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Shared Book Reading Interventions and Children's Skills

A Meta-Analysis of Randomised Controlled Trials

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Shared Book Reading Interventions and Children's Skills: a Meta-Analysis of Randomised Controlled Trials

Abstract

Over the past two decades, a growing number of randomised controlled trials have assessed the impact on children's language skills of interventions encouraging parents to read books to their children. We present the results of a meta-analysis of the impact of 30 such interventions. Results indicate that they are often ineffective, and that only one specific methodology (dialogic reading), displays systematically positive impacts. Moreover, effective interventions display weaker impacts on low-socioeconomic groups, thus raising equity issues, and on younger children. Our systematic analysis of the research designs of these studies points at three major weaknesses. First, only short-term outcomes are measured, most often within six months after the conclusion of the intervention, and even within such a narrow time window, we find indications that treatment impacts fade out. A second limitation concerns the limited range of outcomes measured (receptive or expressive vocabulary). Finally, these studies display low external validity (ad hoc sampling, small sample sizes, lack of multi-site experiments, scant evidence outside Anglo-Saxon countries).

Keywords: Shared book reading; Randomised controlled trial; Dialogic reading; Emergent literacy; Receptive vocabulary; Meta-analysis.

Introduction

Education researchers have increasingly paid attention to the importance of early skills for school success, their determinants, and the related socio-economic inequalities (Heckman, Pinto & Savelyev, 2013; Potter & Roksa, 2013; Whitehurst & Lonigan, 1998). It is well-documented that Shared Book Reading (SBR) at home during the preschool years is associated with higher achievement and academic performance in primary and secondary education (Kalb & van Ours, 2014; Park, 2008; Sénéchal, 2006). SBR provides a prototypical illustration of the importance of parenting practices and informal learning activities for children's skill development. Unsurprisingly, paediatricians and educational experts regard SBR as a highly beneficial practice, and books, blogs, and newspaper articles on parenting systematically encourage this practice (Bus, Van Ijzendoorn & Pellegrini, 1995). The benefits of this activity for language and cognitive development are widely acknowledged (Duursma, Augustyn & Zuckerman, 2008; OECD, 2012, 2017; Persampieri, Gortmaker, Daly, Sheridan & McCurdy, 2006; Scarborough & Dobrich, 1994).

This consensus has inspired a large number of information campaigns worldwide aimed at fostering this activity by granting parents books for children and providing them with information on the benefits of SBR (van Kleeck, Stahl & Bauer, 2003). These programmes often target low-educated parents, who read less often to their children (Marulis & Neuman, 2010; Myrberg & Rosen, 2009). Indeed, a common wisdom is that these interventions have the potential not only to foster early skill development, but also to reduce social inequalities in education (Araujo & Costa, 2015; Lynch, 2009).

Given the huge amount of human and financial resources invested in these programmes, assessing their efficacy is of pivotal importance. Several studies published throughout the 1980s and 1990s documented the beneficial effects of these interventions on SBR frequency and children's skills, as well as the positive reception from parents and children (High, Hopmann, LaGasse & Linn, 1998; Mendelsohn, Mogilner, Dreyer, Forman, Weinstein, Broderick & Napier, 2001; Needlman, Toker, Dreyer, Klass & Mendelsohn, 2005). This conclusion was reinforced by some influential systematic reviews and meta-analyses of these studies (Bus et al., 1995; Dickinson, Griffith, Michnick, Golinkoff & Hirsh-Pasek, 2012; Duursma et al., 2008; Marulis & Neuman, 2010; Moore & Wade, 2003). At the same time, some of these analyses pointed out that children from disadvantaged families benefit less from SBR interventions (Marulis & Neuman, 2010; Mol, Bus, De Jong & Smeets, 2008).

However, these early studies were seldom based on Randomised Controlled Trials (RCT); most often they employed test-retest or matched case-control designs (Goldfeld, Napiza, Quach, Reilly, Ukoumunne & Wake, 2011). They were thus exposed to potential selection biases compromising the comparability of treated and control subjects. Over the past two decades, a growing number of studies have mobilised RCTs to assess the impact of SBR interventions, thus adding to the robustness of their causal inferences¹. In this article, we

¹ Quasi-experimental designs are rare in the literature on SBR and they involve dubious assumptions, such as instrumental regressions based on dubious instruments (Kalb, van Ours 2014).

present the results of a meta-analysis of the impact of 30 interventions assessed in 19 experimental studies. We thus wish to question the consensus about the efficacy of SBR interventions in the light of the experimental evidence accumulated in recent years. To the best of our knowledge, this is the first meta-analysis of SBR interventions relying entirely on RCTs. A previous meta-analysis for the National Early Literacy Panel (Lonigan, Shanahan & Cunningham, 2008) assessed the effects of SBR interventions reported in experimental and quasi-experimental studies and concluded that these interventions have positive impacts on children's skills. However, this study assessed school- and parent-based interventions, while our meta-analysis focuses on interventions that primarily targeted parents², and incorporates the growing evidence collected in the last decade.

The purpose of this study is threefold. On one side, we show that the unqualified consensus on the efficacy of SBR interventions is misguided, at least in the light of existing experimental evidence, which supports the less optimistic conclusion that SBR interventions are generally ineffective, and that only one specific intervention methodology (dialogic reading), displays systematically positive impacts. Secondly, our results suggest that SBR interventions tend to be less effective when they target low-socioeconomic groups and younger children (below the age of 3). Finally, our systematic analysis of the research designs of these experimental studies points at three major weaknesses of these studies, which open possible avenues for future research.

