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Published in:

Early Education and Development

Publication status and date:

Published: 01/01/2023

DOI (link to publisher):

[10.1080/10409289.2022.2123294](https://doi.org/10.1080/10409289.2022.2123294)

Document Version

Publisher's PDF, also known as Version of record

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Citation for the published version (APA):

Dias-Broens, A. S., & van Steensel, R. (2023). Home-Visiting in a Shared Reading Intervention: Effects on Children from Low SES and Ethnic Minority Families. *Early Education and Development*, 34(8), 1919-1940.
<https://doi.org/10.1080/10409289.2022.2123294>

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To cite this article: Aike S. Dias-Broens & Roel van Steensel (2023) Home-Visiting in a Shared Reading Intervention: Effects on Children from Low SES and Ethnic Minority Families, Early Education and Development, 34:8, 1919-1940, DOI: [10.1080/10409289.2022.2123294](https://doi.org/10.1080/10409289.2022.2123294)

To link to this article: <https://doi.org/10.1080/10409289.2022.2123294>



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Home-Visiting in a Shared Reading Intervention: Effects on Children from Low SES and Ethnic Minority Families

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ABSTRACT

Research Findings: In this study, we examined the short- and long-term effects of Reading Express, a home-visiting intervention in which volunteers encourage low socio-economic status and ethnic minority parents to engage in interactive shared reading with their child. Outcomes of a quasi-experiment involving 176 children in the Netherlands (mean age 72 months; $n_{\text{experimental}} = 95$; $n_{\text{control}} = 81$) revealed favorable outcomes of Reading Express for children's home literacy environments (i.e., children's book exposure and parents' reported shared reading frequency), which were maintained over time. Reading Express also had a positive short-term effect on story comprehension. However, the positive trend in story comprehension leveled off 20 weeks after program termination and there were neither short-term nor long-term effects on receptive vocabulary. *Practice or Policy:* Our results show that longer-term changes can be made in children's home literacy environments by means of home visiting programs such as Reading Express, but they also suggest the relevance of better adapting programs to the characteristics and needs of participating families.

Introduction

Over the years, various programs have been developed across the world that encourage parents to engage in interactive shared reading and thereby stimulate their children's early literacy skills. The outcomes of such programs for children from low socio-economic status (SES) and ethnic minority families are mixed. In earlier meta-analyses, hardly any effects were established on children's vocabulary and emergent literacy skills (Manz et al., 2010; Mol et al., 2008), while a more recent review did find positive outcomes on such variables (Fikrat-Wevers, Van Steensel, & Arends, 2021). An important question then is what distinguishes successful from less successful programs. One possible way of optimizing program effects is by the use of home visits. Another important question is whether possible positive outcomes can be sustained: this remains largely unknown, because only a few studies examined long-term program effects on literacy development (Fikrat-Wevers et al., 2021). In this study, we tested the impact of Reading Express, a program that uses home visits to encourage low-SES and ethnic minority parents to support their children's "meaning-related" literacy skills. We also tested whether possible positive program effects were maintained over time.

Home Literacy Environment, Early Literacy, and the Role of SES and Ethnic Background

SES and ethnicity are important factors in children's early literacy development. Children from families with under-educated parents, low family income, and/or an ethnic minority status often have delays in preschool

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skills when compared with children from high-educated, majority families; such skills involve print familiarity, phonological awareness, letter and word recognition, vocabulary knowledge, and story comprehension (Cabell et al., 2013; Fernald et al., 2013; Strang & Piasta, 2016). These differences appear to consolidate or even further increase in the early years of formal reading instruction (Chatterji, 2006). Given the strong association between early literacy and later reading development, this places these children at risk of even further delays (Sénéchal, 2006; Storch & Whitehurst, 2002). It is thus important to look for effective ways to support these children's literacy development both before and shortly after the start of formal education.

A stimulating home environment is crucial to children's early literacy development (Leseman & De Jong, 1998; Niklas & Schneider, 2013; Van Steensel, 2006). A prototypical home literacy activity parents and children engage in is shared reading. The effects of shared reading on children's early literacy skills have been the subject of much research (Bus et al., 1995; Grolig et al., 2019; Mol et al., 2008). Theoretical frameworks such as the Home Literacy Model (Sénéchal, 2006) suggest that shared reading particularly contributes to such "meaning-related skills" as vocabulary and story comprehension, which allow children to understand extended text. Positive effects on these skills are highly relevant, because they constitute important components of children's later reading development. Several studies have indeed shown that the frequency of early parent-child shared reading has a positive impact on children's later reading proficiency via effects on meaning-related skills (Lehrl et al., 2020; Sénéchal, 2006).

Research has indicated that low-SES and ethnic minority parents read with children less frequently than high-SES and majority parents do (Leseman & De Jong, 1998; Niklas & Schneider, 2013; Payne et al., 1994; Van Steensel, 2006). Differences not only involve the frequency, but also the quality of shared reading. The latter particularly refers to the "extra-textual" interactions parents and children engage in (Hammett et al., 2003). Different studies suggested that when parents initiate "high-level" or "decontextualized" interactions on the basis of the story being read (e.g., ask their child to predict what is going to happen next or reason about events or emotions), this contributes to children's early literacy development, particularly to vocabulary knowledge and story comprehension (Reese, 1995; Rowe, 2012). Research in diverse samples of families has, however, shown that low-SES and ethnic minority parents engage in such high-level talk relatively infrequently (Britto et al., 2006; Bus & Van Ijzendoorn, 1995; Cronan et al., 1996).

These differences in shared reading frequency and quality between parent populations may have various causes. They could first of all result from differences in parental literacy skills that are associated with socio-economic or ethnic minority status (Bus et al., 2000): low-SES and ethnic minority parents may have limited literacy proficiency and this may raise a threshold for parental engagement in shared reading or result in parents focussing on "reading the words right" rather than engaging in a stimulating dialog with their children. Alternatively, parental perceptions of the nature and goal of joint literacy activities may differ. Previous studies have, for instance, shown that low-SES and ethnic minority parents tend to view literacy development primarily as a process of learning how to decode (Li, 2006; Reese & Gallimore, 2000; Wang & McBride, 2017). Consequently, they prefer activities such as letter teaching over shared reading (De Baryshe et al., 2000; Fitzgerald et al., 1991; Krijnen, Van Steensel, Meeuwisse, & Severiens, 2021; Lynch et al., 2006; Sonnenschein et al., 1997; Stipek et al., 1992). Finally, a lower SES is associated with more parenting stress, which may in turn limit parental engagement in literacy activities such as shared reading (Can & Ginsburg-Block, 2016).

Effects of Shared Reading Interventions on Low-SES and Ethnic Minority Children

Over the years, many programs have been developed to promote shared reading in families with young children. These programs assume that encouraging parents to increase the frequency of shared reading and engage in meaningful extra-textual interactions promotes children's early literacy skills. Meta-analyses have generally shown positive results of such programs (for an overview, see, Van Steensel, Herppich, McElvany, & Kurvers, 2012). However, outcomes for children from low-SES and ethnic

minority families are mixed. When comparing outcomes of different groups, both Manz et al. (2010) and Mol et al. (2008) found limited to no effects on vocabulary and emergent literacy skills for children from low-income, ethnic minority, or “at-risk” families. As a possible explanation, they suggested low-SES and ethnic minority parents might experience barriers in engaging in the types of interactions promoted by shared reading programs (Mol et al., 2008): interactive or “dialogic” shared reading requires parents to be sensitive and responsive to situational characteristics of the reading activity, a skill that is not easily trained. Conversely, in a recent meta-analysis targeting only children from low-SES families, Fikrat-Wevers et al. (2021) did detect positive effects of shared reading programs, ranging up to a medium effect on meaning-related skills (Cohen’s $d = 0.75$).

