**Testing the validity of a self-report scale, author recognition test, and book counting as measures of lifetime exposure to print fiction**

Lena Wimmer1, 2 & Heather J Ferguson2

1Department of Education, University of Freiburg, Freiburg im Breisgau, Germany

2School of Psychology, University of Kent, Canterbury, UK

Correspondence to:

Lena Wimmer, Department of Education, University of Freiburg, Rempartstr, 11, 79098 Freiburg im Breisgau, Germany; +49 761 203 2437, lena.wimmer@ezw.uni-freiburg.de

**Abstract**

We report a study testing the validity of the three most commonly-used indicators of lifetime exposure to print fiction, namely a self-report scale, an author recognition test (ART), and book counting, in a sample of older adults (*N*=306; *M*age = 59.29 years, *SD*age = 7.01). Convergent validity of the self-report scale and book counting was assessed through correlations with the fiction sub-score of the ART; divergent validity of these two indicators was examined via correlations with the non-fiction sub-score of that ART. We also assessed criterion-related validity by testing the degree to which each of the three indicators predicted participants’ performance in a vocabulary test. The self-report scale and book counting were significantly more positively associated with the ART fiction sub-score compared to the ART non-fiction sub-score. Regression analyses, controlling for gender and non-fiction exposure, revealed that the ART fiction sub-score had the highest explanatory power among all indicators under investigation for predicting vocabulary test performance. The present results suggest that only ARTs may have satisfactory levels of both construct and criterion-related validity. Recommendations for the assessment of fiction exposure and future directions are discussed.

*Keywords*: fiction, print exposure, reading habits, author recognition test, home literacy

**Introduction**

Over recent years, there has been increasing scientific interest in understanding the potential benefits of reading fiction for a range of psychological outcomes. Whilst the majority of empirical research has tested the idea that reading fiction promotes social cognitive abilities including Theory of Mind, empathy (e.g., Bal & Veltkamp, 2013; Djikic et al., 2013b; Kidd & Castano, 2013), and related outcomes including moral cognition (e.g., Johnson et al., 2013; Koopman, 2015), benefits of reading fiction have been reported in other outcomes as well, for instance need for cognitive closure (Djikic et al., 2013a), creativity (Black & Barnes, 2021), or changes in personality (Djikic et al., 2009). Across outcome variables, the majority of experimental investigations have investigated effects of reading short fictional narratives. A meta-analysis concluded that such experiments on average yield small-sized benefits for social cognition (Dodell-Feder & Tamir, 2018).

However, recently proposed models by Consoli (2018) and Mar (2018) that outline conditions under which reading (fictional) narratives can lead to psychological benefits question the validity of these findings. According to these models, effects in the sense of deep learning are predicted exclusively after frequent exposure to fictional stories over a prolonged period of time, and not after a single brief reading assignment. One method of testing this prediction is to investigate the effects of lifetime exposure to print fiction: Instead of testing outcomes after a reading task, researchers could assess the amount of fiction participants have read in their lifetime so far, and examine whether the amount of lifetime fiction reading is associated with purported benefits. This research agenda requires valid indicators of lifetime fiction reading. In this article, we report a study investigating the validity of three such indicators.

According to a meta-analysis by Mol and Bus (2011), the most frequently applied indicators of print exposure are self-report scales, book counting, and author recognition tests. Using self-report scales, participants report on their own reading preferences and/or habits, often by responding to items using a rating scale. Prior to publication of the Self-Report Habit Index for Reading (SRHI-R; Schmidt & Retelsdorf, 2016), empirically validated self-report instruments did not exist so that researchers relied on bespoke scales (for examples see Acheson et al., 2008; Spear-Swerling et al., 2010). Schmidt and Retelsdorf (2016) reported some evidence suggesting criterion-related validity of the SRHI-R as this questionnaire was a stronger predictor of reading achievement and decoding speed than self-reported reading frequency. However, the SRHI-R was no longer a significant predictor of reading achievement when intrinsic reading motivation was included as predictor. Furthermore, the SRHI-R assesses general reading habits, but not fiction reading specifically. Hence, in the present study we used a bespoke single-item self-report scale. We decided to use a single item since the application of a multi-item instrument would have required additional piloting to clarify the instrument’s factor structure.

Book counting, understood as the number of fiction (or non-fiction) books in one’s home, in other words, the size of one’s home library, is typically used within large sociological surveys as an indicator of the home literacy environment. Within Bourdieu's (1984) classic *cultural reproduction theory*, home libraries are regarded as a component of a family’s cultural capital. Elite families are thought to provide their children with high status cultural signals, including a large home library, in order to convince teachers of their children’s academic excellence. This is supposed to motivate the teachers to give these children extra pedagogical support and seal educational benefits in the long run. More contemporary views, such as the *scholarly culture theory* (Evans et al., 2010), assume that raising children in “bookish” environments, including large home libraries, provides the foundation of their trait-level tastes, skills, and knowledge. This is expected to promote future educational and occupational achievements. In sum, both cultural reproduction theory and scholarly culture theory would predict that the number of books in one’s home is positively linked with reading skills. An important methodological limitation of book counting is that previous studies have not precisely counted participants’ books, but asked them to give rough estimates. For instance, in the study reported by Sikora and colleagues (2019), participants chose from the following response options: *10 books or less; between 11 and 25 books; between 26 and 100 books; between 101 and 200 books; between 201 and 500; more than 500 books*. To increase precision and attain an indicator of *fiction* exposure, the present study asked participants to count the fiction books in their homes and provide the exact figure.

Author recognition tests (ARTs), first introduced by Stanovich and West (1989), attempt to provide an objective measure of lifetime print exposure. In this task, respondents must identify the real authors from a list of names that includes both real authors and non-authors (so-called foils). The more authors are accurately recognised, the higher the estimated lifetime print exposure. The presumed relation between author recognition and reading amount draws on the assumption that people encode author names for the texts they read. Thus, the more they read, the more author names they should recognise. However, test scores are culturally and temporally sensitive, meaning that recognition of authors varies considerably across countries and short periods of time (McCarron & Kuperman, 2021; Moore & Gordon, 2015). This demonstrates the need to regularly develop updated versions for given cultural contexts. Therefore, in the present study we applied the Author Recognition Test-Genres (ART-G; Mar & Rain, 2015), since it is the most recent version providing separate scores for exposure to fiction and non-fiction.

The above-mentioned meta-analysis by Mol and Bus (2011) provides some evidence on the validity of print exposure measures. Here, 99 studies investigating leisure reading of preschoolers, kindergartners, school children and higher education students were synthesized. In view of first, intercorrelations of different types of measures, and second, correlations of these measures with reading skills, it was concluded that print exposure checklists (e.g., ARTs) and book counting have better validity than self-report measures since only the latter are particularly prone to social desirability biases. Despite the importance of the findings it yielded, this meta-analysis was published a decade ago and is limited to child, adolescent, and young adult samples. Hence, we conducted a comprehensive and updated literature search that also considered middle-aged and older adults.

In order to determine criterion-related validity, understood as the degree to which a measure is associated with a behavioural manifestation of the construct to be measured, we chose vocabulary, defined as word knowledge, as criterion of print exposure. This is because word knowledge is regarded as a central component of reading comprehension (e.g., Perfetti & Stafura, 2014), implying that vocabulary should improve as a result of frequent print exposure (Cunningham, 2005). A database search was carried out using PsycINFO and Web of Science, with the search term ‘(author recognition test OR print exposure OR home literacy environment OR reading frequency OR leisure time reading) AND (vocabulary OR word knowledge)’. Further studies were identified via reference lists and article recommendations on journal webpages. In total, we detected 117 studies which reported concurrent correlations between at least one print exposure index and vocabulary in participants’ primary language, and which were not included in the meta-analysis by Mol and Bus (2011). Table 1 provides an overview including correlation coefficients with vocabulary; for an extended version also listing intercorrelations of print exposure measures and correlations involving measures of divergent validity, see https://osf.io/ytudn/.