The rest of this work is organized as follows. In section 2 we examine the theoretical arguments supporting the hypothesis that SBR interventions foster children's early language skills, as well as the possible obstacles to the efficacy of these interventions. In section 3, we present the methodology of this study, focussing on the search and selection criteria, as well as the coding rules that were adopted to build our dataset. Section 4 provides a description of the intervention and evaluation designs of the studies under examination. Section 5 presents the results concerning the overall impact of SBR interventions and the intervention characteristics that moderate these impacts. Section 6 concludes with a discussion of knowns and unknowns in surveyed literature.

I. Theory and Hypotheses on the Impact of Shared Book Reading Interventions

Storybooks are much richer in vocabulary than most competing activities at home. They involve a broad variety of semantic domains and mobilise multiple language registers which are often uncovered in daily conversations at home (Dickinson et al., 2012; Duursma et al., 2008). Hence, SBR is supposed to enrich both children's receptive and expressive vocabulary. Indeed, most studies assessing the impact of SBR interventions focus on language outcomes, most typically children's vocabulary, which is an important predictor of school achievement (National Early Literacy Panel, 2008). However, exposure to books at young age may foster

² Lonigan et al. (2008) did not find any statistically significant difference between teacher- and parent-based interventions, while Marulis and Neuman (2010) reported that the former are substantially more effective.

other language skills as well, such as knowledge of print conventions and phonological awareness, which constitute additional predictors of later academic performance (National Early Literacy Panel, 2008). Furthermore, the potential benefits of SBR extend well beyond the language domain. For instance, it has been claimed that it fosters cognitive development, social skills, and creativity in children, as well as positive attitudes toward book reading in adulthood (Lay See, Winston & Charis, 2014). A frequently invoked beneficial effect of SBR concerns the quality of parent-child relations (Duursma et al. 2008).

Focusing on the relationship between SBR and language skills, it is however possible that any positive impact is contingent not only on the frequency of this activity, but also on parent-child interaction styles around books. In particular, more interactive SBR styles are supposed to be beneficial to language development (Ortiz, Stowe & Arnold, 2001; Partridge 2004). When parents take the time to explain unknown words, to actively use the book images to facilitate story comprehension and the retention of new words, to make questions and prompt children to comment, or even retell the story, their children enjoy more opportunities to incorporate new words into their vocabulary. Studies based on video recordings of SBR report a recurring pattern: parents focus on reading the text, while children are attracted more to book images and stay quite disconnected from verbal contents (Evans and Saint-Aubin, 2005; Vandermaas-Peller, Nelson, Bumpass & Sassine, 2009). SBR thus tends to be a unidirectional activity that relegates children to a passive role.

Overall, it is uncontroversial that a higher frequency and more interactive styles of SBR foster children's vocabulary, and more generally, their language development. Hence, one could formulate the hypothesis that interventions promoting SBR among parents have a positive impact on children's language skills (H1a) and that interventions with a strong focus on fostering interactive SBR styles have stronger impacts (H2).

However, it is far from obvious that interventions aimed at enhancing the frequency and quality of SBR have significant impacts on language development. First, the correlational evidence that SBR is associated with improved learning outcomes does not provide any solid ground for such a claim, given the large number of potential confounders, such as the cultural, social, and economic resources of the parents, their educational aspirations, school engagement, and time investments.

Second, even if the above arguments support the expectation that SBR fosters children's language, several hurdles may hinder receptivity to interventions promoting this practice. For instance, economic deprivation and insecurity resulting in parental distress, a lack of familiarity with books and reading activities, or a limited investment focus of the parents can be relevant barriers (Karrass, Van Deventer & Braungart-Rieker, 2003; Kloosterman, Notten, Tolsma & Kraaykamp, 2011; Lareau, 2011; Notten & Kraaykamp, 2013). Language barriers are yet another hurdle for immigrant parents, who are often screened out if they are entirely allophone, but not if they display limited familiarity with the native language.

Third, any intervention aimed at fostering SBR is confronted with a number of practical problems (Beckett et al., 2010; Jordan, Snow & Porche, 2000), from identifying and reaching

targeted parents (particularly those who are less likely to read to their children) to effectively communicating the benefits of this activity and motivating parents to establish a reading routine; modifying their reading styles can be even more challenging. Additionally, these challenges often motivate the recourse to interventions based on repeated face-to-face interactions, thus raising issues of treatment compliance if parents have to attend some meetings, for instance, at the local library or school. Light-touch interventions based on phone calls, videos or brochures are also faced with treatment compliance issues, albeit of a different nature (e.g. parents may not watch the videos or read the brochures). Furthermore, the intensity and duration of SBR programmes may act as relevant moderating variables: short, one-shot interventions, such as a single home visit to quickly illustrate the benefits of reading aloud and deliver reading materials, may not be enough to modify parental routines; more prolonged, intensive communication campaigns may be necessary, but these interventions may be too costly. Hence, for all these reasons, it is possible to formulate the counter-hypothesis that SBR interventions have a null impact on children's language skills (H1b).

The above barriers are particularly strong for low-educated parents, who may thus be less receptive to SBR interventions (Mol et al. 2008; York, Loeb & Doss, 2019). Moreover, these parents may be less inclined to adopt interactive reading styles than high-educated parents, who tend to be less directive when proposing and managing reading activities (Auger, Reich & Penner, 2014; Doepke & Zilibotti, 2019; Vandermaas-Peller et al., 2009). Hence, we could expect that SBR interventions are less effective when targeted at low-status groups (H3a). The counter-hypothesis is that ceiling effects reduce the impact of these interventions among high-status groups (H3b), if the frequency and quality of SBR are high regardless of SBR interventions. Upper class parents display higher involvement in school and enjoy higher cultural, social, and economic resources, as well as facilitated access to information on the benefits of SBR via books, blogs or newspaper articles on parenting, as well as through their social networks (Radey & Randolph, 2012). Hence, information interventions encouraging them to read to their children may be less consequential for them.

