inappropriate thought.
The picture: They are on the raft. The small frog is missing because the big frog has pushed him into the water. The boy has his mouth open and looks scared.

7. Feelings: What do you think the frog is feeling here? Why do you think so? (Implicit)
2-point response: an appropriate feeling is identified and connected to other events/pages.
1-point response: an appropriate feeling is identified but it is not connected to other events/pages.
0-point response: no answer or not feelings are identified.
The picture: The boy, the turtle, and the dog go away from the raft. The boy is crying. The dog growls at the big frog who sits on the shore and looks sad.
8. Resolution: What happened here? Why does this happen? (Explicit)
2-point response: identifies the resolutions and it is connected to other events/pages of the story.
1-point response: identifies the resolution but no connection to other events/pages is provided.
0-point response: no answer or the resolution is not identified.
The picture: The boy and the dog sit on the bed. The small frog snuggles with the big frog. The big frog is happy.
9. Prediction: This is the last picture of the story. What do you think happens next? Why do you think so? (Implicit)
2-point response: is related to the events of the story but goes beyond the picture (the last picture of the story).
1-point response: is based only on the information of the last picture.
0-point response: no answer or prediction is given.
The picture: The boy and the dog sit on the bed. The small frog snuggles with the big frog. The big frog is happy.
10. Theme: Think about everything that you learned from reading this book. What advice would you give to the boy or the frog so that the same thing doesn't happen again? Why would you say that? (Implicit)
2-point response: provides integration of multiple events of the story.
1-point response: uses information of only one aspect of the story.
0-point response: no answer or inadequate answer.

Narrative production: Main point items

The main points were derived from narratives collected in a pilot study with university students (16 female, 14 male; M_{age} = 23.9 years, *SD* = 4.4 years). Students received 20 Euros as reimbursement for study participation. Idea units that were mentioned in at least 60% of the narratives were categorized as main points and subsequently used for coding the children's narratives.

Table C10.4
Main Point Items and Mean Proportion Produced for Pretest Story "Frog on his own"

Main point	Type	Element	Proportion	
			Adults (*N* = 30)	Children (*N* = 197)
In a park,	literal	setting	0.97	0.14
there is a boy with his dog and his frog.	literal	character	1.00	0.41
They go for a stroll.	literal	event	1.00	0.75
The frog sits in a bucket.	literal	setting	0.77	0.21
He jumps out.	literal	initiating event	0.93	0.45
The boy doesn't notice.	inferential	thought	0.63	0.08
A couple	literal	character	0.97	0.38
is having a picknick.	literal	event	0.73	0.29
The frog goes into their basket.	inferential	motive	0.97	0.25
Then he is holding on to a woman's arm.	literal	problem	0.73	0.61
The woman is furious.	inferential	emotion	0.97	0.37
She shouts at him.	inferential	dialogue	0.67	0.10
The frog jumps away.	literal	resolution	0.80	0.49
He is at a pond.	literal	setting	0.73	0.15
A mother sits with a buggy,	literal	character	1.00	0.44
a baby, and a cat.	literal	character	0.63	0.21
The frog watches the mother.	inferential	thought	0.93	0.14
She is reading.	literal	event	0.70	0.22
The mother is distracted.	inferential	thought	0.70	0.09
She doesn't' notice that the frog jumps into the buggy.	inferential	thought	0.73	0.07
The frog drinks the milk.	literal	event	0.83	0.66
The baby is cross.	inferential	emotion	0.87	0.33
The cat jumps onto the frog.	literal	problem	0.80	0.71
The cat wants to catch it.	inferential	motive	0.97	0.25
The frog runs away.	literal	event	0.67	0.27
The buggy falls over.	literal	setting	0.63	0.30
The baby cries.	inferential	emotion	0.90	0.69
The cat sits on the frog.	literal	event	1.00	0.77
The boy returns.	literal	resolution	0.87	0.22
He rescues the frog.	inferential	motive	0.97	0.59
The frog is happy.	inferential	emotion	0.70	0.13
They go home.	literal	setting	0.90	0.72
			M = 0.83 *SD* = 0.13	*M* = 0.36 *SD* = 0.22

Table D10.5
Main Point Items and Mean Proportion Produced for Posttest Story "Frog, where are you?"