**Table 1**

*Overview of studies that provide information on the validity of print exposure measures in terms of concurrent correlations with primary language vocabulary; not included are studies synthesized by Mol and Bus (2011).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Reference* | *Type of print exposure addressed* | *Measures of print exposure under investigation* | *Sample* | *Concurrent correlation of print exposure measure with vocabulary* |
| Current study | **Fiction**  | **ART, book count, self-report** | ***N* = 306 older adults** | **ART: .57****Book count: .31****Self-report: .24** |
| Aram et al. (2013) | General | Parent-report, researcher observations, book count | *N* = 89 children | Home literacy score (composed of all measures listed in the 3rd column): .41 |
| Baroody & Diamond (2012) | General | Parent-report, book count | *N* = 81 preschool children | Home literacy environment score (contains book count, frequency of parental reading to child): .12 |
| Bojczyk et al. (2015) | General | Parent-report, book count | *N* = 112 preschool children from rural or urban region | Urban background:Stipek formal home learning activities (SFHLA) – Peabody Picture Vocabulary Test (PPVT): .17Stipek informal home learning activities (SIHLA) – PPVT: .09Home learning experience subscale (HLES) – PPVT: .00Stoney Brook family reading survey (SBFRS; contains book count, frequency of child looking at books) – PPVT: .12Rural background: SFHLA – PPVT: .44SIHLA – PPVT: .58HLES – PPVT: .47SBFRS – PPVT: .42 |
| Bojczyk et al. (2018) | General | Parent-report, book count | *N* = 112 mother-child dyads participating in Head Start | Stipek Home Learning Activities (SHLA): .38Home‐Learning Environment Profile (HLEP): .24 Stoney Brook family reading survey (SBFRS; contains book count, frequency of child looking at books): .27 |
| Bojczyk et al. (2019) | General | Parent-report, book count | *N* = 198 kindergarten children and first-grade pupils | Kindergarten children:Stipek Home Learning Activities (SHLA) – Peabody Picture Vocabulary Test (PPVT): .01SHLA – Expressive Vocabulary Test (EVT-2): -.01Home learning experience subscale (HLES) – PPVT: -.03HLES – EVT-2: .04Stoney Brook family reading survey (SBFRS; contains book count, frequency of child looking at books) – PPVT: .33SBFRS – EVT-2: .30First-grade pupils: SHLA – PPVT: -.04SHLA – EVT-2: -.05HLES – PPVT: -.16HLES – EVT-2: -.14SBFRS – PPVT: .12SBFRS – EVT-2: .17 |
| Bracken & Fischel (2008) | General | Parent-report, book count | *N* = 233 preschool children from low-income backgrounds | Child reading interest (contains child reading frequency): .23Parent-child reading interaction (contains number of books and frequency of shared reading): .39 |
| Brittnacher (2015) | General | Parent-report | *N* = 121 preschool children attending Head Start | Enrichment Activities (literacy activities the child participated in during a typical week): .10Dialogic Reading (quantity of the parental instructional interactions within literacy activities): .19 |
| Brysbaert et al. (2020), Study 1 | Fiction | ART | *N =* 195 undergraduates | Yes/No Vocabulary test Dutch: .05Vocabulary test Dutch: .42 |
| Brysbaert et al. (2020), Study 3 | Fiction | ART | *N =* 85 adults | .28 |
| Brysbaert et al. (2020), Study 4 | Fiction | ART | *N* = 72 vocation higher education students | .33 |
| Brysbaert et al. (2020), Study 5 | Fiction | ART | *N* = 62 undergraduates and graduates | Yes/No Vocabulary test Dutch: .26Vocabulary test Dutch: .64 |
| Burris et al. (2019) | General | Title recognition test completed by parents, parent-report, book count | *N* = 256 preschool children attending Head Start | Peabody Picture Vocabulary TestBook count: .22Frequency of primary caregiver reading to child: -.09Frequency of other person reading to child: -.06Frequency of library visits: -.03Age at which parents began reading to child: .00Title recognition test: .07Expressive One Word Picture Vocabulary TestBook count: .14Frequency of primary caregiver reading to child: .04Frequency of other person reading to child: -.07Frequency of library visits: .05Age at which parents began reading to child: -.03Title recognition test: .12 |
| Carlson et al. (2012) | General | Parent-report | *N* = 3,104 preschool children receiving special education | .14 |
| Carroll et al. (2019) | General | Parent-report | *N* = 55 preschool children | .36 |
| Chen & Fang (2015) | Popular *vs* high-brow literature | ART, self-report | *N* = 358 college students | Time spent reading print-based: .15Time spent reading internet-based: .01Reading frequency of fiction, non-fiction, Newspapers and magazines: .15Reading frequency of e-fiction, e-news, blogs and Bulletin Board Systems: .03ART score: .23 |
| Chen & Fang (2016) | General | Self-report, diary, ART, title recognition test | *N =* 318 fifth graders | Diary - school-day book reading time: .22Diary - non-school-day book reading time: .22Diary - average book reading time: .25Self-reported recreational reading attitude: .35Self-reported academic reading attitude: .28Self-reported reading attitude total: .34Self-reported activity preference reading: .35Title recognition test: .23ART: .42 |
| Chow et al. (2017) | General | Self-report, book count | *N* = 312 children aged 3 to 11 | Reading resources and opportunities at home (contains book count): .31Time when parental instruction began: .02Literacy activities: .02Duration of daily parental instruction: .08Parents’ literacy teaching methods: .04 |
| Conte et al. (2020) | General | Self-report, book count | *N =* 494 middle and high school pupils | Book count: .61Self-reported reading habits: .41 |
| Dąbrowska (2018) | General | ART | *N* = 90 adults | .60 |
| Dąbrowska (2019) | General | ART, self-report | *N* = 90 adults | ART: .60Self-report: .36 |
| De Jong & Leseman (2001) | General | Parent-report | *N* = 69 third graders | Parent-reported opportunity for literacy interactions: .30 |
| Dulay et al. (2018) | General | Parent-report, book count | *N* = 673 3- to 5-year-old children and their families | Receptive vocabularyHome literacy activities: .06Home literacy resources (contains book count): .11Expressive vocabularyHome literacy activities: .05Home literacy resources: .14Book vocabularyHome literacy activities: .05Home literacy resources: .13 |
| Duursma et al. (2007) | General | Book count | *N* = 96 fifth-grade Latino English language learners  | .50 |
| Emmorey et al. (2016) | General | ART, Magazine Recognition Test | *N =* 28 deaf adults | Correlations controlled for non-verbal IQART: .43Magazine Recognition Test: .61 |
| Ergül et al. (2021) | General | Parent-report | *N* = 441 kindergarten children | Receptive vocabularyParent-reported home reading: time 1: .23, time 2: .23Parent reported shared reading: time 1: .18, time 2: .13Parent-reported phonological and print awareness activities: time 1: .08, time 2: .16Expressive vocabularyParent-reported home reading: time 1: .30, time 2: .27Parent reported shared reading: time 1: .17, time 2: .15Parent-reported phonological and print awareness activities: time 1: .05, time 2: .09 |
| Esmaeeli et al. (2018) | General | Parent-report, book count | *N =* 1,171 children | Correlations with emergent literacy (contains vocabulary)Access to print (contains book count): .25Literacy-related activities: .24Child interest: .36 |
| Esmaeeli et al. (2019) | General | Parent-report, book count | *N =* 208 children | Home literacy environment index (contains frequency of reading to child & book count): .46 |
| Foster et al. (2005) | General | Parent-report, book count | *N =* 325 families | Parent-reported reading to child: .12Parent-reported books and reading materials: .04 |
| Freed et al. (2017) | General | ART, self-report | *N* = 357 young adults | Extended Range VocabularyART: .58Reading Habits: .26Advanced VocabularyART: .46Reading Habits: .28Nelson-Denny VocabularyART: .58Reading Habits: .37 |
| Froiland et al. (2014) | General | Parent-report, book count | *N =* 76 children participating in Head Start | Home literacy environment index (involves book count, frequency of shared reading): .24 |
| Georgiou et al. (2021) | General | Parent-report, book count | *N* = 172 children followed from Grade 1 to Grade 3 | Parent-reported direct teaching: .02Parent-reported shared book reading: .07Book count: .24 |
| Gonzalez et al. (2017) | General | Parent-report, book count | *N =* 252 mothers and their preschool children | Receptive vocabularyHome literacy environment (contains frequency of shared reading): .11Frequency of parent reading to child: .19Book count: .23Expressive vocabularyHome literacy environment: .08Frequency of parent reading to child: .11Book count: .20 |
| Goodrich et al. (2021) | General | Parent-report, book count | *N* = 944 preschool children | Picture book count: -.02Alphabet book count: -.01Frequency of reading to child: -.02Frequency of parents engaging children in stories: .01 |
| Grant et al. (2011) | General | Title recognition test | *N =* 29 Grade 3 pupils | .51 |
| Grant (2012, Study 2) | General, fiction, non-fiction | Self-report, Book Cover Recognition Test, Title Recognition Test | Pupils tested in Grades 1 (*N* = 42) and 2 (*N* = 40) | Grade 1 (correlations controlled for age)Book Cover Recognition Test (BCRT) – titles: .40BCRT – characters: .21BCRT – details: .21Home reading: percentage of fiction: -.15Home reading: number of books read: -.36Grade 2 (correlations controlled for age)Title Recognition Test (TRT) overall: .33TRT fiction: .21 |
| Grant (2012, Study 3) | General, fiction, non-fiction | ART, Magazine Recognition Test | *N* = 97 undergraduate students | ART: .32ART fiction: .34Magazine Recognition Test: .28 |
| Griffin & Morrison (1997) | General | Parent-report, book count | *N* = 295 children followed from kindergarten to Grade 2 | Home literacy environment index (includes number of books and parent-reported frequency of reading to child): .63 |
| Grolig et al. (2017, Study 2) | General | Parent-report, Title Recognition Test (completed by children) | *N =* 202 preschool children | Explaining concepts vocabulary testTitle Recognition Test (TRT): .39Home literacy environment index (contains book count, frequency of reading to child): .43Picture naming vocabulary testTRT: .31Home literacy environment index: .38 |
| Grolig et al. (2019) | General | Parent-report, Title Recognition Test (completed by children) | *N =* 201 preschool children | Explaining concepts vocabulary testTitle Recognition Test (TRT): .43Home literacy environment index (contains book count, frequency of reading to child): .34Picture naming vocabulary testTRT: .43Home literacy environment index: .38 |
| Hindman & Morrison (2012) | General | Parent-report | *N =* 229 preschoolers | Home literacy environment index (contains frequency of literacy teaching): .04Frequency of shared book reading: .20 |
| Hofslundsengen et al. (2019) | General | Parent-report | *N =* 111 preschoolers | Home literacy environment index (involves weekly duration of shared book reading): .33 |
| Hutton et al. (2020) | General | Parent-report | *N =* 47 3–5-year-olds | Shared reading score: .45 |
| Inoue et al. (2018) | General | Parent-report, book count | *N* = 214 children followed from kindergarten to Grade 3 | Parental letter teaching: .23Parental letter sound teaching: .25Parental reading words teaching: .15Parent-reported reading to child: .31Book count: .19 |
| Iruka et al. (2018) | General | Parent-report, book count | *N =* 5,046 toddlers | Home literacy environment (involves book count, parent–child literacy activities): .24Frequency of reading to/with child: .08 |
| James et al. (2018) | General | ART, self-report | *N =* 117 adults | Reading time estimate survey: .10Comparative reading habits survey: .35ART: .45 |
| Johns et al. (2018) | General | Magazine Recognition Test | *N* = 35 young adults | .55 |
| Johnson et al. (2008) | General | Parent-report, book count | *N* = 455 kindergarten and Grade 1 students | Child is read to: .08Child owns more than 30 books: .21Child amuses self with books: -.05Number of books child brings home: .11Family uses library card more than once year: .17Number of household subscription: .32 |
| Kalia & Reese (2009) | General | Parent-report | *N =* 50 kindergarten children | Book-reading practices: .34Teaching practices: .29 |
| Kim et al. (2018) | General | ART, Magazine Recognition Test | *N =* 60 undergraduate students | Print exposure index (composed of ART and Magazine Recognition Test): .38 |
| Korat et al. (2013) | General | Parent-report, book count | *N =* 109 kindergarten children | Home literacy environment index (contains book count, frequency of reading to child)Spoken vocabulary: .38Written vocabulary: .46Peabody Picture Vocabulary Test: .18 |
| Landi (2010) | General | ART | *N =* 928 university students | .46 |
| Lee et al. (1997)  | General | ART, self-report | *N =* 30 adults | ART: .53Frequency of reading for pleasure: .59 |
| Lee et al. (2019) | General | ART, self-report | *N* = 104 undergraduates and graduates | Self-reported reading time: .04Comparative reading habits survey: .23ART: .35 |
| Lehrl et al. (2020) | General | Parent- and self-report, researcher observations, book count | *N* = 554 children followed from age 3 to age 13 | Formal literacy activities score (contains frequency of literacy teaching activities): -.02Informal literacy activities (contains frequency of reading to child & book count): .41 |
| Lenhart et al. (2021) | General | Parent-report | *N =* 643 children | Expressive vocabulary: .17Receptive vocabulary: .17 |
| Leseman & de Jong (1998) | General | Parent-report | *N* = 89 primary school children | Parent-reported frequency of literacy-related activities with childAge 4: .46Age 7: .30 |
| Lewis et al. (2016) | General | Parent-report, book count | *N =* 93 preschool children attending Head Start | Book count: -.05Frequency of shared reading: .00Frequency of maternal teaching: -.24 |
| Li et al. (2008)  | General | Parent-report, book count | *N* = 88 children followed for three years starting at age 5 | Bejing sampleHome reading resources (contains book count): .12Exposure to reading at home: .09Direct literacy teaching at home: .40Exposure to reading in classroom: .35Direct literacy teaching in classroom: .42Hong Kong sampleHome reading resources (contains book count): .14Exposure to reading at home: .34Direct literacy teaching at home: .56Exposure to reading in classroom: .72Direct literacy teaching in classroom: .60 |
| Li et al. (2020) | General | Parent-report, book count | *N =* 124 pupils in Grades 4 to 6 | Book count: .59Age at which child started shared reading: .43 |
| Liebeskind et al. (2014) | General | Parent-report, book count | *N* = 500 children aged 8–36 months | Number of child books: .02Number of adult books: .05Parent-child interactions (contains teaching letters/words, shared reading): .16 |
| Liu et al. (2018) | General | Parental self-report, book count | *N* = 140 kindergarten children | Parent-reported frequency of literacy teaching: .04Parent-reported frequency of story reading to child: .13Book count: .35 |
| Manolitsis et al. (2011) | General | Parent-report, book count | *N* = 70 children followed from kindergarten to Grade 4 | Parent-reported frequency of parental literacy teaching: -.05Storybook exposure (contains number of books and parent-reported frequency of reading to child): .38 |
| Manolitsis et al. (2013) | General | Parent-report, book count | *N =* 82 children followed from kindergarten to Grade 1 and their parents | Parent-reported frequency of parental literacy teaching: .19Storybook exposure (contains bookd count and parent-reported frequency of reading to child): .33 |
| Mar & Rain (2015), Study 1 | Fiction and non-fiction | ART, self-report | *N* = 349 undergraduates | Self-reported fiction exposure: .23ART fiction: .32 |
| Marjanovič-Umek et al. (2008) | General | Parent-report, Title Recognition Test completed by parents | *N =* 115 preschool children | Correlations with Language Expression Scale (contains vocabulary)Home literacy environment score: .15Title Recognition Test: 15 |
| Marjanovič-Umek et al. (2017)  | General | Parent-report | *N =* 51 toddlers | Frequency of shared reading: .34 |
| Martin et al. (2009) | General | ART | *N* = 646 twin pairs and 307 singleton siblings of twins in the adolescent to young adult age range | .42 |
| Mendez (2010) | General | Parent-report | *N =* 288 children attending Head Start | Frequency of reading to child: .14 |
| Meng (2015) | General | Parent-report | *N* = 2,611 preschool children attending Head Start | Home literacy environment index (reflects parental teaching and reading behaviours, providing literacy activities, making literacy materials accessible for child): .10 |
| Mesman & Kibby (2011) | General | Title Recognition Test | *N =* 158 8- to 12-year-olds | .33 |
| Misyak & Christiansen (2012) | General | ART | *N =* 30 undergraduate students | .33 |
| Moore & Gordon (2015) | General | ART | *N* = 1,012 university students | .44 |
| Napoli & Purpura (2018) | General | Parent-report | *N =* 114 preschool children | Home literacy environment – code-related (contains frequency of printing letters, identifying letters, and identifying letter sounds): .30Frequency of storybook reading: .01 |
| Niklas & Schneider (2013) | General | Parent-report, book count | *N* = 921 children followed from kindergarten to Grade 1 | Home Literacy Environment Index (contains parent-reported child reading frequency, parent-reported frequency of reading to child, book count): .60 |
| Niklas et al. (2013) | General | Parent-report, book count | *N =* 922 kindergarten children | Cultural capital (contains book count): .55Cultural praxis (contains frequency of reading to child, library visits): .46 |
| Niklas & Schneider (2015) | General | Parent-report, book count | *N* = 125 preschool children | Home Literacy Environment Index (contains frequency of reading to child, book count): .20 |
| O’Brien et al. (2020) | General | Parent-report, book count | *N* = 1,327 kindergarten children and their parents | Shared reading score (includes book count, parent reported frequency of shared reading): .20Parent habit score (contains frequency of parental literacy teaching activities): .09Child interest score (contains frequency of child looking at books, asking to be read to): .07 |
| Ocal (2016) | General | ART | *N =* 42 university students | .43 |
| Patterson (2002) | General | Parent-report | *N* = 64 bilingual 21- to 27-month-old children from homes in which Spanish and English were spoken | Frequency of reading to child in English – English vocabulary: .40Frequency of reading to child in Spanish – Spanish vocabulary: .35 |
| Payne et al. (2012) | General | ART, self-report | *N* = 139 older adults (taken from the Senior Odyssey project) | ART: .62 |
| Peeters et al. (2009a) | General | Parent-report, book count | *N =* 35 children with Cerebral Palsy | Child writing experiences: .12Child experiences of literacy materials: .14Child storybook reading: .07Child story orientation activities: .31Child word orientation activities: .08Provision of literacy materials (contains book count): -.12 |
| Peeters et al. (2009b) | General | Parent-report, book count | *N =* 40 6-year-olds with Cerebral Palsy, N = 62 age-matched typically developing controls | Children with Cerebral PalsyChild writing experiences: .29Child experiences with literacy materials: .23Child storybook reading interest: .04Child story orientation activities: .19Child word orientation activities: .26Child book orientation activities: .04Provision of literacy materials (contains book count): .04Typically developing controlsChild writing experiences: -.19Child experiences with literacy materials: .01Child storybook reading interest: .03Child story orientation activities: -.17Child word orientation activities: -.03Child book orientation activities: -.01Provision of literacy materials (contains book count): .01 |
| Petrill et al. (2014) | General | Parent-report | *N* = 212 kindergarten children at risk for language impairment | Frequency of storybook reading: .11 |
| Pfost et al. (2013) | Fiction, Non-fiction | Self-report | *N =* 1,226 secondary school pupils | Frequency of reading novels, stories, or tales: .34 |
| Pratheeba & Krashen (2013) | General | Self-report | *N =* 25 engineering students | Self-reported reading habits: .78 |
| Prevoo et al. (2014) | General | Parent-report, book count | *N* = 111 6-year-old children of first- and second-generation Turkish immigrant parents in the Netherlands  | Dutch vocabularyFrequency of reading by mother: .10Frequency of reading by father: .23Book count: .29Turkish vocabularyFrequency of reading by mother: .13Frequency of reading by father: .05Book count: -.03 |
| Reynolds & Werfel (2020) | General | Parent-report | *N* = 22 3- to 4-year-old children with hearing loss and *N* = 27 age-matched controls | Children with hearing lossParent facilitation of literacy: -.26Child orientation to literacy: .11Child interaction with books: .54ControlsParent facilitation of literacy: .04Child orientation to literacy: .03Child interaction with books: -.00 |
| Rose et al. (2018) | General | Observation of parent-child interactions, parent-report, book count | *N =* 547 3-year-olds | Home literacy environment index (contains frequency of shared reading and book count) – language skills (contains vocabulary): .42 |
| Scheele et al. (2012) | Personal narrative, impersonal narrative | Parent-report | *N =* 58 3-year-olds | Impersonal narrative input: .21Personal narrative input: .47 |
| Schmidtke et al. (2018) | General | ART, Magazine Recognition Test | *N* = 138 adolescents/ young adults  | Print exposure score (composed of ART and Magazine Recognition Test): .70 |
| Schmitt et al. (2011, Study 1) | General | Title Recognition Test (completed by parents), parent-report | *N =* 50 infants | MacArthur–Bates Communicative Development Inventory - Words and GesturesTitle Recognition Test: .02Home literacy environment index (contains frequency of reading to child): .55Computerized comprehension taskTitle Recognition Test: .17Home literacy environment index: .35 |
| Schroeder et al. (2016) | General | Title Recognition Test, book count | *N =* 416 primary school children | Title Recognition Test: .58Book count: .10 |
| Segers et al. (2016) | General | Parent-report, book count | *N =* 101 kindergarten children | Reading climate (involves book count): .35Reading frequency (frequency of reading to child, frequency of child asking to be read to): .22 |
| Sénéchal et al. (2018) | General | Self-report | *N =* 103 Grade 4 children | Frequency of reading for pleasure: .07 |
| Sénéchal & LeFevre (2014) | General | Parent-report | *N* = 110 children followed from kindergarten to Grade 2  | KindergartenTeach/expect (involves parent teaching to read words and parents’ expectations about their child’s reading before Grade 1): .08Shared reading: .31Grade 1Teach/listen (involves parent teaching to read words and parents’ listening to their child reading): .11Shared reading: .40Grade 2Teach/listen: -.13Shared reading: .09 |
| Shriver et al. (2020) | General | Parent-report | *N =* 308 infants at time 1, N = 179 infants at time 2 | Time 1 (age 11-15 months): .21Time 2 (age 23-37 months): .13 |
| Sparks et al. (2014) | General | ART, Magazine Recognition Test | *N =* 54 Grade 10 pupils | Print exposure composite score (composed of ART and Magazine Recognition Test) – ISTEP reading (contains vocabulary): .61 |
| Sparks & Reese (2013) | General | Parent-report | *N =* 60 preschool children attending Head Start | Correlations controlled for child age and maternal educationPeabody Picture Vocabulary TestFrequency of reading to child: -.04Frequency of print teaching: -.08Frequency of reading teaching: -.05Frequency of child asking to be read to: .10Expressive Vocabulary TestFrequency of reading to child: .16Frequency of print teaching: -.06Frequency of reading teaching: -.08Frequency of child asking to be read to: .09 |
| Spear-Swerling et al. (2010) | Fiction and non-fiction | ART, self-report | *N* = 87 sixth graders | ART: .57Reading habits fiction books: .25 |
| Strasser et al. (2017) | General | Book cover recognition test | *N* = 281 first grade children | .26 |
| Stutz et al. (2016) | General | Self-report | *N =* 1,075 primary school pupils | Self-reported reading frequency – word comprehension girls: .27Self-reported reading frequency – word comprehension boys: .29 |
| Suggate et al. (2011) | General | Parent-report | *N =* 103 primary school children | Home literacy environment index: .23 |
| Tabullo & Gago-Galvagno (2021) | General | Parent-report, book count | *N =* 136 infants | Frequency of shared reading: .17Book count: .07 |
| Torppa et al. (2007) | General | Parent-report, book count | *N =* 186 preschool children | Children at risk of dyslexiaFrequency of shared reading: .37Access to print (contains book count): .34Child interest in print: .44ControlsFrequency of shared reading: .25Access to print: .13Child interest in print: .12 |
| Torppa et al. (2013) | General | Parent-report | *N* = 1,006 kindergarten children | Frequency of shared reading: .15Frequency of literacy teaching: -.05 |
| Tremblay et al. (2020) | General | Self- and parent-report, retrospective title recognition test, ART | *N* = 45 adolescent-parent dyads | Self-reported reading enjoyment and frequency: .08ART: .44 |
| van der Schuit et al. (2009) | General | Parent-report, book count | *N =* 48 children with intellectual disabilities | Receptive language (contains receptive vocabulary)Child’s storybook reading interest: .03Child’s activities with literacy materials: .25Provision of literacy materials (contains books count): .06Story orientation activities: .60Book orientation activities: .06Word orientation activities: .40Productive vocabularyChild’s storybook reading interest: -.01Child’s activities with literacy materials: .34Provision of literacy materials: .13Story orientation activities: .52Book orientation activities: -.14Word orientation activities: .33 |
| Vasilyeva et al. (2018) | General | Parent-report, book count | *N* = 1,332 first graders and their parents | Correlations with child literacy score (contains vocabulary):Language activities at home (contains shared book reading): .27Book count: .20 |
| Veldre et al. (2021) | General | ART | *N* = 49 older adults | .51 |
| Welcome & Trammel (2017) | General | ART, self-report | *N =* 48 adults | ART: .53Adult Reading History Questionnaire: .10 |
| West et al. (1993) | General | Range of exposure checklists containing author names, magazine titles, newspaper titles; actual leisure reading in a waiting lounge | *N* = 217 adults | Actual leisure reading in a waiting lounge: .46ART: .62Magazine Recognition Test: .48Newspaper Recognition Test: .47 |
| Westerveld et al. (2017) | General | Parent-report | *N =* 57 preschoolers with Autism Spectrum Disorder | Home literacy environment index (contains frequency of shared reading, child asking to be read to): .06 |
| Willard et al. (2015) | General | Parent-report, book count | *N* = 119 preschoolers and *N* = 121 4th graders with a Turkish background living in Germany  | Preschool childrenHome literacy environment index (contains book count, frequency of reading to child): .194th gradersHome literacy environment index: .09 |
| Yuet-Han Lau & McBride-Chang (2005) | General | Parent-report, self-report, book count | *N =* 92 2nd graders | Correlations controlled for ageSelf-report Interest: literacy skills learning: -.02Interest: literacy skills self-efficacy: .17Interest: bookstore and storybook: .27Book count: .41Parent-reportFrequency of buying books: .17Frequency of reading: .16Duration of reading: -.04Duration of teaching to read: .10 |
| Zhang et al. (2018) | General | Parent-report, book count (provided by parents), title recognition test (provided by parents), book title knowledge (provided by children) | *N* = 147 kindergarten children | Frequency of shared book reading: .19Number of children’s books at home/children’s title recognition list: .24Children’s knowledge of book titles: .28 |
| Zhang et al. (2020) | General | Parent-report, book count | *N =* 145 children followed from kindergarten to Grade 2 | Reading to child at bedtime: .17Reading to child at other times: .14Parents’ diary: .19Teaching to read characters: .02Teaching to read pinyin: .02Book count: .11Visits of libraries/bookstores: .18 |
| Zucker et al. (2013) | General | Teacher logs | *N =* 178 preschoolers | Fall assessmentsFrequency of shared reading: -.19Spring assessmentsFrequency of shared reading: .01 |