Overall, while the hypotheses about positive and equalizing impacts are more often evoked in the literature, the above arguments suggest that their counter-hypotheses are equally plausible. It is therefore surprising that a large consensus about their efficacy dominates both the scientific literature and the public debate (Dickinson et al., 2012; Duursma et al., 2008). Some previous contributions have already questioned the unqualified consensus on the efficacy of SBR interventions (Scarborough, & Dobrich, 1994) or have stressed the paucity of solid empirical evidence (Goldfeld et al. 2011; National Early Literacy Panel, 2008). The proceeding section presents the methods employed to reassess this consensus on the basis of the existing experimental evidence.

II. Methodology: Selection and Coding Criteria

To be included in the meta-analysis, a study had to meet the following criteria: a) primarily involve a SBR intervention; b) target parents of pre-schoolers; c) target children aged 0-6 years old without any cognitive, language, or physical disability; d) involve random

assignment of families to the treatment; e) report outcome measures of children's language skills after the intervention based on standardised assessments; f) be written in English, French, or Spanish; g) be published between 1988 and 2018.

The motivations behind these selection criteria are as follows. Only studies assessing interventions primarily aimed at fostering SBR frequency or quality were selected. Intervention studies where SBR was only one of the several components of a broader intervention were not considered (for instance, as in York et al., 2019). While these studies are obviously important, the research questions of this study specifically focus on the efficacy of SBR interventions. For the same reason, studies targeting children aged 7 or older, who are more likely to become active readers and less likely to be read books by their parents, were also excluded. We screened out evaluation studies primarily targeting teachers because they involve interventions that are too different from parenting interventions in terms of their context, contents and purposes.

Only RCTs are considered in this work because they tend to score higher in terms of internal validity than the test-retest or matched case-control designs that dominated earlier literature (Torgerson & Torgerson, 2001). As documented below, these experiments face serious limitations in terms of external validity (e.g., small sample sizes, ad hoc sampling methods), but similar limitations are also found in correlational studies. Similarly, the scant evidence on long-term outcomes and the limited coverage of some potentially relevant outcomes are limitations shared by RCTs and by observational studies. In other words, while there are good reasons to prioritise experimental studies in this work, we also try to systematically document their limitations³, and we emphasise that randomisation is only one component of internal validity and, more generally, of research quality (Joyce 2019; Phillips, 2019).

We did not consider RCTs where the only outcome variables involved were SBR frequency or parents' and/or children's attitudes toward reading. These outcomes are self-reported and, in the absence of objective evidence on children's skills, it is questionable whether any positive impact is real or simply reflects social desirability bias (Bus et al., 1995). Moreover, as discussed above, the dominant justification of SBR interventions is that they foster children's early language skills, thus leading to school success and reducing the related social inequalities. Studies were also screened out if they did not report effect sizes and their standard errors, or the information needed to derive them (most typically, the pre- and post-intervention values on the outcome variables for treated and control children). In six cases of missing information all the authors of the study were contacted to recover the information. As a result, two more studies were included, while four eligible articles were excluded from the meta-analysis because the relevant statistical information could not be retrieved.

We did not impose any geographical restriction criteria. The observation window covers the last three decades. Earlier studies were not considered because we suspect that their results do not apply to the current context, since the frequency of SBR practices, and more generally parental time investments in activities fostering children's early skills, have substantially

³ A common limitation of experimental designs refers to spillover effects. The RCTs under examination use individual randomisation designs based on small samples. Hence, this bias should be of minor entity.

increased and their social selectivity has concurrently decreased (Dotti Sani & Treas 2016; Noel, Stark & Redford, 2013). At any rate, RCTs on SBR meeting the previous eligibility criteria and published before 1988 are virtually absent.

In order to identify eligible studies, an extensive literature search was conducted across Google Scholar, Psychological Abstracts Online (PsychINFO) and Education Resources Information Center (ERIC). We used a comprehensive search operational definition: (random*OR experiment*) AND (read* OR book*) AND (parent* OR mother* OR father* OR caregiver*). Having an initial list of eligible studies, we ensured that this definition would pick them all. Studies were screened out when the abstracts reported unambiguous information proving them ineligible, otherwise we read the full article to reach a final decision. Whenever an eligible study was found, we performed a manual search in its reference lists; we cross-checked the reference lists of previous meta-analyses and systematic reviews. Three recent, unpublished studies were included in the dataset to reduce any possible publication bias.

Each selected study was independently coded by two coders. In order to ensure consistency across coders, a coding manual was created with detailed operational definitions for coding. The rare instances of disagreement across coders were discussed and easily resolved by a third coder. When an eligible study includes multiple, independent experimental arms, these are treated as separate experiments, thus resulting in 19 studies and 30 experiments.

For each study, the following information was coded: a) publication information (authors, title, publication support, publication identifiers); b) contextual data (country and publication year of the study⁴, whether it was carried out in large/medium/small cities, and whether it targeted disadvantaged neighbourhoods⁵); c) targeted population: age of the children in months, language exclusion criteria⁶, whether disadvantaged families were explicitly targeted (*see* footnote 3); d) sampling (sample size, longitudinal attrition for the treated and control groups, sampling method, contact method); e) intervention characteristics: the main setting of the intervention, its duration, frequency and intensity, and whether it involves the gift of books to the families; f) the communication formats of the intervention (face-to-face, brochures, videos, phone calls, etc.); g) whether it was a dialogic reading intervention; h) whether it was implemented on an individual or group basis; i) children's outcomes skill domain, such as receptive vocabulary, and specific measure used, such as PPVT (Dunn & Dunn, 2007), SBR frequency, and other outcomes (such as infant attention or library use); l) the values on these outcomes at the pre- and post-test (point estimates, standard errors, effect sizes, statistical significance); m) the distance between the conclusion of the intervention and the date of the latest post-test, and whether one or more post-tests were carried out. The complete dataset is

⁴ Not all studies reported the year when the study was carried out, but when they do, the publication year is sufficiently close to represent an acceptable approximation.