Main point	Type	Element	Proportion	
			Adults (*N* = 30)	Children (*N* = 188)
A boy is with his dog and a frog	literal	character	1.00	0.53
in his room.	literal	setting	0.73	0.04
The frog is caught in a jar.	literal	initiating event	0.97	0.44
The boy and the dog sleep.	literal	initiating event	1.00	0.81
The frog escapes.	inferential	motive	0.93	0.78
The next morning,	literal	setting	0.87	0.26
the boy wakes up.	literal	event	0.83	0.46
The frog is gone.	literal	problem	0.93	0.67
The boy is sad.	inferential	emotion	0.70	0.08
He wants to find the frog.	inferential	motive	0.63	0.55
He searches the frog in the room.	literal	event	0.97	0.47
He goes to the window and calls the frog.	inferential	dialogue	0.93	0.44
They want to find the frog	inferential	motive	0.87	0.60
in the woods.	literal	setting	0.70	0.24
An animal bites the boy.	literal	event	0.93	0.48
The dog barks at some bees.	literal	event	0.60	0.34
He shakes down the bee hive.	literal	problem	0.67	0.53
The bees attack him.	literal	event	0.87	0.63
The dog is scared and flees.	inferential	emotion	0.63	0.18
The boy shouts into	inferential	dialogue	0.67	0.51
a hole in a tree.	literal	setting	0.60	0.42
He thinks that the frog is inside.	inferential	thought	0.97	0.26
An owl wants to chase away the boy.	inferential	motive	0.70	0.58
He startles.	inferential	emotion	0.60	0.15
The boy falls off the tree.	literal	event	0.77	0.50
He climbs	literal	event	0.83	0.42
on a rock.	literal	setting	0.93	0.48
He calls the frog.	inferential	dialogue	0.63	0.34
A deer	literal	character	0.63	0.90
takes the boy on his head.	literal	problem	0.97	0.63
The dog escapes from the bees.	literal	resolution	0.73	0.15
Deer, boy and dog come to a cliff.	literal	setting	0.73	0.22
The boy and the dog fall down.	literal	event	0.73	0.62
They land in water.	literal	resolution	0.97	0.89
The boy notices something.	inferential	thought	0.67	0.08
He thinks that there is something behind a tree.	inferential	thought	0.87	0.65
They find the frog.	literal	resolution	1.00	0.87
There are many other frogs.	literal	character	0.93	0.56
The boy is happy.	inferential	emotion	0.73	0.08
He takes one frog	literal	event	0.73	0.55
from the frog family.	literal	character	0.80	0.47

The boy says goodbye.	inferential	dialogue	0.67	0.33
			M = 0.80	*M* = 0.46
			SD = 0.14	*SD* = 0.23

Table D10.6

Main Point Items and Mean Proportion Produced for Follow-up I Story"Robot-bot-bot"

Main point	Type	Element	Proportion	
			Adults (*N* = 30)	Children (*N* = 143)
A girl waves to her	inferential	motive	0.90	0.08
father.	literal	character	0.70	0.35
The father has a packet in his car.	literal	setting	0.90	0.34
They go inside.	literal	setting	0.77	0.21
The family	literal	character	1.00	0.29
is curious.	inferential	emotion	0.60	0.13
They wonder what might be in the packet.	inferential	thought	1.00	0.83
It's a robot.	literal	character	1.00	0.96
They try out the robot.	literal	event	0.93	0.65
It cleans the dishes.	literal	event	1.00	0.86
It brings out the trash.	literal	event	1.00	0.92
The family is happy with the robot.	inferential	emotion	0.87	0.23
The parents chat and dance.	inferential	dialogue	0.70	0.21
The girl is curious.	inferential	thought	0.77	0.90
She wants to look inside the robot.	inferential	motive	0.67	0.24
She opens the robot.	literal	event	0.87	0.68
She pulls out cables.	literal	event	0.77	0.63
She ties them into a knot.	literal	initiating event	0.80	0.34
She turns on the robot.	literal	event	0.63	0.51
The robot becomes mad.	inferential	thought	0.83	0.48
It rushes into the living room.	literal	problem	0.67	0.23
It throws the father out of the chair.	literal	event	0.87	0.32
The father is scared.	inferential	emotion	0.70	0.14
The living room is trashed.	literal	setting	0.63	0.40
The robot goes out of the window.	literal	resolution	1.00	0.46
It lands in a trash can.	literal	event	1.00	0.75
A garbage collector puts the trash into a truck.	literal	problem	0.60	0.51
The family shouts at him.	inferential	dialogue	0.93	0.61
They want their robot back.	inferential	motive	0.80	0.38
Father and daughter repair the robot.	literal	resolution	0.97	0.90
			M = 0.83	*M* = 0.48
			SD = 0.14	*SD* = 0.27

Table D10.7

Main Point Items and Mean Proportion Produced for Follow-up II Story "One frog too many"