 The vast majority of investigations (82 out of 117 studies in Table 1) have studied child samples up to primary school age, whereas studies with adolescents of secondary school age (8 out of 117 studies in Table 1) and young or middle-aged adults (25 out of 117 studies in Table 1) are less frequent. In addition, there is an apparent lack of studies with older adults (2 out of 117 studies in Table 1: Payne et al., 2012; Veldre et al., 2021). Investigating this population is especially informative for recent models on the effects of reading (fictional) narratives by Consoli (2018) and Mar (2018), since the amount of fiction read accumulates over the lifespan, so that effects of fiction exposure should be largest in older adults compared to younger samples.

Regarding criterion-related validity, the following correlation coefficients between print exposure measures and vocabulary have been observed (see Table 1): for ARTs, 34 correlation coefficients range between .05 (yes/no vocabulary test in Brysbaert et al., 2020, Study 1) and .70 (print exposure index composed of ART and Magazine Recognition Test in Schmidtke et al., 2018), with an interquartile range of .34 to .58. For book count, 71 correlation coefficients range between -.12 (Peeters et al., 2009a) and .63 (home literacy environment index including book count and parent-reported frequency of reading to child in Griffin & Morrison, 1997), with an interquartile range of .12 to .38. For self-report measures (or parent-report measures in case of younger child samples), 257 correlation coefficients range between -.36 (correlation controlled for age in Grant, 2012, Study 2) and .78 (Pratheeba & Krashen, 2013), with an interquartile range of .06 to .31. Taken together, the pattern of correlations confirms the earlier conclusions by Mol and Bus (2011) that ARTs and book counting have better validity than self-report indicators. Beyond this, the current literature review seems to suggest that ARTs have even better criterion-related validity than book counting.

However, the majority of extant work has relied on a combination of self-report scales with either author recognition tests or book counting, whereas interrelations between all three indicators have rarely been tested so far; a look at Table 1 reveals that only four out of 117 studies included all types of indicators (namely: Burris et al., 2019; Grolig et al., 2017, 2019; and Zhang et al., 2018), and that all of these studies worked with child samples. Also, these studies applied Title Recognition Tests instead of ARTs, so do not address ARTs directly. For those studies applying more than one type of index, the following intercorrelations were reported (see https://osf.io/ytudn/): 15 correlation coefficients addressing the association between ARTs and self-/parent-report measures range between .03 (time spent reading online in Chen & Fang, 2015) and .50 (frequency of reading for pleasure in Lee et al., 1997), with an interquartile range of .16 to .41. In addition, 55 correlation coefficients concerning the relation between self-/parent-report measures and book count range between -.02 (Torppa et al., 2007) and .73 (score containing book count and parent-reported frequency of shared reading in O’Brien et al., 2020), with an interquartile range of .20 to .46. There were no studies reporting the association of book count with ARTs. It would therefore be important to assess construct validity, i.e., whether the three types of indicators measure the same or different constructs, more extensively.