⁵ The criteria to identify deprived neighborhoods (or families) vary across studies. The most common ones are family income and parental education.

⁶ In several SBR interventions, parents and/or children must have some familiarity with the native language to be eligible.

available upon request and a table reporting main information for each study is reported in the Appendix (Tab. A1).

Most experiments collect information on either one outcome (6 studies) or two (15). Importantly, 24 out of 30 experiments collect information on receptive vocabulary at the post-test, and 20 do the same for expressive vocabulary. The other most common outcomes are additional language measures, namely phonological awareness and knowledge of print, but only for children's vocabulary is there evidence on a sufficiently large number of cases to warrant a meta-analysis. If an experiment contains multiple outcome measures, it is included only once in the dataset, giving priority to measures of receptive vocabulary, next to measures of expressive vocabulary. One study reporting only a measure of phonemic awareness was included after having checked that its inclusion did not affect the findings. Overall, it is evident that there is a sufficient knowledge base to assess the effects of SBR on children's vocabulary, but not on other potentially important language, cognitive or affective dimensions of child development.

Our hypotheses imply that the impacts of SBR interventions can vary across socio-economic groups and that they are higher for interactive SBR interventions. Since virtually no study reports separate estimates across different socio-economic groups, we must rely on a proxy. We will compare the results of RCT's targeting deprived neighbourhoods or deprived families with those of RCT's that do not involve any targeting on socio-economic status. Moreover, the information reported about the intervention methodologies does not allow any detailed, standardised coding of their interactivity. Hence, we decided to rely on a simple dichotomy, contrasting dialogic reading with other types of intervention. To be sure, we do not mean to suggest that other intervention methodologies never encourage interactions around the books between parents and children. However, interactivity is the very core of dialogic reading interventions, while being a less important or missing element in most other SBR interventions. Dialogic reading is a SBR methodology where the adult and the child switch roles so that the child learns to become the storyteller with the support of the adult, who acts as a listener and questioner (Whitehurst & Lonigan, 1998). This approach involves the so-called PEER sequence, where the adult prompts the child to say something about the story, evaluates her response, expands this response (for instance by adding some information), and repeats the prompt to make sure that the child has learned from the expansion.

III. Characteristics of the Selected Studies

Let us describe the main characteristics of the selected studies before presenting the evidence on the impacts of SBR interventions. As reported in table 1, only three studies were published between 1988 and 1998, while nine appeared in the 2000s, and seven in the last decade. Hence, it is clear that the consensus on the efficacy of SBR interventions that emerged in the 1980s and 1990s could not be based on RCTs. The growing recourse to experimental designs is a relatively recent innovation in this field.

Most of these 19 studies involved the US (8 cases) or other Anglo-Saxon countries (5), while the coverage of continental Europe (1), Asia (3) and Africa (2) is marginal. We carried out the

search for eligible studies in three languages (English, French, Spanish), finding only one study written in a language other than English. As such, our conclusions about the limited geographic coverage of the available RCTs should not be biased by the dominant language of publication. The lack of robust causal evidence on SBR interventions outside Anglo-Saxon countries represents a significant research gap, since it is unclear whether these interventions are equally effective across different institutional contexts. For instance, current enrolment rates in early childhood education and care are significantly lower in the US than in most European countries (OECD 2017). This probably enhances both the importance of parenting practices and the potential impact of home-based interventions in the US relative to other OECD countries. More generally, there is evidence that the relationship between SBR practices, children's skills and the related socio-economic gaps varies across countries (Araujo & Costa, 2015).

These studies cover both children below (8 cases) and above (11) the age of three at the start of the intervention. Targeting is a common choice: seven studies out of 19 target poor neighbourhoods and eight target disadvantaged families, defined either in terms of parental education or household income. Moreover, seven studies apply language restrictions: when the intervention provides books only in the native language, as is typically the case, allophone parents are often excluded.

Tab. 1 The context and targeting of the experimental studies on shared-book reading interventions

	Number of experi- ments (n=30)
Context of the intervention	
<i>Year of publication</i>	
1988-1998	5
1999-2008	14
2009-2019	11
<i>Country</i>	
US	11
Anglo-Saxon countries	7
Europe	1
Asia	6
Africa	5
Targeting of intervention	
<i>Age of children</i>	
36 months or less	9
More than 36 months	21
<i>Targeting deprived neighbourhood</i>	
No	22
Yes	8
<i>Targeting low-status families</i>	
No	21
Yes	9
<i>Applying language restrictions</i>	
No + NA	17
Yes	13

Table 2 presents a description of the 30 interventions assessed in the above-described 19 studies. Most typically, these interventions were carried out in health care institutions (7), such as hospitals or paediatric clinics, but also schools (6) and public libraries (4) were common settings. In 27 cases, these interventions provided parents with one or more books, and in almost two thirds of them parents received also some written materials providing information on SBR. In 19 interventions out of 30, a dialogic reading protocol was used.

The overall duration of these interventions varied significantly, ranging from programmes that last one month or less (5) to those spanning across more than ten months (6). However, the overall amount of time for treatment delivery was generally quite limited: for 11 out of the 15 interventions for which this information is available, the total reported duration was less than two hours. Moreover, programmes that were entirely (10) or partially (3) delivered on a group basis were common. Overall, it is apparent that light-touch interventions are prevalent, possibly owing to concerns for feasibility and cost-effectiveness.

Finally, we have coded whether the treatments were delivered face-to-face, via phone calls or videos. Since a combination of these formats is possible, these options are not mutually exclusive. As can be seen, an extensive recourse to face-to-face contacts, possibly complemented by video stimuli, is the most common solution.