Main point	Type	Element	Proportion	
			Adults (*N* = 30)	Children (*N* = 129)
A boy has a frog, a dog, and a turtle.	literal	character	1.00	0.95
The boy gets a present.	literal	setting	1.00	0.96
He opens it.	literal	initiating event	0.97	0.68
It's a small frog.	literal	character	1.00	0.90
The boy introduces the small frog to his animal friends.	inferential	dialogue	0.70	0.39
Everybody cheers except for the big frog.	inferential	emotion	0.83	0.56
They go out	literal	event	0.97	0.68
into the woods.	literal	setting	0.77	0.13
The animals follow the boy.	literal	event	0.70	0.40
The frogs sit on the turtle.	literal	setting	0.90	0.69
The big frog does not like the small frog.	inferential	motive	1.00	0.86
He pushes the small frog from the turtle back.	literal	problem	1.00	0.98
The small frog cries.	inferential	emotion	0.97	0.68
The boy shouts at the big frog.	inferential	dialogue	0.90	0.60
They come to water.	literal	setting	0.67	0.15
The boy tells the big frog not to come with them.	inferential	dialogue	0.67	0.18
The boy and the other animals go on a raft.	literal	event	0.97	0.56
The big frog stays at land.	literal	resolution	0.63	0.61
The boy is distracted.	inferential	thought	0.77	0.25
The big frog jumps onto the raft.	literal	initiating event	1.00	0.92
He pushes the small frog from the raft.	literal	problem	1.00	0.98
The small frog falls into the water.	literal	problem	0.73	0.59
The turtle alarms the boy.	inferential	motive	0.90	0.19
The boy is shocked.	inferential	emotion	0.90	0.65
They search for the small frog.	literal	event	1.00	0.95
They want to rescue him.	inferential	motive	1.00	0.06
They don't find the small frog.	literal	event	0.97	0.58
They feel sad.	inferential	emotion	1.00	0.86
At home,	literal	setting	0.60	0.21
the boy lies on his bed.	literal	event	0.90	0.43
The dog licks his arm.	literal	event	0.80	0.29
They notice a sound from outside.	inferential	thought	0.87	0.26
They look expectantly at the window.	inferential	motive	0.60	0.29
The small frog jumps into the room.	literal	resolution	1.00	0.95
He lands on the big frog.	literal	event	0.77	0.70
The two frogs are friends now.	literal	resolution	0.80	0.77
Everybody is happy.	inferential	emotion	0.97	0.70
			M = 0.87 *SD* = 0.14	*M* = 0.58 *SD* = 0.29

Appendix E – Parental exposure to adult literature: Relations to children's storybook exposure and oral language skills

Table E12.1
Regression Analysis of Parental Print Exposure and Parental Storybook Exposure as Predictors of Children's Storybook Exposure

	Children's storybook exposure		
Fixed effects	*B*	*SE*	R_2 unique
Parent			
Print exposure (ART)	-0.092	0.077	.00
Storybook exposure	0.375**	0.096	.09
Control variables			
Age	0.002	0.003	.00
Nonverbal IQ	0.003	0.003	.01
Verbal STM	0.001	0.002	.01
Socioeconomic status	0.003*	0.001	.04
Fixed effects R_2		.17	
Random effects (ICC)		.00	

Note. N = 131. ART, author recognition test; STM, short-term memory; ICC, intraclass correlation.
* $p < .05$. ** $p < .01$.

Table E12.2

Regression Analyses of Parental Print Exposure, Parental Storybook Exposure, and Children's Storybook Exposure as Predictors of Oral Language Skills

	Lower level language skills						Higher level language skills					
	Vocabulary			Syntactic integration			Comprehension monitoring			Narrative comprehension		
Fixed effects	*B*	*SE*	R^2_{unique}	*B*	*SE*	R^2_{unique}	*B*	*SE*	R^2_{unique}	*B*	*SE*	R^2_{unique}
Parent												
Print exposure (ART)	0.112*	0.054	.02	0.208**	0.065	.05	0.042	0.058	.00	0.026	0.065	.00
Storybook exposure	0.218**	0.072	.04	0.061	0.087	.01	0.132	0.076	.00	0.093	0.087	.00
Child												
Storybook exposure	0.168**	0.063	.03	0.224**	0.014	.05	0.228**	0.068	.06	0.161**	0.077	.03
Control variables												
Age	0.010***	0.010	.06	0.004	0.003	.00	0.005	0.003	.00	0.005	0.003	.00
Nonverbal IQ	0.002	0.002	.00	0.003	0.002	.00	0.003	0.002	.01	-0.002	0.002	.00
Verbal STM	0.004**	0.001	.03	0.001	0.002	.00	0.001	0.001	.00	0.004*	0.002	.05
Socioeconomic status	0.000	0.001	.00	0.001	0.001	.00	0.001	0.001	.00	0.001	0.001	.00
Fixed effects R^2		.37			.24			.23			.13	
Random effects (ICC)		.08			.01			.00			.00	

Note. N = 131. ART, author recognition test; STM, short-term memory; ICC, intraclass correlation.