A previously understudied question is whether print exposure measures have divergent validity, which would indicate that they do not highly correlate with measures of theoretically unrelated constructs (Campbell & Fiske, 1959). In fact, assessment of divergent validity should be an integral part of each validation process (see also Hodson, 2021): strictly speaking, assumptions about a measure’s convergent validity draw on a comparison of associations with indicators reflecting similar constructs on the one hand and associations with indicators reflecting dissimilar constructs on the other. A measure is said to have good convergent validity if the former associations are considerably higher than the latter. Nevertheless, within the 117 studies listed in Table 1, we identified only 68 correlation coefficients between vocabulary on the one hand and constructs thought to be associated with vocabulary to a lower extent than print exposure on the other (see https://osf.io/ytudn/). These divergent measures reflected various behaviours and skills, including non-verbal intelligence, numeracy, and memory. Correlation coefficients ranged between -.28 (rapid automatized naming test in Zhang et al., 2020) and .61 (inference-making ability in Sénéchal et al., 2008; IQ in Sparks et al., 2014), with an interquartile range of .10 to .31. This seems to suggest that only ARTs may have divergent validity, since ARTs typically correlated more strongly with vocabulary than the divergent measures included in Table 1 (see above), whereas book counting and self-/parent-report measures did not typically exceed correlations of .31. Yet, this assumption may be premature due to the relative scarcity and heterogeneity of investigations into divergent validity. More research in this area would be desirable.

Finally, the field has focused on the amount of lifetime reading in general, but not reading fiction specifically: Only 10 out of the 117 studies reported in Table 1 looked at fiction exposure (namely: Brysbaert et al. 2020, Studies 1, 3, 4, 5; Chen & Fang, 2015; Grant, 2012, Studies 2, 3; Mar & Rain, 2015; Pfost et al. 2013; Spear-Swerling et al., 2010). Hence, conclusions about assessment of fiction exposure are currently not supported.

In the present article we report a study investigating the three main indicators of lifetime exposure to written fiction in a sample of older adults (here defined as individuals aged between 50 and 80 years old). We examined the construct validity of a self-report scale and book counting, two types of measures whose validity has been evidenced to a relatively low degree, especially regarding the fiction exposure of older adults, against the fiction sub-score of an ART, for which validity is supported by a comparatively larger evidence base. Convergent construct validity was investigated in terms of bivariate correlations of the ART-G fiction sub-score with the self-report scale and book counting. Divergent validity was tested through bivariate correlations of the ART-G non-fiction sub-score with the self-report scale and book counting. In addition, we examined criterion-related validity in so far as we determined the value of each indicator in predicting performance in a vocabulary test.

We aimed to answer the following research questions:

* 1. How strongly are self-report scales and counting fiction books correlated with fiction author recognition lists on the one hand and non-fiction author recognition lists on the other?
	More positive correlations with fiction author recognition than with non-fiction author recognition would suggest that self-report scales and counting fiction books measure the same construct as the ART-G fiction sub-score, and, hence, the most parsimonious indicator might be sufficient to assess lifetime exposure to print fiction.
	2. Which of the three indicators demonstrates the strongest positive association with word knowledge?
	This indicator can be regarded as the one with the best criterion-related validity.

**Methods**

This study utilised a correlational design and was authorised by the Research Ethics Committee of the School of Psychology at the University of Kent before study commencement. The sample overlaps with the one reported in Study 2 within Wimmer, Currie, Friend, and Ferguson (2021). Wimmer et al. (2021) investigated relations of the ART-G subscales with empathy, Theory of Mind, general world knowledge, and imaginative skills. As distinct from the present study, Wimmer et al. (2021) did not include self-report measures of fiction reading or book counting.

**Participants**

A total of *N* = 337 participants were recruited via Prolific Academic, the University of the Third Age (https://u3a.org.uk/), and through local social media/web pages. Participants were deemed eligible if they were native English speakers and aged between 50 and 80 years old. Participants were excluded from analyses if they did not report their age (*N* = 5), did not pass an attention check item interspersed within the survey (*N* = 11), or selected more than two mock authors in the ART-G[[1]](#footnote-1) (*N* = 15). This resulted in a final sample of *N* = 306[[2]](#footnote-2), 281 of which were recruited from Prolific Academic and 25 from one of the other sources named above. Participants had a mean age of 59.29 years (*SD*age = 7.01), and 60.5% were female. All respondents gave written informed consent prior to data collection and were compensated with a payment of £10.00, either via bank transfer or a digital shopping voucher. Post hoc power analyses using SPSS 27 showed that the final sample size had a power of 1-β > .99 to detect a medium-sized correlation of *rho* = .30 in a two-tailed test adopting a significance level of *p* < .05, and a power of 1-β = .41 to detect a small-sized correlation of *rho* = .10 in the same sort of inference test.

**Assessment measures**

 **Lifetime exposure to print.** *ART-G* (Mar & Rain, 2015) provided the first indicator of reading habits. Respondents were tasked to accurately recognise author names from a list that included 110 fiction authors and 50 non-fiction authors (targets), as well as 40 non-authors (foils). Fiction and non-fiction sub-scores were calculated from the number of selected authors for each genre, i.e., the fiction sub-score is the sum of correctly identified fiction authors, the non-fiction sub-score is the sum of correctly identified non-fiction authors. As distinct from the scoring procedures of the ART version by Stanovich and West (1989), foils were not subtracted from hits because the ART-G materials do not contain instructions to do so. Since we excluded participants selecting more than two foils, the penalty for foil checking was very strict (see above). Hence, the final sample for analyses had limited variance of ART-G foils, and further control measures did not seem necessary. Split-half reliability (Guttman split-half coefficient; test halves were composed using the odd-even method) was .96 for the fiction sub-score and .86 for the non-fiction sub-score.

*Book counting* served as the second measure of print exposure. Participants were given the following instruction: “How many fiction books do you have at home? Fiction books include novels such as crime novels, romantic novels, science fiction novels, but also short stories, comics/graphic novels, fairy tales, storybooks (often for children), theatre plays, poetry, etc. Please also include fiction e-books you may have on your e-book reader. If you live with other people, please only count the books that belong to you (i.e. reflect YOUR reading preferences). If you have more than 160 fiction books in your house, you can stop counting when you have reached 160 fiction books.” Participants were explicitly asked to give an accurate response and reminded that failure to do so would make the study results useless. The threshold of 160 books was based on the finding that British household have on average 143 books (*SD* = 179; Sikora et al., 2019), but this score does not differentiate between fiction and non-fiction. Since there is no information available regarding the proportion of fiction *vs* non-fiction books typically owned, we arbitrarily assumed that, on average, 50% of books at home (*M*= 72, *SD* = 80) are fiction, and 50% are non-fiction (*M* = 72, *SD* = 80). Participants having more than (*M* + 1*SD* =) 152 fiction books can therefore be considered scoring above average. Assuming that the number of books in one’s home is normally distributed and that the current sample was representative, collecting precise book counts from everyone scoring below 152 implied that we were able to gather precise estimates from approximately 84% of the sample. 160 rather than 152 was used as a cut-off to provide participants with a round number, which made instructions easier to follow, and to get exact estimates from even more than 84% of the sample. Using this threshold was regarded as feasible because it increased feasibility for participants, and prevented inaccurate responses.

Thirdly, participants *self-reported* on their reading frequency by responding to “About how often do you read a fiction book?” using a 6-point Likert scale with response options being 1 = “less than once a month”, 2 = “once a month”, 3 = “more than once a month”, 4 = “once a week”, 5 = “more than once a week”, and 6 = “every day”.

**Vocabulary.** An adapted version of the vocabulary subtest of the Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II; Wechsler, 2011) reflected the breadth of participants’ vocabulary and overall word comprehension. Respondents had to provide a written definition of 31 words presented to them. The time limit for each word was 30s. Correct responses were awarded a score of ‘2’, partly correct responses were coded ‘1’, and incorrect responses received a score of ‘0’. A sum score with a possible range of 0 to 62 served as dependent measure. Split-half reliability (Guttman split-half coefficient; test halves were composed using the odd-even method) was .84.

In the original version, the examiner conducts the vocabulary test in a face-to-face session with the participant. The test was adapted to fit the online setting of the study: participants received the same instructions and items, and were also given the same time limit as in the original version. As distinct from the original version, instructions were presented in written from via a Qualtrics survey instead of orally by the examiner, and participants typed their responses into a text field instead of answering orally.

**Procedure**

Volunteers participated online, via the Qualtrics platform. After providing informed consent, participants completed the vocabulary test, ART-G, book counting survey, and self-report reading scale in this order. Finally, they provided their demographics, were debriefed in written form, and remunerated. Participants also completed other tasks reported in Wimmer et al. (2021). The entire study took approximately 90min per participant.

**Data analysis**

Full data and analysis scripts are available on the Open Science Framework web pages (see https://osf.io/ytudn/for data and https://osf.io/sb7xz/ for analysis scripts). If not otherwise stated, statistics were computed using SPSS 27. After computing descriptive statistics of our key variables, we conducted Kolmogorov-Smirnov tests to check whether the measures of print exposure were normally distributed. Bivariate correlations between all print exposure measures and vocabulary were analysed through bivariate Spearman’s correlations. Next, we compared the correlation coefficients observed for the ART-G fiction sub-score with the ones observed for the ART-G non-fiction sub-score using the online calculator https://www.psychometrica.de/correlation.html. We also checked whether the three indicators of fiction exposure and the vocabulary sum score were associated with age (using bivariate correlations) or gender (using independent samples t-tests), to see whether analyses would have to be controlled for age and/or gender. Associations of the three indicators of fiction exposure with the vocabulary sum score were tested using a hierarchical linear regression, with the vocabulary sum score serving as the outcome variable. The self-report reading frequency scale was entered as first predictor, then followed the book count, and finally the ART-G fiction sub score. Unless otherwise mentioned, we adopted the standard 5% significance level.

**Results**

Descriptive statistics for all independent variables and the dependent measure are summarised in Table 2. Significant Kolmogorov-Smirnov tests indicated that none of the indicators of print exposure under investigation was normally distributed (all *ps* < .001). In line with this, for the book count 30.4% of the current sample reported to have 160 fiction books or more in their homes whereas the expected percentage under normal distribution is 13.5%. Hence, interrelations between the ART-G fiction and non-fiction sub-scores, the book count, and the self-report scale on the frequency of reading fiction, and the vocabulary sum score were tested using bivariate Spearman’s correlations, as described above (see Figure 1 for illustrations). The significance level was adjusted for multiple comparisons using the Bonferroni method, resulting in *pcrit*= .005.All correlation coefficients were small- to medium-sized and significant (all *ps* < .0004; see Table 1). The ART-G fiction and non-fiction sub-scores were strongly positively correlated. Nevertheless, the ART-G fiction sub-score was significantly more positively correlated with the book count and the self-report scale than the ART-G non-fiction sub-score (*Zs* > 4.70).

**Table 2**

Descriptive Statistics and Bivariate Correlations for Indicators of Print Exposure and Vocabulary

|  |  |  |
| --- | --- | --- |
| Variable | Descriptive statistics | Spearman’s *rho* correlation coefficients |
| *N* | *M (SD)* | 1 | 2 | 3 | 4 |
| 1 ART-G fiction sub score | 306 | 27.28 (17.06) | - |  |  |  |
| 2 ART-G non-fiction sub score | 306 | 5.65 (4.91) | .688\*\*\* | - |  |  |
| 3 Book count | 306 | 73.83 (63.80) | .512\*\*\* | .317\*\*\* | - |  |
| 4 Self-report scale on frequency of reading fiction | 293 | 2.72 (1.94) | .440\*\*\* | .206\*\*\* | .552\*\*\* | - |
| 5 Vocabulary sum score | 306 | 47.26 (7.65) | .572\*\*\* | .449\*\*\* | .310\*\*\* | .241\*\*\* |

*Note*. ART-G = Author Recognition Test-Genres; \*\*\* *p* < .001.

Further analyses revealed that none of the independent variables nor the dependent measure were associated with age (*ps* > .051). The vocabulary sum score did not differ by gender (*p* = .425). However, there were significant gender differences for the self-report scale on frequency of reading fiction, *t*(267.84) = -2.192, *p* = .029, *d* = -0.255, book count, *t*(267.48) = -2.329, *p* = .021, *d* = -0.269, and ART-G fiction sub-score, *t*(294.12) = -2.185, *p* = .030, *d* = -0.243. Females scored consistently higher than males. Means (*SD*s) were 2.92 (2.02) *vs* 2.43 (1.79) for the self-report scale, 80.56 (64.83) *vs* 63.53 (61.03) for book count, and 28.91 (18.43) *vs* 24.79 (14.45) for ART-G fiction sub-score.