An important question then is: what distinguishes more from less successful shared reading programs for low-SES and ethnic minority families? Bryant and Wasik (2004) suggested home visiting as an effective way of supporting these families. First of all, home visiting is flexible and family-focused, removing practical barriers for program participation: parents do not have to leave their homes as in center- or school-based programs and visits can be adjusted to parents’ personal schedules. Home visiting also signifies respect for parents as individuals and allows opportunity to discuss information parents might not bring forward in a group setting, which contributes to a trusting relationship with program deliverers. Additionally, home visiting allows for individualized support: home visits give program deliverers insights into family routines, beliefs, and needs. This allows them to be more sensitive and thus provide more tailored help. Previous meta-analyses have shown that home visiting has positive effects on child and parent outcomes in a range of domains, such as cognitive and socio-emotional child outcomes, parenting skills, prevention of abuse, quality of the home environment, and maternal life course (Kendrick et al., 2000; Nievar et al., 2010; Sweet & Applebaum, 2004). Such favorable outcomes appear to also hold for home visiting programs in the domain of family literacy, although it is as yet unclear whether these result from the advantages suggested by Bryant and Wasik (2004), due to lack of scientific attention to program delivery (De la Rie, Van Steensel, & Van Gelderen, 2017). In their meta-analysis, Manz et al. (2010) showed that when training was only provided at home, effects of shared reading programs were larger than when training was also or solely center- or school-based (Cohen’s $d = 0.47$ versus 0.13). However, Manz et al. did not focus exclusively on low-SES and ethnic minority families. Fikrat-Wevers et al. (2021), whose meta-analysis did target such families, detected medium effects of programs that were only delivered at home on children’s meaning-related skills (Cohen’s $d = 0.68$). The latter outcome, in particular, provides the empirical foundation for hypothesizing a positive effect of home visiting in the current study.

Sustainability of Program Effects

An important, but understudied issue in evaluations of shared reading interventions is the sustainability of program effects. Shared reading interventions aim to bring about enduring changes in family reading routines and are thus expected to have a longitudinal impact on children’s literacy skills (Van Steensel, McElvany, Kurvers, & Herppich, 2011). Although the question of whether programs indeed succeed in making such changes is important, there is a dearth of research on long-term benefits (Anderson et al., 2010). This also holds for children from low-SES and ethnic minority families: in their recent meta-analysis of 48 studies since 2000, Fikrat-Wevers et al. (2021) found that 33 only included immediate posttests, nine included only follow-up measures, and no more than six included both. Average long-term effects on meaning-related skills were marginal (Cohen’s $d = 0.09$). However, because there was large variability in the timing of follow-up assessments (ranging from 6 weeks to 6 years), Fikrat-Wevers et al. concluded “that the information necessary to analyze long-term effects was too limited and diverse, allowing no definite conclusions about the presence or absence of fading-out effects” (2021, p. 600). To draw more generalizable conclusions on the sustainability of program effects, more longitudinal research is thus needed.

Research Questions

In the current study, we examined the effects of Reading Express, a Dutch home visiting program that stimulates low-SES and ethnic minority parents to engage in interactive shared reading with their children. We aimed to answer two research questions:

- (1) Does Reading Express positively affect children's home literacy environments or HLE's (i.e., their book exposure and parents' shared reading frequency) and children's meaning-related skills (i.e., vocabulary and story comprehension)?
- (2) Are positive changes in the HLE and meaning-related skills as a consequence of program participation sustained over time?

Context of the Study

Reading Express is an existing Dutch shared reading intervention for 2 to 8-year-olds at risk of language delays, most often children from low-SES and ethnic minority families. The rationale behind the program is that introducing shared reading in at-risk families – who often have limited HLE's – results in changes in home literacy routines that contribute to children's early literacy skills (particularly their meaning-related skills). These changes are then assumed to promote children's later reading development and ultimately their school success. Central to Reading Express is the use of home visits: the assumption is that weekly home visits over an extended period of time (4–5 months), during which volunteers bring children's books into families, model (interactive) shared reading, and provide individual support, allow changes in home literacy routines to occur. Reading Express is comparable to other home-visiting programs that combine book provision with volunteer modeling and support (Bierman et al., 2015; Colmar, 2014; Cronan et al., 1996, 1999; Manz et al., 2016; O'Farrelly et al., 2018; Reese et al., 2010).

Reading Express was developed by SodaProducties (www.sodaproducties.nl) and is coordinated by the Reading Express Foundation (www.voorleesexpress.nl). Reading Express is implemented across The Netherlands by about 350 local agencies (particularly, welfare organizations and libraries) and in 2019 served about 4,000 families (Reading Express, 2020). Mostly, target children are in the age range 4–8 (82%) and have a non-Dutch background (92%). Ethnic minority children in the Netherlands have an increased risk of educational disadvantage (OECD, 2018). This risk results in a relatively large incidence of low literacy in later years (Gubbels et al., 2019), which appears partly due to variability in home literacy practices in these families (Bus et al., 2000; Leseman & De Jong, 1998; Van Steensel, 2006). Usually, teachers or special needs coordinators at schools identify children as possible candidates for participation in Reading Express on the basis of observed or diagnosed language delays and then suggest parents to enroll. After enrollment and intake by representatives of the local agencies, families are matched with a volunteer (often, a university student or a retired schoolteacher), who visits the family 20 times on a weekly basis. Typically, home visits last about 1 hour and consist of (i) a shared reading activity, in which the volunteer models interactive shared reading and/or provides guidance while the parent reads to the child; (ii) additional stimulating activities (e.g., games such as memory); and (iii) a volunteer-parent talk, during which the volunteer and parent discuss how the family can make shared reading part of their daily routines and together explore opportunities for other stimulating activities. The volunteer provides children's books (made available by local libraries) and pays at least one visit to the library together with the family. Reading Express participation costs about 125 euro's per family; participation is subsidized.

The Reading Express Foundation attends to a uniform implementation across locations by providing guidelines for volunteer training and coaching. Volunteers normally participate in a 2-hour training session, during which local program coordinators provide information on how to promote interactive shared reading in families. Volunteers learn techniques to engage children in books (i) by introducing the story, asking children to respond to title and cover, activating prior knowledge, and

eliciting predictions; (ii) by explaining infrequent words, making connections with children's own experiences, and asking inferencing questions ("What will happen next?", "Why is Bear happy?"); and (iii) by responding to and elaborating children's own initiations. Volunteers are instructed to start the sequence of home visits by modeling: they use the first visits to read to children themselves, while they ask parents to join and observe, but not to participate. Then, volunteers are instructed to gradually involve parents in the shared reading activity, encourage them to engage in the types of interactions described above, and provide feedback.

Additionally, the volunteer training includes advice on how to select developmentally appropriate books with appealing topics, with clear but attractive plotlines that stir children's interest and trigger discussions ("Why did ladybug paint her spots?"), and with clear pictures that support story comprehension. Volunteers are also advised to select books that match thematic units provided in school (e.g., "The zoo," "Autumn" or "In hospital"). Program coordinators give suggestions for appropriate books per age category.