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

LEBENSLAUF

Der Lebenslauf ist in der Online-Version aus Gründen des Datenschutzes nicht enthalten.

Der Lebenslauf ist in der Online-Version aus Gründen des Datenschutzes nicht enthalten.

PUBLIKATIONSVERZEICHNIS

Publikationen (peer-reviewed)

Grolig, L., Tiffin-Richards, S. & Schroeder, S. (in press). Print exposure across the reading life span. *Reading and Writing.* doi:110.1007/s11145-019-10014-3 [OSF]

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Grolig, L., Cohrdes, C. & Schroeder, S. (2017, September). Effects of a combined language intervention, early music education and home literacy environment on precursors of reading. Paper presented at the 17th Meeting of the sections Developmental Psychology and Educational Psychology of the German Society for Psychology, Münster. Organisation der Arbeitsgruppe "Fostering language abilities of kindergarten children: Interventions in child care centers and families".

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SELBSTSTÄNDIGKEITSERKLÄRUNG

Hiermit versichere ich, dass ich die vorgelegte Arbeit mit dem Titel „Shared Storybook Reading and the Development of Oral Language Skills“ selbständig verfasst habe. Andere als die angegebenen Hilfsmittel habe ich nicht verwendet. Die Arbeit ist in keinem früheren Promotionsverfahren angenommen oder abgelehnt worden.

Berlin, den 30.12.2019 Lorenz Grolig

EIGENANTEIL UND VERÖFFENTLICHUNGEN

Kapitel 7 bis 10 dieser Dissertationsschrift wurden in marginal modifizierten Versionen in Fachzeitschriften veröffentlicht bzw. zur Veröffentlichung angenommen. Die Tabelle zeigt den Eigenanteil an den Manuskripten. Die Dissertation entstand im Rahmen des Projektes „MusiCo“, gefördert durch die Stiftung Mercator und den Rat für kulturelle Bildung e.V. (Projekt 14-001-4).

Autoren	Titel	Status	Eigenanteil
Grolig, L., Cohrdes, C., & Schroeder, S.	Der Titelrekognitions-test für das Vorschulalter (TRT-VS): Erfassung des Lesevolumens von präkonventionellen Lesern und Zusammenhänge mit Vorläuferfertigkeiten des Lesens	2017 veröffentlicht in *Diagnostica*, *63*, 309–319. doi:10.1026/0012-1924/a000186	Erarbeitung des Forschungsstands und theoretischen Hintergrunds; Konzeption, Entwicklung und Pilotierung des TRT-VS; Mitarbeit bei der Datenerhebung; Statistische Analysen; Verfassen des Manuskripts und Umschreiben des Manuskripts nach Feedback von Co-Autoren und Reviewern
Grolig, L., Tiffin-Richards, S. & Schroeder, S.	Print exposure across the reading life span	2019 angenommen zur Veröffent-lichung in *Reading and Writing: An Interdisciplinary Journal.* doi:110.1007/s11145-019-10014-3	Erarbeitung des Forschungsstands und theoretischen Hintergrunds; Konzeption, Entwicklung und Pilotierung des ART; Statistische Analysen; Verfassen des Manuskripts und Umschreiben des Manuskripts nach Feedback von Co-Autoren und Reviewern
Grolig, L., Cohrdes, C., Tiffin-Richards, S. & Schroeder, S.	Effects of preschoolers' storybook exposure and literacy environments on lower level and higher level language skills	2019 veröffentlicht in *Reading and Writing: An Interdisciplinary Journal*, *32*, 1061–1084. doi:10.1007/s11145-018-9901-2	Erarbeitung des Forschungsstands und theoretischen Hintergrunds; Mitarbeit bei der Datenerhebung; Statistische Analysen; Verfassen des Manuskripts und Umschreiben des Manuskripts nach Feedback von Co-Autoren und Reviewern
Grolig, L., Cohrdes, C., Tiffin-Richards, S. P., & Schroeder, S.	Narrative dialogic reading with wordless picture books: A cluster-randomized intervention study	Wird 2020 veröffentlicht in *Early Childhood Research Quarterly*, *51*, 191–203. doi:10.1016/j.ecresq.2019.11.002; 2019 online veröffentlicht	Erarbeitung des Forschungsstands und theoretischen Hintergrunds; Konzeption und Entwickung der Intervention; Mitarbeit bei der Datenerhebung; Statistische Analysen; Verfassen des Manuskripts und Umschreiben des Manuskripts nach Feedback von Co-Autoren und Reviewern

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