Tab. 2 The characteristics of the treatment of experimental studies on shared book-reading interventions (n=30)

Variable	Description	Categories	Number of experiments
Setting	Setting of the intervention	Health care institution	7
		School	6
		Library	4
		Other institutions	4
		No institution	6
		NA	3
Delivery of books	Families received books	No	3
		Yes	27
Delivery of brochure	Families received written information	No	11
		Yes	19
Dialogic reading	The intervention used a dialogic reading protocol	No	11
		Yes	19
Duration	Total duration of the intervention in months	One month or less	5
		Two months	9
		Three to five months	2
		Six to ten months	3
		More than ten months	6
		NA	5
Length	Total length of the intervention in minutes	Up to 20 minutes	3
		21-60 minutes	5
		61-120 minutes	3
		More than two hours	4
		NA	15
Intensity	Intensity of the intervention	One-shot intervention	10
		Multiple intervention	20
Frequency	Number of interventions (if intensity=one shot, frequency=1)	1	10
		2	8
		3	3
		4-5	3
		6-10	4
		More than 10	2
Individual or group-based	Treatment delivered individually or in a group setting	Group	10
		Individual	14
		Mixed	3
		NA	3
Face-to-face	Intervention delivered on a face-to-face basis	No	8
		Yes	22
Phone calls	Phone calls were used as part of the intervention	No	25
		Yes	5
Use of video training	Videos were used as part of the intervention	No	15
		Yes	15

Table 3 presents information on the evaluation design of these experiments. In none of them respondents were selected via random sampling; researchers most often directly approached parents of pre-schoolers, for instance by contacting some patients in health care institutions, while in three experiments they advertised the study, for instance via newspapers, and recruitment was based on voluntary registration. Hence, it is unclear whether the results of these RCTs can be generalised to the broader population.

These 30 experiments are based on small samples. The median size of the analytical samples is 106 cases and in 15 experiments sample size is below 100 children. The median attrition rate is generally low (3.6%); in only seven experiments it is above 10%, and its highest value is 16%. Overall, the external validity of the selected RCTs is low in terms of country coverage, sampling methods, and sample size.

Tab. 3 The evaluation design of experimental studies on shared book-reading interventions

	Number of experi- ments (n=30)
Sample selection, size and attrition	
<i>Sampling method</i>	
Approached	24
Voluntary	6
<i>Sample Size</i>	
Less than 50	6
51-100	9
101-200	14
More than 200	1
Mean sample size	119
Median sample size	106
Range of sample size	18-552
<i>Attrition rate</i>	
Less than 2%	11
2% - 5%	3
6% - 10%	4
More than 10%	7
NA	5
Mean attrition rate	6%
Median attrition rate	3.6%
Range of the attrition rate	0% - 16%
Data collection design	
<i>Timing of post-test*</i>	
Within one month after the intervention	17
One to six months after the intervention	10
More than six months after the intervention	1
NA	2
<i>Follow-up</i>	
No	22
Yes	8
<i>Waiting list</i>	
No	23
Yes	7

Only a minority of these experiments (8) entailed a follow-up after the first post-test assessment. In 17 experiments out of 30, the latest outcome assessment was carried out within one month after the conclusion of the intervention, and in 10 of them within the next six months; only in one case was there a post-test after this date. Hence, it is important to keep in mind that the results that we will report in the next section refer only to short-term impacts. In some cases, researchers cannot assess long-term impacts because the control group is

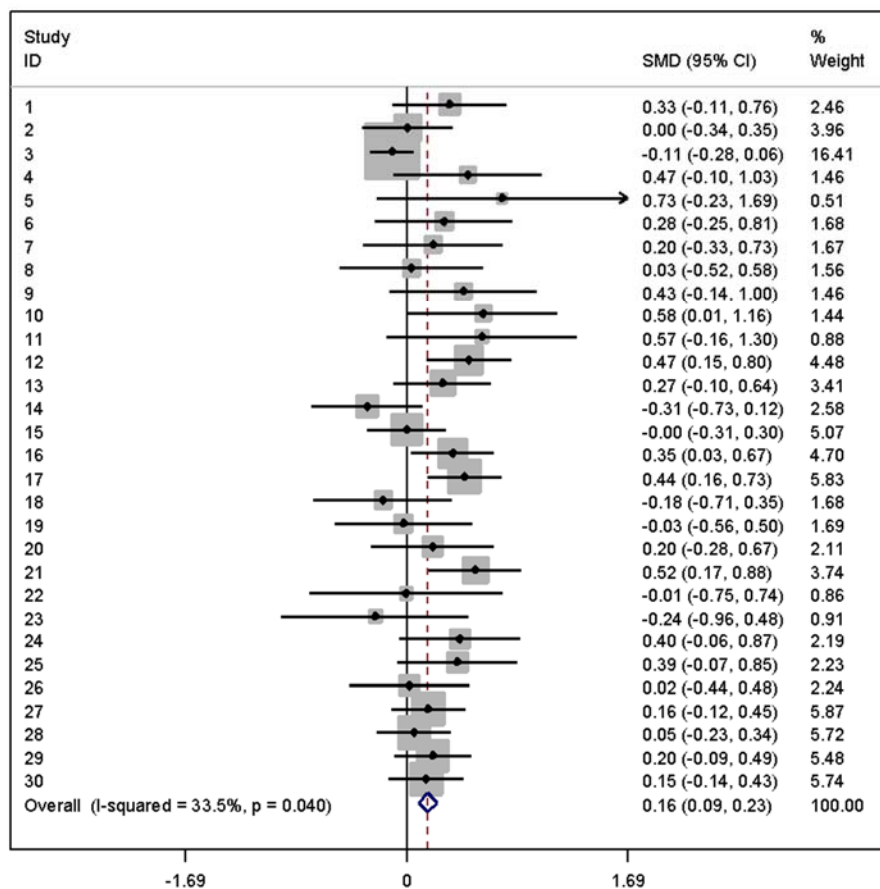
assigned to a waiting-list to access the treatment short after the experimental group. However, the control group was assigned to a waiting list in only seven SBR experiments.