Finally, volunteers receive information on how to support families that have another home language than Dutch: they are suggested to stimulate parents to read in the language they are most proficient in. For this, volunteers are encouraged to seek the help of local libraries, which usually have a collection of books in other languages, although the supply of such books is rather limited (A. Heinsbroek, personal communication, August 7, 2022). Volunteers also take part in three coaching sessions organized by the local coordinator, during which they share their experiences and receive additional tips or information.

Methods and Materials

Design

We used a pretest-posttest quasi-experimental design: an experimental group of families participating in Reading Express were compared with a waiting list control group of families not yet participating. Because of ethical reasons, random assignment to the conditions was not possible. Instead, families were assigned to a condition based on the order in which they were enrolled in Reading Express. Before and immediately after treatment, children in the experimental and control conditions were administered a vocabulary test and a story comprehension test to assess meaning-related skills, and a "book cover recognition test" to assess exposure to children's books. On both occasions, parents (or other caregivers) were administered an HLE questionnaire during a personal interview. During a delayed posttest (20 weeks after the program), all instruments were administered again, but only in the experimental condition because waiting list families had started participation in Reading Express at that time.

Participants

Initially, 180 children ($n_{\text{experimental}} = 99$; $n_{\text{control}} = 81$) from 150 families participated. During program participation, four children from the experimental group left, because of family circumstances (2), relocation (1), and because the volunteer fell seriously ill and there was no replacement (1). Consequently, 176 children from 146 families were left at the time of the immediate posttest ($n_{\text{experimental}} = 95$; $n_{\text{control}} = 81$). Power analysis using G*Power 3.1.9.7 (Buchner et al., 1992-2020) suggested this sample size was more than appropriate. Given the outcome of a recent meta-analysis (Fikrat-Wevers et al., 2021), we expected a medium effect size. With a significance criterion of $\alpha = .05$ and power = 0.80, the minimum N needed to detect such an effect with an ANCOVA with one covariate (see Analyses) would be 128. During the delayed posttest, all the children in the experimental group were maintained ($n = 95$). Background characteristics are in Table 1.

Children were on average around 6 years of age (range: 4–8). There were more girls than boys in the sample. The majority of the sample (60%) were in kindergarten or Grade 1. Both mothers and fathers were mainly born outside the Netherlands (> 80%). Most mothers (58%) could be characterized as low

Table 1. Background characteristics of reading express group, control group, and total sample.

Characteristics	Reading Express	Control group	Total sample
<i>Children</i>	<i>n</i> = 95	<i>n</i> = 81	<i>N</i> = 176
Age (months)	72.51 (14.80)	71.72 (14.71)	72.14 (14.72)
Gender			
• Girls	57 (60%)	34 (42%)	91 (52%)
• Boys	38 (40%)	47 (58%)	85 (48%)
Grade			
• Junior kindergarten	20 (21%)	16 (20%)	36 (21%)
• Senior kindergarten	28 (30%)	26 (32%)	54 (31%)
• Grade 1	28 (30%)	24 (30%)	52 (29%)
• Grade 2	13 (14%)	12 (15%)	25 (14%)
• Grade 3	6 (6%)	3 (4%)	9 (5%)
<i>Parents</i>	<i>n</i> = 82	<i>n</i> = 64	<i>n</i> = 146
Country of birth mother			
• The Netherlands	9 (12%)	12 (22%)	21 (16%)
• Other	65 (88%)	43 (78%)	108 (84%)
Country of birth father			
• The Netherlands	7 (12%)	10 (22%)	17 (17%)
• Other	50 (88%)	35 (78%)	85 (83%)
Highest educational level mother			
• Primary education (or less)	20 (29%)	15 (30%)	35 (29%)
• Secondary education	24 (34%)	10 (20%)	34 (28%)
• Post-secondary vocational education	14 (20%)	16 (32%)	30 (25%)
• Higher education	12 (17%)	9 (18%)	21 (18%)
Language spoken by parents*			
• Only Dutch	7 (9%)	7 (11%)	14 (10%)
• Another language than Dutch	24 (29%)	15 (24%)	39 (27%)
• Combination of Dutch and another language	44 (54%)	36 (58%)	80 (56%)

The languages besides Dutch that were spoken most often by parents were Arabic, Turkish, English, Polish, Tamazight, and Spanish ($n = 41$, $n = 22$, $n = 8$, $n = 7$, $n = 6$ and $n = 6$, respectively).

educated according to the standards of Statistics Netherlands (www.cbs.nl). Finally, nearly all parents (89%) spoke either another language than Dutch or both Dutch and another language. Our sample thus matches the usual population of Reading Express families (see Context of the Study); for comparison: in the Dutch population of 25 to 35-year olds (approximately the age range of the parents in this sample), only 10% is low educated and 28% has a migrant background according to the latest demographic data (www.opendata.cbs.nl). There were no significant differences between the conditions in the distribution of background characteristics, with one exception: there were more girls in the experimental condition and more boys in the control condition ($\chi^2[1] = 5.69$, $p = .017$). Consultation with local implementing organizations revealed no clear reason for this difference.

All 176 children participated in both pretest and immediate posttest administration, although during the pretest two children failed to finish one of the tests: a child from the experimental group proved to have too little Dutch language proficiency to conclude the book cover recognition test and a child from the control group refused to finish this test. The parent questionnaire was filled in at pretest and immediate posttest by 119 families (82% response). Only experimental children and parents took part in the delayed posttest: the tests were administered to all 95 children, while 47 of the 82 parents who had participated in both pretest and immediate posttest were available to fill in the questionnaire (69% response). The lower response rate in the latter case was a likely result of the fact that the home visitors (who administered the questionnaires) were in less close contact with families at this time because program participation had ended.

Measures

Children

To measure (receptive) vocabulary knowledge and story comprehension, two standardized tests from the TAK test battery (“Taaltoets Alle Kinderen” or “Language Test All Children”; Verhoeven &

Vermeer, 2006) were used. Vocabulary was tested in a format resembling the Peabody Picture Vocabulary Test (e.g., Dunn, 2018). Children were shown a maximum of 96 sets of four pictures. With each set, test leaders read aloud a word and children had to indicate which of the pictures matched the word; children's answers were scored immediately, during test administration. The test had a cutoff norm: if children had five consecutive incorrect answers, the administration was terminated. The selection of words was based on two lists (Verhoeven & Vermeer, 2006): a list of about 7,000 words primary school teachers think are important for students to know at the start of primary education; and a list of about 15,000 words, that is based on a corpus analysis of words students come across in primary education, either orally or in print. Reliabilities were high: at pretest Cronbach's $\alpha = .98$, at immediate posttest $\alpha = .97$, and at delayed posttest $\alpha = .97$.

The TAK story comprehension test consisted of six stories (9–12 sentences per story), which were read aloud by test leaders. They asked four questions per text: two referring to explicit information and two referring to information implied in the text. Children could get 0, 0.5, or 1 points per question. Sample questions and answers are given in Table 2. Children answered orally and their answers were recorded, transcribed, and then assessed by two raters. Interrater reliabilities were high: average Cohen's κ was .89 at pretest and .94 at both immediate and delayed posttest. Cronbach's α reliabilities were high as well: .90 at pretest, .89 at immediate posttest, and .85 at delayed posttest.