As outlined above, a hierarchical regression tested the predictive power of each of the three indicators of fiction exposure in explaining variance of the vocabulary sum score (see Table 3 and Figure 2). The indicators of print exposure were *Z*-standardised, and gender was contrast coded (-.50 = male, .50 = female). To control for the observed gender differences, the two-way interactions of gender with the self-report scale, book count, and ART-G fiction sub-score were included in the baseline model alongside the ART-G non-fiction sub-score[[3]](#footnote-3) in order to control for effects of non-fiction exposure. The self-report scale as was entered as the predictor in the second model, book count was added in the third model, and the fourth model finally included all three predictors. Multicollinearity was acceptable (all VIFs < 3). *R2* increased significantly in each model. The self-report scale was a significant predictor in the second model but lost its significance when book count was added in the third model. Book count, in turn, predicted vocabulary significantly in the third model but lost its significance when the ART-G fiction sub score was added in the fourth model. Thus, when all variables – including the ART-G non-fiction sub score – were entered, the ART-G fiction sub score remained the only significant predictor of vocabulary (*p* < .001).

**Figure 1**

*Regression Plots Illustrating Inter-correlations of the Indicators of Print Exposure under Investigation*

**Figure 2**

*Regression Plots Illustrating the Relationship of the Three Indicators of Fiction Exposure with Performance in a Vocabulary Test*



**Table 3**

*Summary of Stepwise Multiple Regression for the Vocabulary Sum Score (N = 293)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Baseline Model† | Model 2 | Model 3 | Model 4 |
|  |  | *B* | *SE B* | β | *B* | *SE B* | β | *B* | *SE B* | β |
| ART-G fiction sub score | - | - | - | - | - | - | - | 3.294 | 0.660 | .437\*\*\* |
| Book count | - | - | - | - | 1.036 | 0.514 | .137\* | 0.473 | 0.506 | .062 |
| Self-report scale on frequency of reading fiction | - | 1.307 | 0.433 | .172\*\* | 0.755 | 0.510 | .100 | 0.012 | 0.512 | .002 |
| *R2* | .379 | .412 | .426 | .497 |
| *F* for change in *R2* | 12.057\*\*\* | 9.094\*\* | 4.070\* | 24.896\*\*\* |

*Note*. ART-G = Author Recognition Test-Genres; \*\*\* *p* < .001; \*\* *p* < .01; \* *p* < 05; †the baseline model included the intercept, the ART-G non-fiction sub score, and the following two-way interactions: gender \* self-report scale on frequency of reading fiction, gender \* book count, gender \* ART-G fiction sub score.

**Discussion**

There has been a recent increase of research interest in the potential benefits of reading fiction. According to contemporary models (Consoli, 2018; Mar, 2018), investigating the effects of lifetime exposure to written fiction in older adults seems particularly promising. Such a research agenda requires validated indicators of lifetime exposure to print fiction. The present study was the first to look at the three main types of indicators, namely self-report, author recognition test, and book counting, when applied to reading fiction rather than reading in general in a sample of older adults. We investigated convergent and divergent construct validity of the self-report scale and book counting through bivariate correlations with fiction author recognition on the one hand and non-fiction author recognition on the other, and criterion-related validity via associations of each indicator of fiction exposure with vocabulary test scores.

Our first research question addressed whether the self-report scale and book counting are more positively associated with fiction author recognition than with non-fiction author recognition. Such a pattern would indicate that self-report scales and counting fiction books reflect the same or a similar construct as the ART-G fiction sub-score, so that researchers could confine themselves to applying the most efficient measure without loss of information – in that case, using multiple measures would not provide additional information about participants’ engagement with fiction. The correlations observed were all statistically significant and ranged between *rho* = .206 (self-report scale – ART-G non-fiction sub-score) and *rho* = .688 (ART-G fiction - non-fiction sub-score), so were of small to medium size. Importantly, the self-report scale and book counting correlated consistently more strongly with the ART-G fiction sub-score than with the ART-G non-fiction sub-score. In general, the current interrelations of print exposure indicators are within the range of coefficients identified in our review of the literature, though consistently above the 75th percentile. The finding that the present associations were slightly higher than what has been typically found in earlier studies could trace back to either the age of our sample, which is higher than most previous studies; or to the fact that we examined specifically fiction exposure rather than general print exposure.

Whilst the above-mentioned statistics suggest that the self-report scale and book counting have satisfactory levels of convergent validity (Frey, 2018), the variance shared with the ART-G fiction sub-score ranges from 19% to 26%, leaving between 74% and 81% of variations within each indicator unexplained. This means that the constructs assessed by the three measures do overlap partially but are far from congruent (by congruency we mean a shared variance of 100%, or approaching 100% given the levels of noise typically present in empirical observations, rather than the partial overlap found in the current study). Thus, we cannot say from the present data that the three indicators can be used interchangeably. If researchers would like to get a comprehensive picture of participants’ lifetime exposure to print fiction, they might want to apply all three indicators, that is a self-report-based measure, and author recognition test, and book counting.

The second research question dealt with the strength of associations between each of the three indicators on the one hand and vocabulary test scores on the other. Since vocabulary is considered a central component of reading comprehension (Perfetti & Stafura, 2014) and good levels of reading comprehension at least partly trace back to frequent reading (Perfetti, 1985; Torppa et al., 2020), we assumed that the relation between the indicators and vocabulary test scores would be informative of the indicators’ criterion-related validity. Analyses revealed that, when gender and non-fiction exposure were controlled for, the self-report scale had the lowest predictive value as its contribution was no longer significant when book counting was added. Book counting proved to be the indicator with the second-best predictive value as it outperformed the self-report scale but lost its significance when the ART-G fiction sub-score was included as another predictor. Finally, the ART-G fiction sub-score was found to have the highest criterion-related validity since it emerged as the only significant predictor in the regression model including all three measures of exposure to print fiction. The model including the ART-G fiction sub-score was the one with the highest *R2*, too, meaning it was the one explaining most variance of the vocabulary test score. This emphasises the predictive power of the ART-G fiction sub-score.

Compared with earlier evidence summarized in Table 1, the current correlations between indicators of fiction exposure and vocabulary are similar in size, though above the median. Again, slightly higher coefficients could be related to either the age of our sample or the present focus on fiction exposure. Still, it is reassuring that according to the present findings, applying print exposure measures to index fiction exposure in older adults is not associated with reduced, but rather even better validity.

Additional results partly confirmed and partly deviated from earlier findings. On the one hand, females scored higher than males on all three indicators of exposure to written fiction. This resonates with the well-established finding that females have a stronger preference for fiction texts than males (e.g. Thums et al., 2021). On the other hand, in the current sample none of the measures of fiction exposure were related to age. This conflicts with results of Grolig and colleagues (2020) where author recognition test scores increased with rising age. The difference between the findings by Grolig et al. (2020) and the present results is likely to reflect differences in the samples’ age ranges. Participants in Grolig et al. (2020) were between 13 and 77 years old, whereas the current sample included a much smaller age range, from 50 to 79 years. Comparatively lower variance of age in the present study might have made the detection of an age-based impact more difficult. Whilst we deliberately focused on an older target group to capture lifetime experience with fiction, research on fiction exposure across the entire lifespan would indeed require samples covering the full scope of literate ages.

Although the research reported here made novel contributions to the field of fiction research in several respects, a few limitations should be acknowledged. First, the skewed distribution of the book count may raise some concerns about the reliability of book counting. The highest possible score of 160 was reported by a percentage (i.e., 30.4 %) more than twice the size expected under normal distribution (here, the score of 160 would be reported by 13.5% only). On one hand, it is possible that the number of fiction books is not normally distributed in our older adult population (who are likely to have accumulated a larger home library over their lifetime compared to the younger samples tested in most previous studies), so assuming normal distribution was incorrect in the first place. On the other hand, it cannot be ruled out that some participants did not actually count their books until they reached 160 but instead made a rough guess in fact overestimating the number of their books. Unfortunately, we do not have data, such as response times, which could be used to test this potential explanation. Future investigations could compare self-reported book counts with those recorded by researchers during home visits in order to gauge the reliability of self-reported book counts. Figure 1 also reveals that a considerable percentage of the sample (i.e., 7.2%) reported to have zero books in their home, which may be counter-intuitive – everyday experience suggests that people typically own at least a small number of books. Possibly, this result is associated with the target group of the current investigation. Older adults are likely to change their housing situation to something more age-appropriate, either downsizing or moving to a retirement home means adjusting to less personal space, so that one might have to divest oneself of personal belongings including books. In that case, book counting would not reliably reflect lifetime print exposure in this population. Targeted research is needed to clarify this.

Second, the use of a single-item self-report scale likely limited the reliability of this measure. Also, since Schmidt and Retelsdorf (2016) found the SRHI-R, another self-report indicator of print exposure (see Introduction), to be confounded with reading motivation, the same may have applied to the current study. We opted for a single-item scale for three reasons, namely the lack of validated multi-item self-report questionnaires of fiction exposure, a shortage of resources to pilot a new multi-item instrument, and the previous successful application of a bespoke single-item self-report scale in a study with older adults by Payne and colleagues (2012) . The first reason turned out to be obsolete since Kuijpers and colleagues (2020) developed the Reading Habits Questionnaire to assess fiction and non-fiction exposure. This questionnaire was published after the planning stage of the current study (end of 2019/beginning of 2020) and we were not aware of it until after data collection was completed.

Another limitation is related to the variable used to assess criterion-related validity, namely vocabulary or word knowledge. First, some researchers assume that good word knowledge is caused by frequent reading (e.g., Perfetti, 1985; Perfetti & Stafura, 2014), whereas others postulate other relationships between reading frequency and word knowledge. For instance, performance in a vocabulary test has been shown to predict reading comprehension (e.g., Laufer & Aviad–Levitzky, 2017; Ouellette, 2006), which suggests that word knowledge is a precursor rather than an outcome of reading behaviour. Hence, it remains disputable whether word knowledge is a suitable criterion-variable of reading exposure. Second, even if one accepts word knowledge as an appropriate criterion of print exposure, it does not provide a criterion of *fiction* exposure in particular. General word knowledge should improve through any kind of reading, but a specific benefit after reading fiction is not currently justifiable. However, at present we simply do not know what indicators are suitable criteria of fiction exposure. This may be related to the fact that empirical fiction research is still in its infancy, even though research activities are increasing. Only when research has identified robust outcomes of reading fiction, we will learn what measures to apply as external criteria of fiction exposure.

To conclude, in the present study we found evidence to suggest that self-report measures, book counting, and author recognition tests have good levels of construct validity as indicators of exposure to written fiction. However, the three indicators overlap only partially, so that they cannot be used interchangeably. In order to achieve a comprehensive picture of participants’ fiction exposure, researchers are encouraged to apply all three indicators. Out of the measures under investigation, the ART-G fiction sub-score has proven to have the highest criterion-related validity. It remained the only significant predictor of word knowledge both when the impact of gender and non-fiction reading were controlled for and when all indicators were entered in a regression model. Thus, we recommend that researchers include all three measures of fiction exposure if they have the resources to do so, and that they confine themselves to the ART-G in case they can include a single indicator only. For the future, it would be interesting to examine the reliability of book counting more closely, and to validate a multi-item self-report scale. Furthermore, estimating criterion-related validity would benefit if reliable outcomes of fiction reading were identified.

**Declarations**

**Acknowledgements and funding**: This work was supported by the Leverhulme Trust [grant number RPG- 2017-365].

**Conflicts of interest/Competing interests**: The authors declare that they have no affiliations with or involvement in any organisation or entity with any financial interest, or non-financial interest, in the subject matter or materials discussed in this manuscript.

**Ethics approval: The research reported here was approved by the Research Ethics Committee at the School of Psychology, University of Kent, ethics ID 202015852434366336.**

**Consent to participate**: Informed consent was obtained from all individual participants included in the study.

**Consent for publication**: Participants were informed that their consent to participate involved that their anonymized responses could be used by the research team, shared with other researchers, or made available in an online data repository.

**Open practices statement/availability of data and materials**: Data are available at the Open Science Framework, https://osf.io/ytudn/. Materials are available from the authors upon request. The research was not preregistered.

**Code availability**. The SPSS syntax for the main analyses is available at the Open Science Framework, https://osf.io/sb7xz/.