IV. The Casual Impact of Shared Book Reading Interventions

The standardised difference between the mean value of the intervention group and of the control group at the post-test was computed using Cohen's *d* effect sizes. When they were not directly reported by the authors, they were retrieved using information on the means and standard errors for the two groups. When computing estimates of the mean effect sizes of SBR interventions, each study contributed proportionally to its sample size.

The forest plot presented in figure 1 provides an overview of the estimated causal impacts of SBR interventions. Their (weighted) mean effect size is 0.16: if we take Cohen's (1977) benchmarks, the magnitude of this effect size is small. However, this value is perfectly aligned to the more context-specific benchmark of the average effect size of RCTs in education research reported in a recent meta-analysis (0.16, Lortie-Forgues & Inglis, 2019). Overall, in line with hypothesis 1a, there is evidence that altogether SBR interventions display moderately positive impacts on children's vocabulary development.

Fig. 1 Mean effect size of book reading interventions



The 95% confidence interval around this mean effect size ranges between 0.09 and 0.23. The confidence intervals around the point estimates of the effect sizes of single RCTs are often very large, which is unsurprising, since most of them rely on small samples (*see* table 2). For only five experiments out of 30 the point estimate is positive and the confidence interval does not contain zero. Small-N studies do not display systematically larger or smaller effect sizes, but they drive a high estimate uncertainty.

As a robustness check we tried alternative specifications of the outcome of interest and results from these analyses are reported in the Appendix: first, we only considered measures of receptive vocabulary (tab. A1); second, we only analysed measures of expressive vocabulary (tab. A2); finally, we took into account all the 30 experiments, but giving priority to measures of expressive vocabulary, then (if not available) to receptive vocabulary, and then (if not available) to other outcomes (tab. A3). These results substantially confirm those reported in Figure 1, even though the mean effect size is found to be slightly larger when the outcome is homogeneous across experiments (0.21 for receptive vocabulary, 0.19 for expressive vocabulary).

The fail-safe statistic was computed in order to estimate how many missing studies with a zero effect we would need to retrieve in the analysis before the p-value for the mean effect size loses statistical significance. The value is 255, which is bigger than the tolerance level of $5k+10$ (where k =number of studies) proposed by Rosenthal (1979). The heterogeneity chi-squared statistic (Q) is equal to 43.58 with a p-value of 0.04. The I^2 statistic suggests that 33.5% of the outcome variability is due to heterogeneity.

We observe significant heterogeneity between studies in the estimated impacts of SBR interventions. In line with hypothesis 2, this heterogeneity partly reflects the stronger impacts of dialogic reading interventions, which focus on fostering parent-child interactions around books. As reported in table 4, their mean effect size is 0.26, with a confidence interval ranging between 0.16 and 0.36, while for other SBR interventions the mean effect size is 0.06, with a confidence interval comprised between -0.04 and 0.16. Since the confidence intervals for the two sets of interventions do not overlap, the difference between them is statistically significant. On one hand, this confirms the efficacy of the dialogic reading approach. On the other hand, our results suggest that other SBR interventions tend to be ineffective.

Table 4 reports evidence on further determinants of the variability of the effect sizes of SBR interventions: the meta-analysis is stratified according to the variables of interest (one at a time) in order to assess the contribution of moderator variables on study mean effect size, and for each model the table reports the point estimate and the 95% confidence interval. First, we observe that interventions targeting disadvantaged families (either directly or by targeting disadvantaged neighbourhoods) display small, non-significant effect sizes (0.097), while studies not targeting poor families report much larger effect sizes (0.21), in line with hypothesis 3a. However, this result must be taken with caution, since the confidence intervals for the two estimates overlap. A previous meta-analysis suggested that dialogic reading interventions tend to be less effective among these groups (Mol et al., 2008). Our results confirm this pattern, but we would stress that it is not specifically driven by the experiments

testing this methodology⁷. The evidence suggesting lower effectiveness of SBR interventions among disadvantaged families is a major reason for concern: the risk is that the overall improvements in children's vocabulary come at the price of fostering socio-economic gradients.

Tab. 4 Mean effect size by characteristics of experimental design

	Point estimate	95% confidence interval
Mean effect size	0.161	[0.092 ; 0.230]
Year of publication		
1988-1998	0.154	[-0.041 ; 0.349]
1999-2008	0.221	[0.098 ; 0.345]
2000-2019	0.130	[0.039 ; 0.221]
Dialogic Reading		
Yes	0.262	[0.165 ; 0.359]
No	0.060	[-0.037 ; 0.157]
Sample size		
Small N (<100)	0.163	[0.019 ; 0.306]
Large N (>=100)	0.161	[0.082 ; 0.239]
Targeting low-status families and/or deprived neighbourhoods		
Yes	0.097	[-0.009 ; 0.203]
No	0.208	[0.118 ; 0.298]
Age of children		
<3 years old	0.065	[-0.047 ; 0.177]
3 years or older	0.219	[0.132 ; 0.305]
Intensity of intervention		
One-shot intervention	0.179	[0.042 ; 0.315]
Multiple intervention	0.155	[0.076 ; 0.234]
Duration of intervention		
One or two months	0.198	[0.063 ; 0.333]
Three months or more	0.150	[0.052 ; 0.248]
NA	0.145	[0.007 ; 0.283]
Face-to-face intervention		
Yes	0.165	[0.088 ; 0.241]
No	0.145	[-0.012 ; 0.302]
Type of treatment		
Individual	0.094	[-0.005 ; 0.193]
Group	0.130	[0.015 ; 0.246]
Mixed	0.386	[0.196 ; 0.577]
NA	0.522	[0.169 ; 0.875]
Post-test immediately after the intervention		
Yes	0.227	[0.137 ; 0.317]
No	0.078	[-0.030 ; 0.186]
NA	-0.129	[-0.646 ; 0.388]

Second, table 4 indicates that interventions carried out among younger children (less than 3 years) tend to be less effective (0.06) than interventions targeting children aged 3 to 6 (0.22). While the common wisdom is that SBR should start as early as possible, it is possible that parents are less at ease with reading books to babies or are less capable of fostering

⁷ Indeed, the mean effect size for other intervention methodologies targeting low socio-economic groups is even smaller (0.045, not reported).

interactions around books with them. At any rate, more studies are needed to reach solid conclusions about the moderating impact of children's age.