Exposure to children's books was measured with a book cover recognition test based on the title recognition tests originally developed by Cunningham and Stanovich (1993). Title recognition tests have been used in many studies as a proxy for children's home literacy environments and/or reading activities (Mol & Bus, 2011): the assumption is that the number of books children recognize is an adequate reflection of the extent to which they are exposed to print (Stainthorp, 1997). Children were given a list of genuine and fake covers of children's books. For each book cover, test leaders asked children to indicate whether they recognized it. Total scores were computed by subtracting the proportion of (incorrectly) recognized fake covers from the proportion of (correctly) recognized genuine covers, resulting in scores between -1 and $+1$. Fake covers were included so that test reliability was not negatively affected by social desirability; children were told that the test included both genuine and fake covers. Genuine covers were selected from (i) a list of the fifty most sold children's books in the age range 5–8 by a well-known online bookstore, and (ii) a list of recommended books for 4 to 9-year-olds on www.keesplein.nl, an online platform developed by the Dutch Royal Library. We made sure that from these lists we selected books that were written for both younger and older children in these age ranges, using information provided on the websites. Subsequently, we had our selection checked by two experts from the Dutch Reading Foundation, who assessed whether the titles were age-appropriate. Test reliability (based on the genuine covers; see Cunningham & Stanovich, 1993) was high: Cronbach's $\alpha = .91$ at pretest, .84 at immediate posttest, and .82 at delayed posttest.

Parents

Parents were administered an adaptation of the Stonybrook Family Reading Survey (Payne et al., 1994). Because the aim was to measure changes in the HLE, one item was excluded (age when reading with child began) and one was added: number of days in the last week the parent(s) read to their child.

Table 2. Sample questions and answers from the story comprehension test.

Questions	Answers with scoring
<i>Questions referring to explicit information</i>	
Text: Then Mouse sneaks in the room from his tiny hole. He is looking for bread and cheese.	0 points: "The house."
Question: What is Mouse looking for?	0.5 points: "For the cheese." 1 point: "Bread and cheese."
<i>Questions referring to implicit information</i>	
Text: Rosa passes a playground. There, she decides to play with her friend. They make mud pies in the sandbox.	0 points: "Build a castle or play." 0.5 points: "In the sandbox."
Question: What do Rosa and her friend do at the playground?	1 point: "Make a pie in the sandbox."

For each of the ten items in the list, parents could answer on a 4 or 5-point Likert scale, that for instance, ranged from 1 (*hardly ever*) to 4 (*[nearly] every day*). To increase the response rate and accommodate parents with other home languages than Dutch, the questionnaire was translated into Turkish, Moroccan-Arabic, French, English, and Polish, which were common home languages among the families in the sample.

Because the questionnaire was adapted to another language and some changes were made to the original version, the internal structure was analyzed using Principal Component Analysis (PCA) on the pretest scores. After establishing that the assumptions of PCA were met ($KMO = .73$; Bartlett's test of sphericity = 328.29, $df = 45$, $p < .001$), three interpretable components were revealed, together explaining 61% of the variance in scores. The first ($\lambda = 3.39$) consisted of three items and pertained to the frequency of shared reading (e.g., "How often do you or your partner read a book to your child?"). The second ($\lambda = 1.50$) also comprised three items and involved parents' own reading behavior (e.g., "How many minutes a day do you read books, newspapers, or magazines? These can also be digital."). The third ($\lambda = 1.20$) consisted of four items and reflected children's involvement in shared reading (e.g., "How often does your child ask you or your partner to read to him/her?"). Because the reliability of the second scale at immediate posttest was too low (Cronbach's $\alpha = .49$) and because we had no clear hypothesis on the program effect on parents' own reading behavior, it was excluded from further analyses. Because one of the items in the third scale showed a low item-test correlation (.25), it was dropped. Reliabilities of the two remaining scales (frequency of shared reading, child involvement in shared reading) were generally adequate for research purposes (pretest: Cronbach's $\alpha = .79$ and $.70$; immediate posttest: Cronbach's $\alpha = .72$ and $.68$; delayed posttest: Cronbach's $\alpha = .66$ and $.77$).

Implementation

We paid additional attention to implementation. Previous research suggested that programs such as Reading Express often show considerable variability in implementation and that implementation, in turn, can influence program effects (De la Rie et al., 2017). For both research questions, we therefore took "dosage" (i.e., number of home visits) into account as an indicator of implementation. When the immediate posttest was administered, the number of home visits to families in the experimental group varied between five and 20 ($M = 16.41$, $SD = 3.47$). For several reasons (i.e., illness, volunteers or families canceling home visits, holiday breaks), not all families had finished the program at this time. In consultation with the Reading Express Foundation, 15 visits (75%) were set as the criterion for "sufficient" implementation: by the 15th visit, parents are expected to be actively participating in the shared reading sessions. At the time of the immediate posttest, 73 families (77% of the experimental group) had received 15 visits or more, whereas at the time of the delayed posttest, 78 families (82%) met this criterion.

Procedure

From April until September 2017, families were recruited by local implementing organizations. Any family who had enrolled for Reading Express at these locations, could participate in the study. When families signed a consent form, they were assigned to the experimental or waiting list control group based on their date of enrollment in Reading Express. Program participation usually starts twice per school year: either in September or in January. Whether a family starts in September or January, is dependent on whether a volunteer is available. Because there is a high demand and a limited number of volunteers, families that cannot start immediately are placed on a waiting list. Families' placement on this waiting list is dependent on date of enrollment (if families enroll later, their chance of being placed on the waiting list increases) and not on the measure of urgency. Consequently, it is likely that families on the waiting list are not dissimilar to families not on the waiting list. To corroborate this, we compared the pretest scores of the two conditions on the effect measures and found there were no significant differences (see Results).

The pretests were carried out in September and October 2017. Because Reading Express trajectories usually last 20 weeks, the immediate posttest was administered approximately 20 weeks after the start of each trajectory (January–March 2018). Delayed posttests were administered in May and June 2018; on average, this was 3 months after the immediate posttests. All child measures (i.e., the vocabulary test, the story comprehension test, and the book cover recognition test) were administered at children's schools, with four exceptions: in three cases, tests were administered at children's homes and in one case test data collected by the school were used, because the same vocabulary and story comprehension tests had already been administered by the school shortly before our pretest. Child measures were administered and scored by the first author and by a team of test leaders, who were trained in test administration by the first and second author. The first author was aware of the condition children were in; the test leaders were not given this information. The tests were administered in one session (approximately 40–60 minutes). If test leaders noticed a lapse in children's attention or motivation, they stopped for a short break, in which children could do a physical activity (e.g., make ten jumps in the air) or watch a short YouTube® clip (e.g., a cartoon). Children were told at the beginning of each session that they could stop the tests at any moment. After each session, children were given a sticker sheet.

For reasons of efficiency, the parent questionnaires were administered by Reading Express volunteers and interns, most of whom attended a training session given by the first and/or second author. In a few cases, volunteers/interns were given written instructions or questionnaires were administered by research assistants. Questions were posed orally, filled out on paper, and returned by post to the researchers. Like the children, parents were told that they could stop participation in the study at any time. If in one family more than one child took part, parents were requested to answer the questions for their youngest child. Parents with limited Dutch language skills could use a translation of the questionnaire in their mother tongue if available. At the end of the study, parents received a small reward (a gift certificate of 15 euros).