References

Acheson, D. J., Wells, J. B., & MacDonald, M. C. (2008). New and updated tests of print exposure and reading abilities in college students. *Behavior Research Methods*, *40*(1), 278–289. https://doi.org/10.3758/BRM.40.1.278

Aram, D., Korat, O., Saiegh-Haddad, E., Arafat, S. H., Khoury, R., & Elhija, J. A. (2013). Early literacy among Arabic-speaking kindergartners: The role of socioeconomic status, home literacy environment and maternal mediation of writing. *Cognitive Development*, *28*(3), 193–208. https://doi.org/10.1016/j.cogdev.2012.10.003

Bal, P. M., & Veltkamp, M. (2013). How does fiction reading influence empathy? An experimental investigation on the role of emotional transportation. *PLoS ONE*, *8*(1), e55341. https://doi.org/10.1371/journal.pone.0055341

Baroody, A. E., & Diamond, K. E. (2012). Links among home literacy environment, literacy interest, and emergent literacy skills in preschoolers at risk for reading difficulties. *Topics in Early Childhood Special Education*, *32*(2), 78–87. https://doi.org/10.1177/0271121410392803

Black, J. E., & Barnes, J. L. (2021). Pushing the boundaries of reality: Science fiction, creativity, and the moral imagination. Psychology of Aesthetics, Creativity, and the Arts, 15(2), 284–294. https://doi.org/10.1037/aca0000281

Bojczyk, K. E., Haverback, H. R., & Pae, H. K. (2018). Investigating maternal self-efficacy and home learning environment of families enrolled in head start. *Early Childhood Education Journal*, *46*(2), 169–178. https://doi.org/10.1007/s10643-017-0853-y

Bojczyk, K. E., Haverback, H. R., Pae, H. K., Hairston, M., & Haring, C. D. (2019). Parenting practices focusing on literacy: A study of cultural capital of kindergarten and first-grade students from low-income families. *Early Child Development and Care*, *189*(3), 500–512. https://doi.org/10.1080/03004430.2017.1328416

Bojczyk, K. E., Rogers-Haverback, H., Pae, H., Davis, A. E., & Mason, R. S. (2015). Cultural capital theory: A study of children enrolled in rural and urban Head Start programmes. *Early Child Development and Care*, *185*(9), 1390–1408. https://doi.org/10.1080/03004430.2014.1000886

Bourdieu, P. (1984). *Inequality: Classic readings in race, class, and gender*. https://www.taylorfrancis.com/books/9780429499838

Bracken, S. S., & Fischel, J. E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education and Development*, *19*(1), 45-67. https://doi.org/10.1080/10409280701838835

Brittnacher, L. M. (2015). *The role of the personal and contextual factors on emergent literacy skills* (2015-99190-095; Issues 4-A(E)) [ProQuest Information & Learning]. http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx%3fdirect%3dtrue%26db%3dpsyh%26AN%3d2015-99190-095%26site%3dehost-live

Brysbaert, M., Sui, L., Dirix, N., & Hintz, F. (2020). Dutch author recognition test. *Journal of Cognition*, *3*(1). https://doi.org/10.5334/joc.95

Burris, P. W., Phillips, B. M., & Lonigan, C. J. (2019). Examining the relations of the home literacy environments of families of low SES with children’s early literacy skills. *Journal of Education for Students Placed at Risk*, *24*(2), 154–173. https://doi.org/10.1080/10824669.2019.1602473

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, *56*(2), 81–105. https://doi.org/10.1037/h0046016

Carlson, E., Bitterman, A., & Jenkins, F. (2012). Home literacy environment and its role in the achievement of preschoolers with disabilities. *The Journal of Special Education*, *46*(2), 67–77. https://doi.org/10.1177/0022466910371229

Carroll, J. M., Holliman, A. J., Weir, F., & Baroody, A. E. (2019). Literacy interest, home literacy environment and emergent literacy skills in preschoolers. *Journal of Research in Reading*, *42*(1), 150–161. https://doi.org/10.1111/1467-9817.12255

Chen, S., & Fang, S. (2015). Developing a Chinese version of an Author Recognition Test for college students in Taiwan. *Journal of Research in Reading*, *38*(4), 344–360. https://doi.org/10.1111/1467-9817.12018

Chen, S.-Y., & Fang, S.-P. (2016). Print exposure of Taiwanese fifth graders: Measurement and prediction. *The Asia-Pacific Education Researcher*, *25*(1), 69–78. https://doi.org/10.1007/s40299-015-0234-5

Chow, B. W., Ho, C. S., Wong, S. W. L., Waye, M. M. Y., & Zheng, M. (2017). Home environmental influences on children’s language and reading skills in a genetically sensitive design: Are socioeconomic status and home literacy environment environmental mediators and moderators? *Scandinavian Journal of Psychology*, *58*(6), 519–529. https://doi.org/10.1111/sjop.12397

Consoli, G. (2018). Preliminary steps towards a cognitive theory of fiction and its effects. *Journal of Cultural Cognitive Science*, *2*(1–2), 85–100. https://doi.org/10.1007/s41809-018-0019-5

Conte, F., Costantini, G., Rinaldi, L., Gerosa, T., & Girelli, L. (2020). Intellect is not that expensive: Differential association of cultural and socio-economic factors with crystallized intelligence in a sample of Italian adolescents. *Intelligence*, *81*, 101466. https://doi.org/10.1016/j.intell.2020.101466

Cunningham, A. E. (2005). Vocabulary growth through independent reading and reading aloud to children. In E. H. Hiebert & M. L. Kamil (Eds.), *Teaching and learning vocabulary: Bringing research to practice* (pp. 45–68). Lawrence Erlbaum Associates Publishers.

Dąbrowska, E. (2018). Experience, aptitude and individual differences in native language ultimate attainment. *Cognition*, *178*, 222–235. https://doi.org/10.1016/j.cognition.2018.05.018

Dąbrowska, E. (2019). Experience, aptitude, and individual differences in linguistic attainment: A comparison of native and nonnative speakers. *Language Learning*, *69*(Suppl 1), 72–100. https://doi.org/10.1111/lang.12323

De Jong, P. F., & Leseman, P. P. (2001). Lasting effects of home literacy on reading achievement in school. *Journal of School Psychology*, *39*(5), 389-414. https://doi.org/10.1016/S0022-4405(01)00080-2

Djikic, M., Oatley, K., & Moldoveanu, M. C. (2013a). Opening the closed mind: The Effect of exposure to literature on the need for closure. *Creativity Research Journal*, *25*(2), 149–154. https://doi.org/10.1080/10400419.2013.783735

Djikic, M., Oatley, K., & Moldoveanu, M. C. (2013b). Reading other minds: Effects of literature on empathy. *Scientific Study of Literature*, *3*(1), 28–47. https://doi.org/10.1075/ssol.3.1.06dji

Djikic, M., Oatley, K., Zoeterman, S., & Peterson, J. B. (2009). On being moved by art: How reading fiction transforms the self. *Creativity Research Journal*, *21*(1), 24–29. https://doi.org/10.1080/10400410802633392

Dodell-Feder, D., & Tamir, D. I. (2018). Fiction reading has a small positive impact on social cognition: A meta-analysis. *Journal of Experimental Psychology: General*, *147*(11), 1713–1727. https://doi.org/10.1037/xge0000395

Dulay, K. M., Cheung, S. K., & McBride, C. (2018). Environmental correlates of early language and literacy in low- to middle-income Filipino families. *Contemporary Educational Psychology*, *53*, 45–56. https://doi.org/10.1016/j.cedpsych.2018.02.002

Duursma, E., Romero-Contreras, S., Szuber, A., Proctor, P., Snow, C., August, D., & Calderón, M. (2007). The role of home literacy and language environment on bilinguals’ English and Spanish vocabulary development. *Applied Psycholinguistics*, *28*(1), 171–190. https://doi.org/10.1017/S0142716407070099

Emmorey, K., McCullough, S., & Weisberg, J. (2016). The neural underpinnings of reading skill in deaf adults. *Brain and Language*, *160*, 11–20. https://doi.org/10.1016/j.bandl.2016.06.007

Ergül, C., Ökcün Akçamuş, M. Ç., Akoğlu, G., Demir, E., Tülü, B. K., & Bahap Kudret, Z. (2021). Longitudinal investigation of endogenous and exogenous predictors of early literacy in Turkish-speaking kindergartners. *Early Child Development and Care*, *191*(10), 1651–1667. https://doi.org/10.1080/03004430.2019.1670654

Esmaeeli, Z., Kyle, F. E., & Lundetræ, K. (2019). Contribution of family risk, emergent literacy and environmental protective factors in children’s reading difficulties at the end of second-grade. *Reading and Writing: An Interdisciplinary Journal*, *32*(9), 2375–2399. https://doi.org/10.1007/s11145-019-09948-5

Esmaeeli, Z., Lundetræ, K., & Kyle, F. E. (2018). What can parents’ self‐report of reading difficulties tell us about their children’s emergent literacy at school entry? *Dyslexia: An International Journal of Research and Practice*, *24*(1), 84–105. https://doi.org/10.1002/dys.1571

Evans, M. D. R., Kelley, J., Sikora, J., & Treiman, D. J. (2010). Family scholarly culture and educational success: Books and schooling in 27 nations. *Research in Social Stratification and Mobility*, *28*(2), 171–197. https://doi.org/10.1016/j.rssm.2010.01.002

Foster, M. A., Lambert, R., Abbott-Shim, M., McCarty, F., & Franze, S. (2005). A model of home learning environment and social risk factors in relation to children’s emergent literacy and social outcomes. *Early Childhood Research Quarterly*, *20*(1), 13–36. https://doi.org/10.1016/j.ecresq.2005.01.006

Freed, E., Hamilton, S., & Long, D. (2017). Comprehension in proficient readers: The nature of individual variation. *Journal of Memory and Language*, *97*, 135–153. https://doi.org/10.1016/j.jml.2017.07.008

Frey, B. B. (2018). Validity coefficients. In *The SAGE encyclopedia of educational research, measurement, and evaluation*. SAGE Publications, Inc. https://doi.org/10.4135/9781506326139.n733

Froiland, J. M., Powell, D. R., & Diamond, K. E. (2014). Relations among neighborhood social networks, home literacy environments, and children’s expressive vocabulary in suburban at-risk families. *School Psychology International*, *35*(4), 429–444. https://doi.org/10.1177/0143034313500415

Georgiou, G. K., Inoue, T., & Parrila, R. (2021). Developmental relations between home literacy environment, reading interest, and reading skills: Evidence from a 3‐year longitudinal study. *Child Development*, 13589. https://doi.org/10.1111/cdev.13589

Gonzalez, J. E., Acosta, S., Davis, H., Pollard-Durodola, S., Saenz, L., Soares, D., Resendez, N., & Zhu, L. (2017). Latino maternal literacy beliefs and practices mediating socioeconomic status and maternal education effects in predicting child receptive vocabulary. *Early Education and Development*, *28*(1), 78–95. https://doi.org/10.1080/10409289.2016.1185885

Goodrich, J. M., Lonigan, C. J., Phillips, B. M., Farver, J. M., & Wilson, K. D. (2021). Influences of the home language and literacy environment on Spanish and English vocabulary growth among dual language learners. *Early Childhood Research Quarterly*, *57*, 27–39. https://doi.org/10.1016/j.ecresq.2021.05.002

Grant, A. K. (2012). *Exploring the relationship between genre preferences and reading skills: Are boys really such poor readers?* (2012-99200-304; Issues 4-B) [ProQuest Information & Learning]. http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx%3fdirect%3dtrue%26db%3dpsyh%26AN%3d2012-99200-304%26site%3dehost-live

Grant, A., Gottardo, A., & Geva, E. (2011). Reading in English as a first or second language: The case of grade 3 Spanish, Portuguese, and English speakers. *Learning Disabilities Research & Practice*, *26*(2), 67–83. https://doi.org/10.1111/j.1540-5826.2011.00327.x

Griffin, E. A., & Morrison, F. J. (1997). The unique contribution of home literacy environment to differences in early literacy skills. *Early Child Development and Care*, *127*(1), 233–243. https://doi.org/10.1080/0300443971270119

Grolig, L., Cohrdes, C., & Schroeder, S. (2017). Der Titelrekognitionstest für das Vorschulalter (TRT-VS): Erfassung des Lesevolumens von präkonventionellen Leserinnen und Lesern und Zusammenhänge mit Vorläuferfertigkeiten des Lesens [The Title Recognition Test for Kindergarteners (TRT-VS): Assessment of preconventional readers’ print exposure and its relations to precursors of reading]. *Diagnostica*, *63*(4), 309–319. https://doi.org/10.1026/0012-1924/a000186

Grolig, L., Cohrdes, C., Tiffin-Richards, S. P., & Schroeder, S. (2019). Effects of preschoolers’ storybook exposure and literacy environments on lower level and higher level language skills. *Reading and Writing: An Interdisciplinary Journal*, *32*(4), 1061–1084. https://doi.org/10.1007/s11145-018-9901-2

Grolig, L., Tiffin-Richards, S. P., & Schroeder, S. (2020). Print exposure across the reading life span. *Reading and Writing*, *33*(6), 1423–1441. https://doi.org/10.1007/s11145-019-10014-3

Hindman, A. H., & Morrison, F. J. (2012). Differential contributions of three parenting dimensions to preschool literacy and social skills in a middle-income sample. *Merrill-Palmer Quarterly*, *58*(2), 191–223. https://doi.org/10.1353/mpq.2012.0012

Hodson, G. (2021). Construct jangle or construct mangle? Thinking straight about (nonredundant) psychological constructs. *Journal of Theoretical Social Psychology*. https://doi.org/10.1002/jts5.120