Third, we suggested that more intensive treatments, i.e. more prolonged interventions delivered on multiple occasions using an individual, face-to-face format, may be needed to effectively foster children's vocabulary. However, these four characteristics seem unrelated to effect size. To the extent that intensive treatments tend to be costlier, these results bring some good news, suggesting that cheap, light-touch interventions can be just as effective.

Fourth, we do not observe any trend over time in the efficacy of SBR interventions. This is another encouraging result: even though SBR is an increasingly common parenting practice, more recent interventions do not seem to have lost efficacy. In other words, while children of the control group enjoy increasing opportunities to access SBR in recent cohorts, recent interventions to foster this practice still have significant margins.

Finally, if we contrast studies where the most recent post-test was carried out within one month after the intervention with studies where it was carried out later on, we observe that the latter display below-average effect sizes (0.078), suggesting fade-out effects. This is another reason for concern, particularly considering that only one study was carried out later than six months after the conclusion of the intervention. Hence, there are indications that, even in the short-run, the impacts of SBR interventions tend to significantly decline.

The results on which we have commented are based on bivariate relations, since it is problematic to carry out a multivariate analysis with only 30 cases. However, we have inspected the bivariate associations between the above-mentioned factors. On the one hand, it is reassuring that dialogic reading interventions display weak statistical associations with the other characteristics: it therefore seems unlikely that our conclusions about their efficacy are biased by other determinants of treatment efficacy. On the other hand, we detect marked bivariate associations between three characteristics: targeting disadvantaged groups, targeting younger children (below three), and having an immediate post-test (within one month of the end of the intervention). This means that experiments carried out on disadvantaged groups more often target younger children and more often have immediate post-tests. This is an important limitation of the current experimental evidence that must be kept in mind. This limitation provides important indications for future research, as discussed in the final section.

Conclusions

In this work we have presented the results of a meta-analysis of the experimental evidence on the impacts of SBR interventions on language skills in early childhood. While the literature is largely dominated by the optimistic view that these programmes are effective (Duursma et al., 2008), our results invite a more cautious, circumscribed conclusion. In particular, the mean effect size of SBR interventions not involving dialogic reading methods (0.06) is very close to a null effect. Indeed, the null hypothesis of no impact could be rejected in only two of these

experiments. Hence, the risk that (non-dialogic) SBR interventions are ineffective is quite concrete⁸.

At the same time, our results support previous evidence that dialogic reading is an effective approach to fostering language development. While in a previous meta-analysis (Lonigan et al., 2008) differences between dialogic and non-dialogic interventions did not reach statistical significance, these differences are significant in our study, which incorporates more recent evidence. Our results thus corroborate and extend the conclusions about the efficacy of dialogic reading of a ‘What Works Clearinghouse’ report (2007), which examined only five experimental studies and reported positive effects for oral language.

However, we also find that dialogic reading is less effective among low socio-economic groups. To be sure, our estimates do not imply that these groups experience negative impacts, nor that non-dialogic interventions perform better in this respect. However, our results suggest that, when SBR interventions are effective, these overall positive impacts come at the price of raising socio-economic gaps in early language skills. While differences across socio-economic groups did not reach significance, it is worth noting that our conclusions confirm the findings reported by Lonigan et al. (2008) and by Marulis and Neuman (2010) for SBR interventions, and by Mol et al. (2008) for dialogic reading interventions. Hence, a major challenge for future research is to develop SBR interventions that foster the skills of disadvantaged children at a faster pace.

An important limitation of existing experimental evidence is that interventions targeting disadvantaged families tend to target younger children. Since this second characteristic is associated with lower effect sizes, it could be a relevant confounder. Hence, a priority for future research is to carry out RCTs assessing the impact of SBR interventions in the ‘empty cells’: younger children without any targeting on socio-economic status and older children with targeting on socio-economic status.

A second important limitation of existing experimental evidence is that only short-term outcomes are measured. In 27 experiments out of 30 the latest assessment was carried out within six months after the conclusion of the SBR programme. Moreover, even within such a narrow time window, we found indications that treatment impacts tend to fade out. Hence, the risk is that the vocabulary gains of treated children are temporary, either because they rapidly forget the new words that they have learnt, or because these gains involve words that children of the control group learn a few months later, regardless of their participation in SBR programmes. Therefore, a major challenge for future research is to prove that the impacts of

⁸ This meta-analysis could not systematically assess the impact of other SBR methodologies that are widely adopted internationally, such as ‘Bookstart’ and ‘Reach out and Read’. The former is a home visiting programme and the only RCT that evaluated its impact assessed only SBR frequency, reporting a null effect (O’Hare & Connolly, 2010). The latter is a pediatric visiting programme for which we could identify only one eligible study, which reported consistently positive impacts on reading practices, but less systematic patterns for the impacts on children’s skills (Alario, Golova, Vivier, Rodriguez & High, 1999).

effective interventions do not vanish after a few months - another risk that is seldom mentioned in the literature celebrating the supposed benefits of these programmes.

A third relevant limitation that we could document concerns the limited range of outcomes measured in existing RCTs. The dominant focus is on receptive or expressive vocabulary. There is currently too little evidence on other potentially relevant outcomes, such as children's enjoyment of SBR or their attention spans. Hence, it is possible that the benefits of SBR programmes lie elsewhere.