Analyses

To answer the first research question, ANCOVA's were conducted, with immediate posttest scores on vocabulary, story comprehension, book cover recognition, frequency of shared reading, and child involvement in shared reading as dependent variables, condition (Reading Express/control) as independent variable, and pretest scores as covariates. Because of variability in the number of home visits (see Implementation), a second series of ANCOVA's were conducted, in which the control condition was compared with experimental children/parents who had been visited 15 times or more. Like the experimental group as a whole (see Results), this subsample did not differ on pretest measures from the control group. Because the distribution of girls and boys was different in the two conditions (see Participants), additional ANCOVA's were conducted with gender as a second factor. In one case – the analysis of the intervention effect on book cover recognition for the whole sample – the assumption of heterogeneity of regression slopes was violated and the ANCOVA could not be conducted.

To answer the second research question, multilevel regression analyses were conducted with time (i.e., number of weeks between pretest, immediate posttest, and delayed posttest) as Level 1, child/parent as Level 2, and vocabulary, story comprehension, book cover recognition, frequency of shared reading, and child involvement in shared reading as dependent variables. These analyses were only conducted for the experimental group, because families in the waiting list group had begun Reading Express participation after the immediate posttest and thus no longer constituted a genuine control condition between immediate and delayed posttest. If possible positive short-term developments as a result of program participation were maintained, growth in Reading Express children/parents between immediate and delayed posttest would continue at the same pace; this would be reflected by a linear effect of time. However, if positive short-term developments weakened, growth between immediate and delayed posttest would be smaller than growth between pretest and immediate

posttest, resulting in a quadratic effect of time. These analyses were conducted both for all Reading Express participants and for those who had received 15 home visits or more.

Results

Descriptive Statistics

Table 3 provides an overview of mean scores and standard deviations on all effect measures (split into outcomes for the whole sample and the comparison between control group and children/parents who had been home visited 15 times or more). For the delayed posttests, descriptive statistics are only provided for the experimental group: effect measures were not administered in the control group at this time, because control families had started Reading Express after the immediate posttest as a result of the waiting list design (see Participants).

There were no significant differences in pretest scores on effect measures between the two conditions (statistical tests not in Table 3), implying they were comparable at the start of the experiment. This was true both for the whole sample and for the comparison between control group and children/parents visited 15 times or more. To establish whether the sample was representative of the target group of Reading Express (children at risk of language delays), we compared the vocabulary and story comprehension scores with norm scores (Verhoeven & Vermeer, 2006). One-sample t-tests showed that, at pretest, the children in our sample had a mean vocabulary score at the level of the lowest achieving norm group at the end of senior kindergarten: children from “Mediterranean” (e.g., Turkish and Moroccan) migrant communities ($t[174] = 0.67, p = .502$). On the story comprehension test, the average score was at the level of Mediterranean children at the start of senior kindergarten ($t[175] = 0.76, p = .451$). Because most children in our sample were in senior kindergarten or Grade 1, we can conclude that they scored on or even below the level of the lowest achieving norm group and, consequently, were at-risk. Results of the parent questionnaires show that parents were relatively positive, particularly about children’s involvement in shared reading: the scores were on average above .5 (the scale maximum was 1).

Table 3. Mean scores and standard deviations on the effect measures at pretest, immediate and delayed posttest.

	Whole sample			At least 15 home visits		
	Reading Express	Control	Total	Reading Express	Control	Total
<i>Pretest</i>						
	<i>n</i> = 94/95	<i>n</i> = 80/81	<i>N</i> = 174–176	<i>n</i> = 71	<i>n</i> = 80/81	<i>N</i> = 151/152
Vocabulary	40.03 (20.38)	38.37 (22.04)	39.27 (21.11)	43.38 (19.12)	38.37 (22.04)	40.73 (20.80)
Story comprehension	8.27 (5.19)	9.03 (6.07)	8.62 (5.61)	8.94 (5.22)	9.03 (6.07)	8.99 (5.67)
Book cover recognition	0.09 (0.17)	0.10 (0.18)	0.09 (0.17)	0.12 (0.17)	0.10 (0.18)	0.11 (0.18)
	<i>n</i> = 72/73	<i>n</i> = 52/54	124/127	<i>n</i> = 53/54	<i>n</i> = 52/53	<i>N</i> = 105/108
Shared reading frequency	0.56 (0.23)	0.54 (0.22)	0.56 (0.22)	0.56 (0.24)	0.54 (0.22)	0.55 (0.23)
Child involvement	0.69 (0.22)	0.68 (0.20)	0.68 (0.21)	0.70 (0.22)	0.68 (0.20)	0.69 (0.21)
<i>Immediate posttest</i>						
	<i>n</i> = 95	<i>n</i> = 81	<i>N</i> = 176	<i>n</i> = 71	<i>n</i> = 81	<i>N</i> = 152
Vocabulary	48.13 (19.42)	45.17 (21.61)	46.77 (20.45)	51.38 (18.70)	45.17 (21.61)	48.07 (20.47)
Story comprehension	11.17 (5.63)	10.38 (5.76)	10.81 (5.69)	12.13 (5.37)	10.38 (5.76)	11.20 (5.63)
Book cover recognition	0.20 (0.20)	0.16 (0.19)	0.18 (0.20)	0.23 (0.20)	0.16 (0.19)	0.19 (0.20)
	<i>n</i> = 66	<i>n</i> = 51/53	<i>N</i> = 117/119	<i>n</i> = 48	<i>n</i> = 51/53	<i>N</i> = 99/101
Shared reading frequency	0.65 (0.20)	0.59 (0.19)	0.63 (0.20)	0.67 (0.19)	0.59 (0.19)	0.63 (0.19)
Child involvement	0.76 (0.18)	0.73 (0.19)	0.75 (0.18)	0.77 (0.18)	0.73 (0.19)	0.75 (0.19)
<i>Delayed posttest</i>						
	<i>n</i> = 95			<i>n</i> = 87		
Vocabulary	52.34 (17.85)	-	-	53.07 (17.53)	-	-
Story comprehension	12.01 (4.97)	-	-	12.26 (4.85)	-	-
Book cover recognition	0.22 (0.21)	-	-	0.23 (0.21)	-	-
	<i>n</i> = 45/47			<i>n</i> = 40/41		
Shared reading frequency	0.66 (0.19)	-	-	0.66 (0.19)	-	-
Child involvement	0.76 (0.18)	-	-	0.78 (0.17)	-	-

Research Question 1: Short-Term Effects on Literacy Skills and the HLE

Table 4 shows the results (i.e., estimated marginal means, standard errors, F values, and effect sizes) of the ANCOVA's for vocabulary, story comprehension, book cover recognition, frequency of shared reading, and child involvement in shared reading.

Outcomes of the ANCOVA's did not show an effect on vocabulary, neither for the sample as a whole, nor when the control group was compared with children who had participated in 15 visits or more. We did see a positive intervention effect on story comprehension: this effect was small when the comparison was based on the sample as a whole, but medium when the comparison was based on the children who had been visited 15 times or more. For children who had received 15 or more visits, we also observed a small intervention effect on book cover recognition and for parents who had received 15 or more visits, a medium effect was found on frequency of shared reading. The remaining effects were not significant. Because of the difference in distribution of girls and boys between the conditions, we also conducted ANCOVA's with gender as a second factor, but these did not result in different outcomes.