Hofslundsengen, H., Gustafsson, J.-E., & Hagtvet, B. E. (2019). Contributions of the home literacy environment and underlying language skills to preschool invented writing. *Scandinavian Journal of Educational Research*, *63*(5), 653–669. https://doi.org/10.1080/00313831.2017.1420686

Hutton, J. S., Dudley, J., Horowitz‐Kraus, T., DeWitt, T., & Holland, S. K. (2020). Associations between home literacy environment, brain white matter integrity and cognitive abilities in preschool‐age children. *Acta Paediatrica*, *109*(7), 1376–1386. https://doi.org/10.1111/apa.15124

Inoue, T., Georgiou, G. K., Parrila, R., & Kirby, J. R. (2018). Examining an extended home literacy model: The mediating roles of emergent literacy skills and reading fluency. *Scientific Studies of Reading*, *22*(4), 273–288. https://doi.org/10.1080/10888438.2018.1435663

Iruka, I. U., Brown, D., Jerald, J., & Blitch, K. (2018). Early Steps to School Success (ESSS): Examining pathways linking home visiting and language outcomes. *Child & Youth Care Forum*, *47*(2), 283–301. https://doi.org/10.1007/s10566-017-9430-1

James, A. N., Fraundorf, S. H., Lee, E.-K., & Watson, D. G. (2018). Individual differences in syntactic processing: Is there evidence for reader-text interactions? *Journal of Memory and Language*, *102*, 155–181. https://doi.org/10.1016/j.jml.2018.05.006

Johns, C., Jahn, A., Jones, H., Kush, D., Molfese, P., Van Dyke, J., Magnuson, J., Tabor, W., Mencl, W., Shankweiler, D., & Braze, D. (2018). Individual differences in decoding skill, print exposure, and cortical structure in young adults. *Language Cognition and Neuroscience*, *33*(10), 1275–1295. https://doi.org/10.1080/23273798.2018.1476727

Johnson, D. R., Jasper, D. M., Griffin, S., & Huffman, B. L. (2013). Reading narrative fiction reduces arab-muslim prejudice and offers a safe haven from intergroup anxiety. *Social Cognition*, *31*(5), 578–598. https://doi.org/10.1521/soco.2013.31.5.578

Johnson, A. D., Martin, A., Brooks-Gunn, J., & Petrill, S. A. (2008). Order in the house! Associations among household chaos, the home literacy environment, maternal reading ability, and children’s early reading. *Merrill-Palmer Quarterly*, *54*(4), 445–472. https://doi.org/10.1353/mpq.0.0009

Kalia, V., & Reese, E. (2009). Relations between Indian children’s home literacy environment and their English oral language and literacy skills. *Scientific Studies of Reading*, *13*(2), 122–145. https://doi.org/10.1080/10888430902769517

Kidd, D. C., & Castano, E. (2013). Reading literary fiction improves Theory of Mind. *Science*, *342*(6156), 377–380. https://doi.org/10.1126/science.1239918

Kim, A. E., Oines, L., & Miyake, A. (2018). Individual differences in verbal working memory underlie a tradeoff between semantic and structural processing difficulty during language comprehension: An ERP investigation. Journal of Experimental Psychology: Learning, Memory, and Cognition, 44(3), 406–420. https://doi.org/10.1037/xlm0000457

Koopman, E. M. (Emy). (2015). Empathic reactions after reading: The role of genre, personal factors and affective responses. *Poetics*, *50*, 62–79. https://doi.org/10.1016/j.poetic.2015.02.008

Korat, O., Arafat, S. H., Aram, D., & Klein, P. (2013). Book reading mediation, SES, home literacy environment, and children’s literacy: Evidence from Arabic-speaking families. *First Language*, *33*(2), 132–154. https://doi.org/10.1177/0142723712455283

Kuijpers, M. M., Douglas, S., & Kuiken, D. (2020). Capturing the ways we read. *Anglistik*, *31*(1), 53–69. https://doi.org/10.33675/ANGL/2020/1/6

Landi, N. (2010). An examination of the relationship between reading comprehension, higher-level and lower-level reading sub-skills in adults. *Reading and Writing: An Interdisciplinary Journal*, *23*(6), 701–717. https://doi.org/10.1007/s11145-009-9180-z

Laufer, B., & Aviad–Levitzky, T. (2017). What type of vocabulary knowledge predicts reading comprehension: Word meaning recall or word meaning recognition? *The Modern Language Journal*, *101*(4), 729–741. https://doi.org/10.1111/modl.12431

Lee, S.-Y., Krashen, S., & Tse, L. (1997). The Author Recognition Test and vocabulary knowledge: A replication. *Perceptual and Motor Skills*, *85*(3, Pt 2), 1428–1430. https://doi.org/10.2466/pms.1997.85.3f.1428

Lee, H., Seong, E., Choi, W., & Lowder, M. W. (2019). Development and assessment of the Korean Author Recognition Test. *The Quarterly Journal of Experimental Psychology*, *72*(7), 1837–1846. https://doi.org/10.1177/1747021818814461

Lehrl, S., Ebert, S., Blaurock, S., Rossbach, H.-G., & Weinert, S. (2020). Long-term and domain-specific relations between the early years home learning environment and students’ academic outcomes in secondary school. *School Effectiveness and School Improvement*, *31*(1), 102–124. https://doi.org/10.1080/09243453.2019.1618346

Lenhart, J., Suggate, S. P., & Lenhard, W. (2021). Shared-reading onset and emergent literacy development. *Early Education and Development*. https://doi.org/10.1080/10409289.2021.1915651

Leseman, P. P., & De Jong, P. F. (1998). Home literacy: Opportunity, instruction, cooperation and social‐emotional quality predicting early reading achievement. *Reading Research Quarterly*, *33*(3), 294-318. https://doi.org/10.1598/RRQ.33.3.3

Lewis, K., Sandilos, L. E., Hammer, C. S., Sawyer, B. E., & Méndez, L. I. (2016). Relations among the home language and literacy environment and children’s language abilities: A study of Head Start dual language learners and their mothers. *Early Education and Development*, *27*(4), 478–494. https://doi.org/10.1080/10409289.2016.1082820

Li, H., Corrie, L. F., & Wong, B. K. M. (2008). Early teaching of Chinese literacy skills and later literacy outcomes. *Early Child Development and Care*, *178*(5), 441–459. https://doi.org/10.1080/03004430600789365

Li, M., Koh, P. W., Geva, E., Joshi, R. M., & Chen, X. (2020). The componential model of reading in bilingual learners. *Journal of Educational Psychology*, *112*(8), 1532–1545. https://doi.org/10.1037/edu0000459

Liu, C., Georgiou, G. K., & Manolitsis, G. (2018). Modeling the relationships of parents’ expectations, family’s SES, and home literacy environment with emergent literacy skills and word reading in Chinese. *Early Childhood Research Quarterly*, *43*, 1–10. https://doi.org/10.1016/j.ecresq.2017.11.001

Manolitsis, G., Georgiou, G. K., & Parrila, R. (2011). Revisiting the home literacy model of reading development in an orthographically consistent language. *Learning and Instruction*, *21*(4), 496–505. https://doi.org/10.1016/j.learninstruc.2010.06.005

Manolitsis, G., Georgiou, G. K., & Tziraki, N. (2013). Examining the effects of home literacy and numeracy environment on early reading and math acquisition. *Early Childhood Research Quarterly*, *28*(4), 692–703. https://doi.org/10.1016/j.ecresq.2013.05.004

Mar, R. A. (2018). Evaluating whether stories can promote social cognition: Introducing the Social Processes and Content Entrained by Narrative (SPaCEN) framework. *Discourse Processes*, *55*(5–6), 454–479. https://doi.org/10.1080/0163853X.2018.1448209

Mar, R. A., & Rain, M. (2015). Narrative fiction and expository nonfiction differentially predict verbal ability. *Scientific Studies of Reading*, *19*(6), 419–433. https://doi.org/10.1080/10888438.2015.1069296

Marjanovič-Umek, L., Fekonja-Peklaj, U., & Sočan, G. (2017). Early vocabulary, parental education, and the frequency of shared reading as predictors of toddler’s vocabulary and grammar at age 2;7: A Slovenian longitudinal CDI study. *Journal of Child Language*, *44*(2), 457–479. https://doi.org/10.1017/S0305000916000167

Marjanovič-Umek, L., Sočan, G., Bajc, K., & Peklaj, U. F. (2008). Children’s intellectual ability, family environment, and preschool as predictors of language competence for 5-year-old children. *Studia Psychologica*, *50*(1), 31–48.

Martin, N. W., Hansell, N. K., Wainwright, M. A., Shekar, S. N., Medland, S. E., Bates, T. C., Burt, J. S., Martin, N. G., & Wright, M. J. (2009). Genetic covariation between the Author Recognition Test and reading and verbal abilities: What can we learn from the analysis of high performance? *Behavior Genetics*, *39*(4), 417–426. https://doi.org/10.1007/s10519-009-9275-y

McCarron, S. P., & Kuperman, V. (2021). Is the author recognition test a useful metric for native and non-native English speakers? An item response theory analysis. *Behavior Research Methods*. https://doi.org/10.3758/s13428-021-01556-y

Mendez, J. L. (2010). How can parents get involved in preschool? Barriers and engagement in education by ethnic minority parents of children attending Head Start. *Cultural Diversity and Ethnic Minority Psychology*, *16*(1), 26–36. https://doi.org/10.1037/a0016258

Meng, C. (2015). Home literacy environment and Head Start children’s language development: The role of approaches to learning. *Early Education and Development*, *26*(1), 106–124. https://doi.org/10.1080/10409289.2015.957614

Mesman, G. R., & Kibby, M. Y. (2011). An examination of multiple predictors of orthographic functioning. *Journal of Learning Disabilities*, *44*(1), 50–62. https://doi.org/10.1177/0022219410371675

Misyak, J. B., & Christiansen, M. H. (2012). Statistical learning and language: An individual differences study. *Language Learning*, *62*(1), 302–331. https://doi.org/10.1111/j.1467-9922.2010.00626.x

Mol, S. E., & Bus, A. G. (2011). To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin*, *137*(2), 267–296. https://doi.org/10.1037/a0021890

Moore, M., & Gordon, P. C. (2015). Reading ability and print exposure: Item response theory analysis of the author recognition test. *Behavior Research Methods*, *47*(4), 1095–1109. https://doi.org/10.3758/s13428-014-0534-3

Napoli, A. R., & Purpura, D. J. (2018). The home literacy and numeracy environment in preschool: Cross-domain relations of parent–child practices and child outcomes. *Journal of Experimental Child Psychology*, *166*, 581–603. https://doi.org/10.1016/j.jecp.2017.10.002

Niklas, F., Möller, K., & Schneider, W. (2013). Die frühe familiäre Lernumwelt als Mediator zwischen strukturellen Herkunftsmerkmalen und der basalen Lesefähigkeit am Ende der ersten Klasse [The early learning environment provided by the family as a mediator between structural family background and basic reading abilities at the end of grade 1]. *Psychologie in Erziehung und Unterricht*, *60*(2), 94–111. https://doi.org/10.2378/peu2013.art08d

Niklas, F., & Schneider, W. (2013). Home literacy environment and the beginning of reading and spelling. *Contemporary Educational Psychology*, *38*(1), 40–50. https://doi.org/10.1016/j.cedpsych.2012.10.001

Niklas, F., & Schneider, W. (2015). With a little help: Improving kindergarten children’s vocabulary by enhancing the home literacy environment. *Reading and Writing: An Interdisciplinary Journal*, *28*(4), 491–508. https://doi.org/10.1007/s11145-014-9534-z

O’Brien, B. A., Ng, S. C., & Arshad, N. A. (2020). The structure of home literacy environment and its relation to emergent English literacy skills in the multilingual context of Singapore. *Early Childhood Research Quarterly*, *53*, 441–452. https://doi.org/10.1016/j.ecresq.2020.05.014

Ocal, T. (2016). *A spelling pronunciation strategy helps college students remember how to spell difficult words* (2016-26517-065; Issues 9-A(E)) [ProQuest Information & Learning]. psyh. http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx%3fdirect%3dtrue%26db%3dpsyh%26AN%3d2016-26517-065%26site%3dehost-live

Ouellette, G. P. (2006). What’s meaning got to do with it: The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology*, *98*(3), 554–566. https://doi.org/10.1037/0022-0663.98.3.554

Patterson, J. L. (2002). Relationships of expressive vocabulary to frequency of reading and television experience among bilingual toddlers. *Applied Psycholinguistics*, *23*(4), 493–508. https://doi.org/10.1017/S0142716402004010

Payne, B. R., Gao, X., Noh, S. R., Anderson, C. J., & Stine-Morrow, E. A. L. (2012). The effects of print exposure on sentence processing and memory in older adults: Evidence for efficiency and reserve. *Aging, Neuropsychology, and Cognition*, *19*(1–2), 122–149. https://doi.org/10.1080/13825585.2011.628376

Peeters, M., Verhoeven, L., de Moor, J., van Balkom, H., & van Leeuwe, J. (2009a). Home literacy predictors of early reading development in children with cerebral palsy. *Research in Developmental Disabilities*, *30*(3), 445–461. https://doi.org/10.1016/j.ridd.2008.04.005

Peeters, M., Verhoeven, L., van Balkom, H., & de Moor, J. (2009b). Home literacy environment: Characteristics of children with cerebral palsy. *International Journal of Language & Communication Disorders*, *44*(6), 917–940. https://doi.org/10.1080/13682820802464759

Perfetti, C. A. (1985). *Reading ability*. Oxford University Press.