Research Question 2: Sustainability of Positive Short-Term Changes

To analyze whether positive developments in children's meaning-related skills and HLE's during Reading Express were maintained, we conducted five series of multilevel regression analyses (one for each dependent variable), with two levels: time and child/parent. All series of analyses were computed for both the whole experimental group and those children/parents who had been visited 15 times or more. For each series, we compared three models: an empty model without predictors (Model 0), a model with the linear effect of time as a predictor (Model 1), and a model with the linear and quadratic effect of time as predictors (Model 2). The multi-level tables can be found in the [Appendix](#).

The outcomes show an interesting pattern. For all variables except story comprehension, there was linear and no quadratic growth. In all these cases, only Models 1 (including the linear effect of time) resulted in a significant improvement of model fit, whereas Models 2 (including the linear and quadratic effects) did not. For the book cover recognition test and reported shared reading frequency, this implies that the increase during program participation was maintained over time. This was not the case for story comprehension: both for the experimental group as a whole and for children who were visited at least 15 times there were a linear *and* a quadratic effect. The nature of these quadratic effects is illustrated in [Figures 1 and 2](#): both figures show that the increase in story comprehension during Reading Express diminished after the program had ended (i.e., between the immediate posttest and the delayed posttest).

Table 4. Results of ANCOVA's on short-term effect measures.

		Reading Express	Control	
Vocabulary	Whole sample	47.47 (0.93)	46.18 (1.01)	$F(1, 172) = 0.88, p = .350$
	≥ 15 visits	49.05 (1.07)	47.47 (1.01)	$F(1, 148) = 1.14, p = .288$
Story comprehension	Whole sample	11.47 (0.32)	10.04 (0.35)	$F(1, 173) = 8.99, p = .003, \text{partial } \eta^2 = 0.05$
	≥ 15 visits	12.17 (0.37)	10.35 (0.35)	$F(1, 149) = 12.59, p = .001, \text{partial } \eta^2 = 0.08$
Book cover recognition	≥ 15 visits	0.23 (0.02)	0.16 (0.02)	$F(1, 148) = 5.22, p = .024, \text{partial } \eta^2 = 0.03$
Shared reading frequency	Whole sample	0.65 (0.02)	0.59 (0.03)	$F(1, 107) = 2.58, p = .111$
	≥ 15 visits	0.67 (0.02)	0.59 (0.02)	$F(1, 91) = 5.28, p = .024, \text{partial } \eta^2 = 0.06$
Child involvement	Whole sample	0.76 (0.02)	0.74 (0.02)	$F(1, 103) = 0.35, p = .557$
	≥ 15 visits	0.78 (0.02)	0.75 (0.02)	$F(1, 87) = 0.91, p = .342$

For the book cover recognition test, no ANCOVA was conducted for the whole sample, because the assumption of heterogeneity of regression slopes was violated.

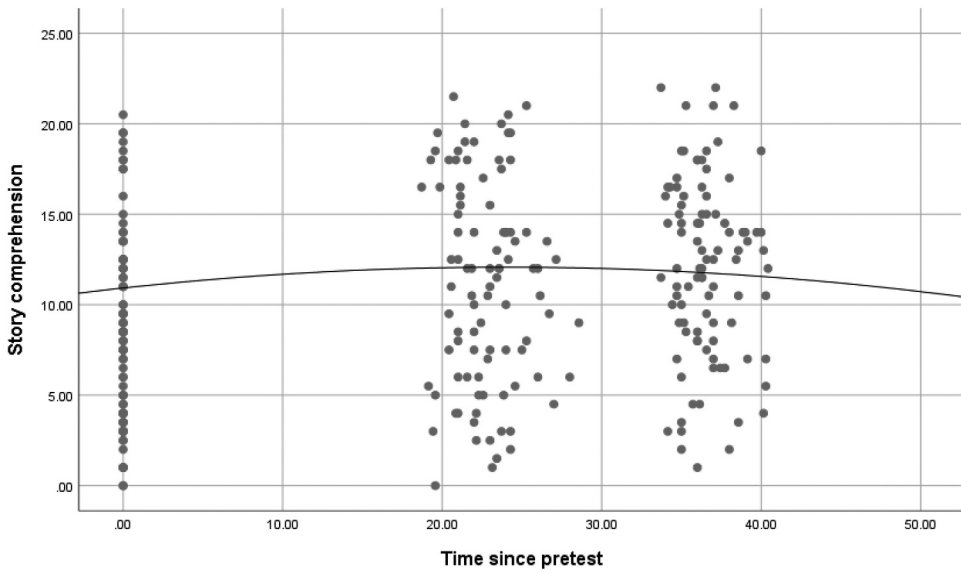


Figure 1. Interpretation of the quadratic effect on story comprehension (all Reading Express children).

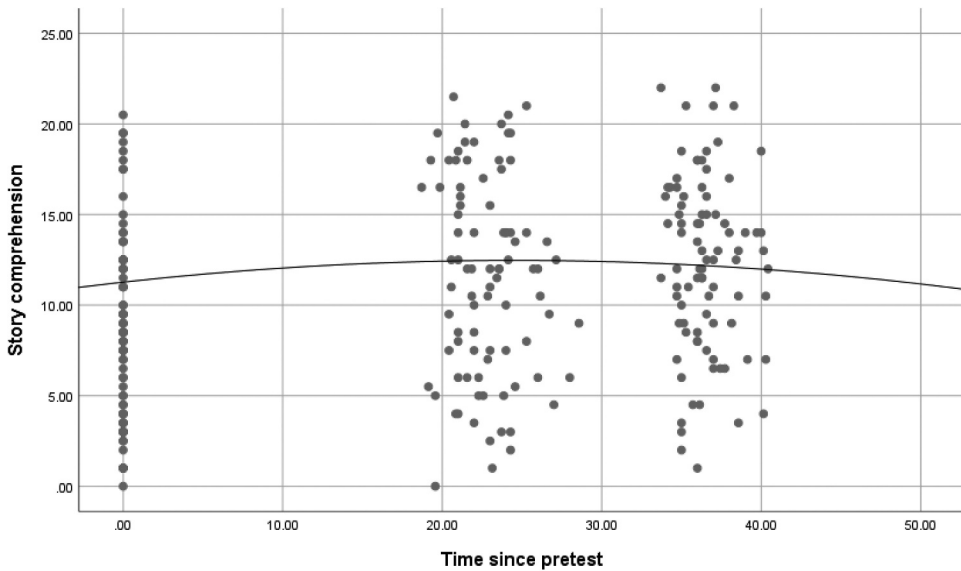


Figure 2. Interpretation of the quadratic effect on story comprehension (only children who were visited 15 times or more).

Discussion

In this study, we examined the effects of Reading Express, an intervention in which volunteer home visitors encourage particularly low-SES and ethnic minority parents to engage their children in interactive shared reading. In part, our analyses revealed favorable outcomes of Reading Express, thereby supporting previous conclusions on the effects of home visiting in family literacy programs (Fikrat-Wevers et al., 2021; Manz et al., 2010). First of all, efforts by volunteers appeared to have led parents to become more involved in their children’s literacy development, as evidenced by increases in children’s book exposure and parents’ reported shared reading frequency. This

positive development was maintained over time. This outcome extends the current research base, which is characterized by a dearth of long-term studies (Anderson et al., 2010; Fikrat-Wevers et al., 2021), and suggests that parent–child reading routines are malleable. Reading Express also had a positive short-term effect on story comprehension: increased exposure to stories apparently contributed to children’s ability to understand extended text. Positive outcomes were related to program implementation: some effects only appeared when a sufficient number of home visits had been conducted. Reading Express did not succeed in making a sustainable impact on children’s literacy development, however. The positive trend in story comprehension leveled off after program termination and there were neither short-term nor long-term effects on vocabulary development.

Our outcomes are somewhat contradictory. On the one hand, it appears that home visitors were able to introduce sustainable reading routines in low-SES and ethnic minority families; on the other hand, these longitudinal changes in children’s HLE’s were not accompanied by permanent improvements in children’s literacy development. How can this be explained? One possibility is, that even though parents may have invested in HLE activities after program participation, they were not able to employ the types of interactive shared reading promoted by the volunteers. It is assumed that the quality of interactions parents and children have is partly responsible for the effects of shared reading on children’s literacy development (Reese, 1995; Rowe, 2012). However, the skills necessary for high-quality interactions are not easily learned (Mol et al., 2008). It might be that the training volunteers received was too brief to allow them to give parents the support they needed to develop these skills. Conversely, it might be that parents did learn the techniques transferred by home visitors, but found it difficult to apply them outside the context of the home visits.

Also, there is some indication that implementation issues – particularly, parental engagement during home visits – hampered the transfer of skills. An additional, small-scale diary study among 32 home visitors (Dias-Broens & Van Steensel, 2019) showed variability in parental engagement. In about two thirds of the families parents actively participated in the home visits: they engaged in shared reading or spoke with the home visitors. In one third of the families, however, parents only observed the volunteer reading to their child or were not present at all. Particularly in the latter case, parents had little to no opportunity to learn from the volunteers’ model behavior, which may have tempered intervention effects (or alternatively, any effect resulting from such situations may have been a volunteer effect rather than a parent effect). Although the precise reasons for these parents’ lack of involvement were not uncovered, language issues are likely one of them. While most volunteers were native Dutch, in about a quarter of the families only another language than Dutch was spoken. In these cases, involving parents in shared reading during home visits was likely difficult. Our diary study provided some indication of the impact of implementation issues. Nevertheless, a more thorough analysis of the moderating role of implementation quality is warranted. As a recent review showed, this recommendation also applies to family literacy intervention studies more generally: De la Rie et al. (2017) found that only few intervention studies included variables such as parent engagement in effect analyses, and the studies that did, showed mixed results.

An additional contradiction is the observation that there was a (short-term) effect on story comprehension, but not on vocabulary, even though both skills are important meaning-related skills and vocabulary is known to be a crucial component of story comprehension (Strasser & Del Río, 2014). One possible explanation is that the vocabulary test is a *general* test: it does not necessarily include the words children came across in the books they were exposed to during Reading Express participation. However, given the outcomes of previous research (Mol & Bus, 2011), we still expected that 20 weeks of shared reading would result in an increase in language exposure that is reflected in higher scores on a test such as this. Another possible explanation is that, given the fact that nearly all parents spoke another language in addition to or instead of Dutch, children did learn more words, but in their home language instead of their second language. Unfortunately, we were not able to test effects on home language vocabulary (see Limitations and Suggestions for Further Research).

All in all, our results show that longer-term changes can be made in children's HLE's by means of home visiting programs such as Reading Express, but they also suggest the relevance of better adapting programs to the characteristics and needs of participating families. Bryant and Wasik (2004) argued that home visiting maximizes opportunities for individualized support: the one-on-one guidance by volunteers allows them to be more sensitive and thus provide more tailored help. However, there might be barriers to the success of this individualized support, which seems to be evidenced by the outcomes of our study. These barriers might be overcome by providing deliverers more intensive support in transferring high-quality interaction skills to parents and by providing assistance for specific subgroups, for instance, by involving bilingual home visitors and including materials in the home language (Boyce et al., 2010; Hirst et al., 2010; Ijalba, 2015; Johnson & Walker, 1991). The latter could also help with increasing what Manz et al. (2010, p. 424) call the "cultural validity" of family programs. Additional research on how this can be achieved effectively is certainly warranted.

Limitations and Suggestions for Future Research

A first limitation of our study is that, for ethical reasons, we were unable to randomly assign children to experimental and control conditions. Instead, they were assigned on the basis of order of enrollment. According to the implementing organizations, this order was not selective, as it is common that children are enrolled throughout the year. The assumption that no selection effect occurred, is strengthened by our observation that pretest scores of both conditions were similar. Still, it would be useful to replicate this study using a randomized controlled trial.

A second limitation is that parental shared reading frequency was measured via a parent questionnaire administered by the volunteer readers. The positive intervention effect on shared reading frequency could thus have been the consequence of social desirability: it may have been that parents in the experimental condition were more inclined than control parents to indicate they read more frequently to their child at posttest, because they had been encouraged to engage in shared reading by the volunteers who interviewed them. However, the effect on shared reading was paralleled by a positive effect on book exposure – a more reliable measure of the home literacy environment – and this positive change was sustained over time.

A third limitation is that we only included experimental families in our delayed posttest, because following the immediate posttest, the waiting list families started their participation in Reading Express and thus could no longer function as controls. Consequently, we were only able to monitor whether program-induced changes were maintained, but we could not test whether there were still significant differences between the experimental and control condition. In a future effect study, an attempt could be made to test long-term effects using a control group.

A fourth limitation is that we were not able to observe how volunteers supported parents during home visits. Hence, we could not assess whether home visiting generated the advantages suggested by Bryant and Wasik (2004) – removal of practical barriers for participation, a more trusting relationship between deliverer and parent, and more sensitive, individualized support – and whether this contributed to intervention effects. A recent review study showed that, in family literacy research, little systematic attention has been paid to program implementation and its impact on program outcomes (De la Rie et al., 2017). Because research on program delivery is particularly scarce, future researchers should consider more precisely analyzing the possible benefits of home visiting by observing home visitor–parent interactions.

A fifth limitation is that we included measures of HLE quantity, but did not assess the quality of shared reading interactions. Reading Express volunteers encourage parents to engage in interactive shared reading. The assumption is that interactive shared reading, in which children are stimulated to take an active role, contributes more to children's meaning-related skills than "typical" shared reading in which adults read and children merely listen (Mol et al., 2008) and, thus, that improved interaction quality during shared reading acts as a mediator of intervention effects on children's skills. Effect analyses using observations of parent–child shared reading quality as a mediator could have given

insight into why short-term effects on story comprehension were not maintained; we suggest to test such mediation effects in future studies.

Finally, we were not able to test possible intervention effects on children's home language skills. In about 90% of the families another language was spoken in addition to or instead of Dutch. It might be that Reading Express participation encouraged parents to engage in shared activities in the home language. However, practical limitations prevented us from assessing whether this resulted in benefits for home language development: appropriate, equivalent tests were not available for the range of language groups in our sample. Additionally, we had no information on the extent to which parents engaged in shared reading activities in their home languages and how this may have impacted program effects. Moreover, the contents of the vocabulary test were driven by mainstream norms: the selection of words was based on what is relevant in the context of education (see Measures), but these words do not necessarily correspond with what is important in children's home environments.