Perfetti, C., & Stafura, J. (2014). Word knowledge in a theory of reading comprehension. *Scientific Studies of Reading*, *18*(1), 22–37. https://doi.org/10.1080/10888438.2013.827687

Petrill, S. A., Logan, J. A. R., Sawyer, B. E., & Justice, L. M. (2014). It depends: Conditional correlation between frequency of storybook reading and emergent literacy skills in children with language impairments. *Journal of Learning Disabilities*, *47*(6), 491–502. https://doi.org/10.1177/0022219412470518

Pfost, M., Dörfler, T., & Artelt, C. (2013). Students’ extracurricular reading behavior and the development of vocabulary and reading comprehension. *Learning and Individual Differences*, *26*, 89–102. https://doi.org/10.1016/j.lindif.2013.04.008

Pratheeba, N., & Krashen, S. (2013). Self-reported reading as a predictor of vocabulary knowledge. *Perceptual and Motor Skills*, *117*(2), 442–448. https://doi.org/10.2466/23.PMS.117x24z5

Prevoo, M. J. L., Malda, M., Mesman, J., Emmen, R. A. G., Yeniad, N., van IJzendoorn, M. H., & Linting, M. (2014). Predicting ethnic minority children’s vocabulary from socioeconomic status, maternal language and home reading input: Different pathways for host and ethnic language. *Journal of Child Language*, *41*(5), 963–984. https://doi.org/10.1017/S0305000913000299

Reynolds, G., & Werfel, K. L. (2020). Home literacy environment and emergent skills in preschool children with hearing loss. *Journal of Deaf Studies and Deaf Education*, *25*(1), 68–79. https://doi.org/10.1093/deafed/enz025

Rose, E., Lehrl, S., Ebert, S., & Weinert, S. (2018). Long-term relations between children’s language, the home literacy environment, and socioemotional development from ages 3 to 8. *Early Education and Development*, *29*(3), 342–356. https://doi.org/10.1080/10409289.2017.1409096

Scheele, A. F., Leseman, P. P. M., Mayo, A. Y., & Elbers, E. (2012). The relation of home language and literacy to three-year-old children’s emergent academic language in narrative and instruction genres. *The Elementary School Journal*, *112*(3), 419–444. https://doi.org/10.1086/663300

Schmidt, F. T. C., & Retelsdorf, J. (2016). A new measure of reading habit: Going beyond behavioral frequency. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.01364

Schmidtke, D., Van Dyke, J. A., & Kuperman, V. (2018). Individual variability in the semantic processing of English compound words. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *44*(3), 421–439. https://doi.org/10.1037/xlm0000442

Schmitt, S. A., Simpson, A. M., & Friend, M. (2011). A longitudinal assessment of the home literacy environment and early language. *Infant and Child Development*, *20*(6), 409–431. https://doi.org/10.1002/icd.733

Schroeder, S., Segbers, J., & Schröter, P. (2016). Der Kinder-Titelrekognitionstest (K-TRT): Ein Instrument zur Erfassung des Lesevolumens von Kindern im Deutschen [The Children Title Recognition Test (K-TRT): A test to assess children’s print exposure in German]. *Diagnostica*, *62*(1), 16–30. https://doi.org/10.1026/0012-1924/a000131

Segers, E., Damhuis, C. M. P., van de Sande, E., & Verhoeven, L. (2016). Role of executive functioning and home environment in early reading development. *Learning and Individual Differences*, *49*, 251–259. https://doi.org/10.1016/j.lindif.2016.07.004

Sénéchal, M., Hill, S., & Malette, M. (2018). Individual differences in grade 4 children’s written compositions: The role of online planning and revising, oral storytelling, and reading for pleasure. *Cognitive Development*, *45*, 92–104. https://doi.org/10.1016/j.cogdev.2017.12.004

Sénéchal, M., & LeFevre, J. (2014). Continuity and change in the home literacy environment as predictors of growth in vocabulary and reading. *Child Development*, *85*(4), 1552–1568. https://doi.org/10.1111/cdev.12222

Shriver, A., Bonnell, L., Berman, S., & Camp, B. (2020). Cumulative risk, the cognitive home environment and vocabulary in early childhood. *Child Care Health and Development*, *46*(2), 244–246. https://doi.org/10.1111/cch.12738

Sikora, J., Evans, M. D. R., & Kelley, J. (2019). Scholarly culture: How books in adolescence enhance adult literacy, numeracy and technology skills in 31 societies. *Social Science Research*, *77*, 1–15. https://doi.org/10.1016/j.ssresearch.2018.10.003

Sparks, R. L., Patton, J., & Murdoch, A. (2014). Early reading success and its relationship to reading achievement and reading volume: Replication of ‘10 years later’. *Reading and Writing: An Interdisciplinary Journal*, *27*(1), 189–211. https://doi.org/10.1007/s11145-013-9439-2

Sparks, A., & Reese, E. (2013). From reminiscing to reading: Home contributions to children’s developing language and literacy in low-income families. *First Language*, *33*(1), 89–109. https://doi.org/10.1177/0142723711433583

Spear-Swerling, L., Brucker, P. O., & Alfano, M. P. (2010). Relationships between sixth-graders’ reading comprehension and two different measures of print exposure. *Reading and Writing*, *23*(1), 73–96. https://doi.org/10.1007/s11145-008-9152-8

Stanovich, K. E., & West, R. F. (1989). Exposure to print and orthographic processing. *Reading Research Quarterly*, *24*(4), 402-433. https://doi.org/10.2307/747605

Strasser, K., Vergara, D., & del Río, M. F. (2017). Contributions of print exposure to first and second grade oral language and reading in Chile. *Journal of Research in Reading*, *40*(Suppl 1), S87–S106. https://doi.org/10.1111/1467-9817.12086

Stutz, F., Schaffner, E., & Schiefele, U. (2016). Relations among reading motivation, reading amount, and reading comprehension in the early elementary grades. *Learning and Individual Differences*, *45*, 101–113. https://doi.org/10.1016/j.lindif.2015.11.022

Suggate, S. P., Schaughency, E. A., & Reese, E. (2011). The contribution of age and reading instruction to oral narrative and pre-reading skills. *First Language*, *31*(4), 379–403. https://doi.org/10.1177/0142723710395165

Tabullo, A. J., & Gago-Galvagno, L. G. (2021). Early vocabulary size in argentinean toddlers: Associations with home literacy and screen media exposure. *Journal of Children and Media*. https://doi.org/10.1080/17482798.2021.1982742

Thums, K., Artelt, C., & Wolter, I. (2021). Reading for entertainment or information reception? Gender differences in reading preferences and their impact on text-type-specific reading competences in adult readers. *European Journal of Psychology of Education*, *36*(2), 339–357. https://doi.org/10.1007/s10212-020-00486-1

Torppa, M., Niemi, P., Vasalampi, K., Lerkkanen, M., Tolvanen, A., & Poikkeus, A. (2020). Leisure reading (but not any kind) and reading comprehension support each other—a longitudinal study across grades 1 and 9. *Child Development*, *91*(3), 876–900. https://doi.org/10.1111/cdev.13241

Torppa, M., Parrila, R., Niemi, P., Lerkkanen, M.-K., Poikkeus, A.-M., & Nurmi, J.-E. (2013). The double deficit hypothesis in the transparent Finnish orthography: A longitudinal study from kindergarten to grade 2. *Reading and Writing: An Interdisciplinary Journal*, *26*(8), 1353–1380. https://doi.org/10.1007/s11145-012-9423-2

Torppa, M., Poikkeus, A.-M., Laakso, M.-L., Tolvanen, A., Leskinen, E., Leppänen, P. H. T., Puolakanaho, A., & Lyytinen, H. (2007). Modeling the early paths of phonological awareness and factors supporting its development in children with and without familial risk of dyslexia. *Scientific Studies of Reading*, *11*(2), 73–103. https://doi.org/10.1080/10888430709336554

Tremblay, B., Rodrigues, M. L., & Martin-Chang, S. (2020). From storybooks to novels: A retrospective approach linking print exposure in childhood to adolescence. *Frontiers in Psychology*, *11*, 571033. https://doi.org/10.3389/fpsyg.2020.571033

van der Schuit, M., Peeters, M., Segers, E., van Balkom, H., & Verhoeven, L. (2009). Home literacy environment of pre-school children with intellectual disabilities. *Journal of Intellectual Disability Research*, *53*(12), 1024–1037. https://doi.org/10.1111/j.1365-2788.2009.01222.x

Vasilyeva, M., Dearing, E., Ivanova, A., Shen, C., & Kardanova, E. (2018). Testing the family investment model in Russia: Estimating indirect effects of SES and parental beliefs on the literacy skills of first-graders. *Early Childhood Research Quarterly*, *42*, 11–20. https://doi.org/10.1016/j.ecresq.2017.08.003

Veldre, A., Wong, R., & Andrews, S. (2021). Reading proficiency predicts the extent of the right, but not left, perceptual span in older readers. *Attention, Perception, & Psychophysics*, *83*(1), 18–26. https://doi.org/10.3758/s13414-020-02185-x

Wechsler, D. (2011). *WASI-II: Wechsler Abbreviated Scale of Intelligence*. PsychCorp.

Welcome, S. E., & Trammel, E. R. (2017). Individual differences in orthographic priming relate to phonological decoding skill in adults. *Cognitive Processing*, *18*(2), 119–128. https://doi.org/10.1007/s10339-017-0793-x

West, R. F., Stanovich, K. E., & Mitchell, H. R. (1993). Reading in the real world and its correlates. *Reading Research Quarterly*, *28*(1), 34-50. https://doi.org/10.2307/747815

Westerveld, M. F., Paynter, J., Trembath, D., Webster, A. A., Hodge, A. M., & Roberts, J. (2017). The emergent literacy skills of preschool children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *47*(2), 424–438. https://doi.org/10.1007/s10803-016-2964-5

Willard, J. A., Agache, A., Jäkel, J., Glück, C. W., & Leyendecker, B. (2015). Family factors predicting vocabulary in Turkish as a heritage language. *Applied Psycholinguistics*, *36*(4), 875–898. https://doi.org/10.1017/S0142716413000544

Wimmer, L., Currie, G., Friend, S., & Ferguson, H. J. (2021). Testing correlates of lifetime exposure to print fiction following a multi-method approach: Evidence from young and older readers. *Imagination, Cognition and Personality*, *41*(1), 54-86. https://doi.org/10.1177/0276236621996244

Yuet-Han Lau, J., & McBride-Chang, C. (2005). Home literacy and Chinese reading in Hong Kong children. *Early Education and Development*, *16*(1), 5–22. https://doi.org/10.1207/s15566935eed1601\_1

Zhang, S. Z., Georgiou, G. K., Xu, J., Liu, J. M., Li, M., & Shu, H. (2018). Different measures of print exposure predict different aspects of vocabulary. *Reading Research Quarterly*, *53*(4), 443–454. https://doi.org/10.1002/rrq.205

Zhang, S.-Z., Inoue, T., Shu, H., & Georgiou, G. K. (2020). How does home literacy environment influence reading comprehension in Chinese? Evidence from a 3-year longitudinal study. *Reading and Writing: An Interdisciplinary Journal*, *33*(7), 1745–1767. https://doi.org/10.1007/s11145-019-09991-2

Zucker, T. A., Cabell, S. Q., Justice, L. M., Pentimonti, J. M., & Kaderavek, J. N. (2013). The role of frequent, interactive prekindergarten shared reading in the longitudinal development of language and literacy skills. *Developmental Psychology*, *49*(8), 1425–1439. https://doi.org/10.1037/a0030347

1. This can suggest disingenuous responding to test items, see Wimmer et al. (2021). [↑](#footnote-ref-1)
2. *N* = 13 participants did not complete the self-report scale on frequency of fiction reading, so the sample size for this measure was *N* = 293 participants. [↑](#footnote-ref-2)
3. We also considered to include the ART-G total score (fiction + non-fiction sub-score) in the baseline model, however this led to multicollinearity issues (VIFs > 36 for the ART-G total and fiction sub scores). [↑](#footnote-ref-3)