Conclusion

We showed that Reading Express, a program in which volunteer home visitors encourage parents to engage in interactive shared reading with their child before and during the early years of education, succeeded in making positive short- and longer-term changes in children's home literacy environments. We also found that participation in Reading Express led to short-term increases in story comprehension, a skill that is an important predictor of later reading comprehension (Silva & Cain, 2015). Our study thus provides support for the assumption that home visiting plays an effective role in achieving favorable outcomes of shared reading interventions in low-SES and ethnic minority families. Policymakers could view our outcomes as an impetus to invest in (volunteer) home visiting as a way of supporting children's literacy development, particularly because effects are achieved at low costs and the program succeeds in reaching those children most in need of support (see Participants). However, our study also calls out to researchers as well as program developers and deliverers to think about how programs can be designed to provide more individualized support that is tailored to the context and needs of these families (Fikrat-Wevers et al., 2021; Manz et al., 2010).

Acknowledgments

We would like to thank the families, volunteers, and local program coordinators for participating in the study, and the research assistants for administering the child measures.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

This project was funded by the Dutch Reading Foundation.

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Appendix

Table A1. Results of multilevel analyses for vocabulary (all Reading Express children).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	46.83 (1.88)	46.83 (1.88)	47.26 (1.98)
Time (linear)		0.34 (0.03)***	0.33 (0.03)***
Time (quadratic)			0.00 (0.00)
Random effects			
Level 2 (child)	305.38 (48.62)	318.65 (48.61)	318.62 (48.59)
Level 1 (time)	87.17 (8.94)	48.45 (4.97)	48.34 (4.96)
Model fit			
–2 Log Likelihood	2314.24	2202.76	2202.31
Difference		111.48***	0.45
<i>Df</i>		1	1

*** $p < .001$ **Table A2.** Results of multilevel analyses for vocabulary (only children who were visited 15 times or more).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	47.71 (1.89)	47.71 (1.89)	48.30 (2.01)
Time (linear)		0.33 (0.03)***	0.32 (0.03)***
Time (quadratic)			0.00 (0.00)
Random effects			
Level 2 (child)	280.75 (47.15)	293.54 (47.11)	293.59 (47.10)
Level 1 (time)	88.51 (9.49)	50.79 (5.45)	50.57 (5.42)
Model fit			
–2 Log Likelihood	2115.48	2018.88	2018.13
Difference		96.60***	0.75
<i>Df</i>		1	1

*** $p < .001$ **Table A3.** Results of multilevel analyses for story comprehension (all Reading Express children).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	10.48 (0.51)	10.48 (0.51)	10.92 (0.55)
Time (linear)		0.10 (0.01)***	0.10 (0.01)***
Time (quadratic)			–0.002 (0.001)*
Random effects			
Level 2 (child)	21.29 (3.53)	22.67 (3.54)	22.65 (3.53)
Level 1 (time)	8.79 (0.90)	5.05 (0.52)	4.94 (0.51)
Model fit			
–2 Log Likelihood	1628.92	1524.22	1519.58
Difference		104.70***	4.64*
<i>Df</i>		1	1

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

Table A4. Results of multilevel analyses for story comprehension (only children who were visited 15 times or more).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	10.73 (0.52)	10.73 (0.52)	11.27 (0.56)
Time (linear)		0.11 (0.01)***	0.10 (0.01)***
Time (quadratic)			-0.002 (0.001)*
Random effects			
Level 2 (child)	20.27 (3.55)	21.75 (3.56)	21.74 (3.54)
Level 1 (time)	9.04 (0.97)	5.02 (0.54)	4.84 (0.52)
Model fit			
-2 Log Likelihood	1493.24	1391.21	1384.70
Difference		102.03***	6.51*
Df		1	1

*** $p < .001$; * $p < .05$ **Table A5.** Results of multilevel analyses for book cover recognition (all Reading Express children).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	16.91 (1.63)	16.87 (1.63)	18.60 (2.02)
Time (linear)		0.39 (0.05)***	0.36 (0.06)***
Time (quadratic)			-0.01 (0.01)
Random effects			
Level 2 (child)	176.35 (37.32)	194.71 (37.10)	195.29 (37.08)
Level 1 (time)	223.56 (22.95)	171.99 (17.68)	170.09 (17.49)
Model fit			
-2 Log Likelihood	2457.35	2408.20	2406.08
Difference		49.15***	2.12
Df		1	1

*** $p < .001$ **Table A6.** Results of multilevel analyses for book cover recognition (only children who were visited 15 times or more).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	17.56 (1.72)	17.56 (1.72)	19.19 (2.13)
Time (linear)		0.38 (0.05)***	0.35 (0.06)***
Time (quadratic)			-0.007 (0.005)
Random effects			
Level 2 (child)	181.86 (39.68)	199.59 (39.48)	199.78 (39.41)
Level 1 (time)	223.43 (23.95)	172.75 (18.52)	171.19 (18.36)
Model fit			
-2 Log Likelihood	2259.99	2215.52	2213.82
Difference		44.47***	1.70
Df		1	1

*** $p < .001$

Table A7. Results of multilevel analyses for shared reading frequency (all Reading Express parents).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	61.67 (2.55)	61.67 (2.55)	63.42 (3.47)
Time (linear)		0.28 (0.10)**	0.24 (0.11)*
Time (quadratic)			-0.01 (0.01)
Random effects			
Level 2 (child)	145.56 (57.97)	154.18 (57.60)	154.82 (57.58)
Level 1 (time)	283.88 (46.67)	258.01 (42.42)	256.10 (42.10)
Model fit			
-2 Log Likelihood	976.46	969.39	968.84
Difference		7.07**	0.55
<i>Df</i>		1	1

** $p < .01$; * $p < .05$ **Table A8.** Results of multilevel analyses for shared reading frequency (only parents who were visited 15 times or more).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	62.33 (2.68)	62.33 (2.68)	65.18 (3.68)
Time (linear)		0.29 (0.11)**	0.24 (0.12)*
Time (quadratic)			-0.01 (0.01)
Random effects			
Level 2 (child)	138.69 (60.96)	148.47 (60.50)	150.17 (60.42)
Level 1 (time)	296.54 (51.62)	267.18 (46.51)	262.10 (45.63)
Model fit			
-2 Log Likelihood	873.41	866.53	865.26
Difference		6.88**	1.27
<i>Df</i>		1	1

** $p < .01$; * $p < .05$ **Table A9.** Results of multilevel analyses for child involvement (all Reading Express parents).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	74.54 (2.61)	74.54 (2.61)	77.00 (3.39)
Time (linear)		0.26 (0.09)**	0.21 (0.10)*
Time (quadratic)			-0.01 (0.01)
Random effects			
Level 2 (child)	165.68 (59.24)	173.47 (58.96)	174.74 (58.92)
Level 1 (time)	237.91 (39.65)	214.54 (35.76)	210.75 (35.12)
Model fit			
-2 Log Likelihood	938.06	930.62	929.33
Difference		7.44**	1.29
<i>Df</i>		1	1

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

Table A10. Results of multilevel analyses for child involvement (only parents who were visited 15 times or More).

Parameter	Model 0	Model 1	Model 2
Fixed effects			
Intercept	76.04 (2.57)	76.04 (2.57)	79.21 (3.33)
Time (linear)		0.26 (0.09)**	0.20 (0.10)*
Time (quadratic)			-0.01 (0.01)
Random effects			
Level 2 (child)	140.70 (54.09)	148.46 (53.79)	150.55 (53.72)
Level 1 (time)	209.78 (37.08)	186.50 (32.97)	180.21 (31.86)
Model fit			
-2 Log Likelihood	820.94	813.41	811.22
Difference		7.53**	2.19
<i>Df</i>		1	1

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