Finally, we would like to reiterate our concerns about the limited external validity of existing studies. The evidence outside the US or other Anglo-Saxon countries is just too scant. Since we argued that we cannot take for granted that contexts do not matter, we should recognize that the transportability of effective SBR methodologies outside Anglo-Saxon countries is another important avenue for future research. Moreover, the recourse to ad hoc sampling methods further weakens the generalisability of results even within Anglo-Saxon countries. Finally, the small sample sizes are an additional, important cause for concern, since the lack of statistical power may result in erroneously failing to reject the null hypothesis that SBR interventions have no impact on children's skills.

Overall, the current experimental evidence suggests that several SBR interventions failed to effectively improve children's language skills, and that more effective approaches may have only short-term impacts or may even foster socio-economic inequalities in language skills. To be sure, while our results challenge the common wisdom that 'SBR programmes work', we do not wish to encourage the equally simplistic view that they can never work (or that they necessarily foster social inequalities). We would rather point out that the common wisdom is not supported by experimental research carried out in the past two decades which provides a more qualified and nuanced picture of the impacts of SBR interventions. At the same time, by documenting several major limitations of previous research, we have tried to identify the most promising avenues for future research. There is a long way to go to identify which SBR intervention methodologies display effective, persisting and equalising impacts on emergent literacy, even more so outside Anglo-Saxon countries.

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Appendix

Tab. A1 List of studies included in the meta-analysis

Authors	Title	Year	Journal	Country	N° experiments
Cooper, P., Murray, L., Tomlison, M. Zahir, V.	The impact of dialogic book-sharing training on infant language and attention: A RCT in a deprived South African community	2015	Journal of child Psychology and Psychiatry and Allied Disciplines	South Africa	1
Alario, G., Golova, N., Vivier, P., Rodriguez, M., High, P.C.	Literacy Promotion for Hispanic Families in a Primary Care Setting: A Randomize, Controlled Trial	1999	Pediatrics	USA	1
Goldfeld, S., Napiza, N., Quach, J., Reilly, S., Ukoumunne, O., Wake, M.	Outcomes of a Universal Shared Reading Intervention by 2 Years of Age: The Let's Read Trial	2011	Pediatrics	Australia	1
Fielding-Barnsley, R., Purdie, N.	Early intervention in the home for children at risk of reading failure	2003	Support for learning: British Journal of Learning Support	Australia	1
Blom-Hoffman, J., O'Neil-Pirozzi, T., Volpe, R., Cutting, J., Bissinger, E.	Instructing Parents to Use Dialogic Reading Strategies with Preschool Children: Impact of a Video-Based Training Program on Caregiver Reading Behaviors and Children's Related Verbalizations	2006	Journal of Applied School Psychology	USA	1
Huebner, C., Meltzoff, A.	Intervention to change parent-child reading style: A comparison of instructional methods	2005	Journal of Applied Developmental Psychology	USA	3
Berthelsen, D., Fielding-Barnsley, R., Nicholson, J., Sim, S., Walker, S.	A shared reading intervention with parents to enhance young children's early literacy skills	2014	Early Child Development and Care	Australia	2
Caufield, M., Whitehurts, G., Falco, F., Fischel, J., DeBaryshe, B., Lonigan, C., Vendez-Menchaca, M.	Accelerating Language Development Through Picture Book Reading	1988	Developmental Psychology	USA	1
Alhlgren, I., Becker, S., Gardner, A., High, P., LaGasse, L.	Literacy Promotion in Primary Care Pediatrics: Can we make a difference?	2000	Pediatrics	USA	1
Huebner, C.	Promoting Toddlers' Language Development Through Community-Based Intervention	2000	Journal of Applied Developmental Psychology	USA	1

Billington, J., Lingwood, J., Rowland, C.	Evaluating the effectiveness of The Reader's 'Shared Reading' programme: A Randomised Controlled Trial.	2012	No	England	1
Kerr, B., Mason, J., Norris, S., Philips, L.	Effect of early literacy intervention in kindergarten achievement	1990	No	Canada	2
Chow-Yeung, K., Lam, SF., Lau, KK., Tse, SI., Wong, BPH.	Involving parents in paired reading with preschoolers: Results from a randomized controlled trial	2013	Contemporary Educational Psychology	China	1
Chow B., McBride-Chang, C.	Promoting Language and Literacy Development through Parent-Child Reading in Hong Kong Preschoolers	2003	Early Education and Development	China	2
Boudreault, P., Cadiex, A.	Effets d'une intervention parentale en lecture sur la connaissance du nom et des sons des lettres et la sensibilité phonologique d'élèves à risque	2003	Revue des sciences de l'éducation	Canada	1
Anil Chacko, Gregory A. Fabiano, Greta L. Doctoroff & Beverly Fortson	Engaging Fathers in Effective Parenting for Preschool Children Using Shared Book Reading: A Randomized Controlled Trial,	2018	Journal of clinical child and adolescent psychology	USA	1
Lonigan, C. J., Whitehurst, G.J.	Relative Efficacy of Parent and Teacher Involvement in a Shared-Reading Intervention for Preschool Children from Low-income Backgrounds	1998	Early Childhood Research Quarterly	USA	2
Chow, B. W. Y., McBride-Chang, C., Cheung, H., & Chow, C. S. L.	Dialogic reading and morphology training in Chinese children: Effects on language and literacy	2008	Developmental Psychology	Hong Kong	3
Knauer, H. A., Jakiela, P., Ozier, O., Aboud, F. E., & Fernald, L. C	Enhancing Young Children's Language Acquisition through Parent-Child Book-Sharing: A Randomized Trial in Rural Kenya.	2019	No	Kenya	4

Fig. A1 Mean effect size of book reading interventions on receptive vocabulary

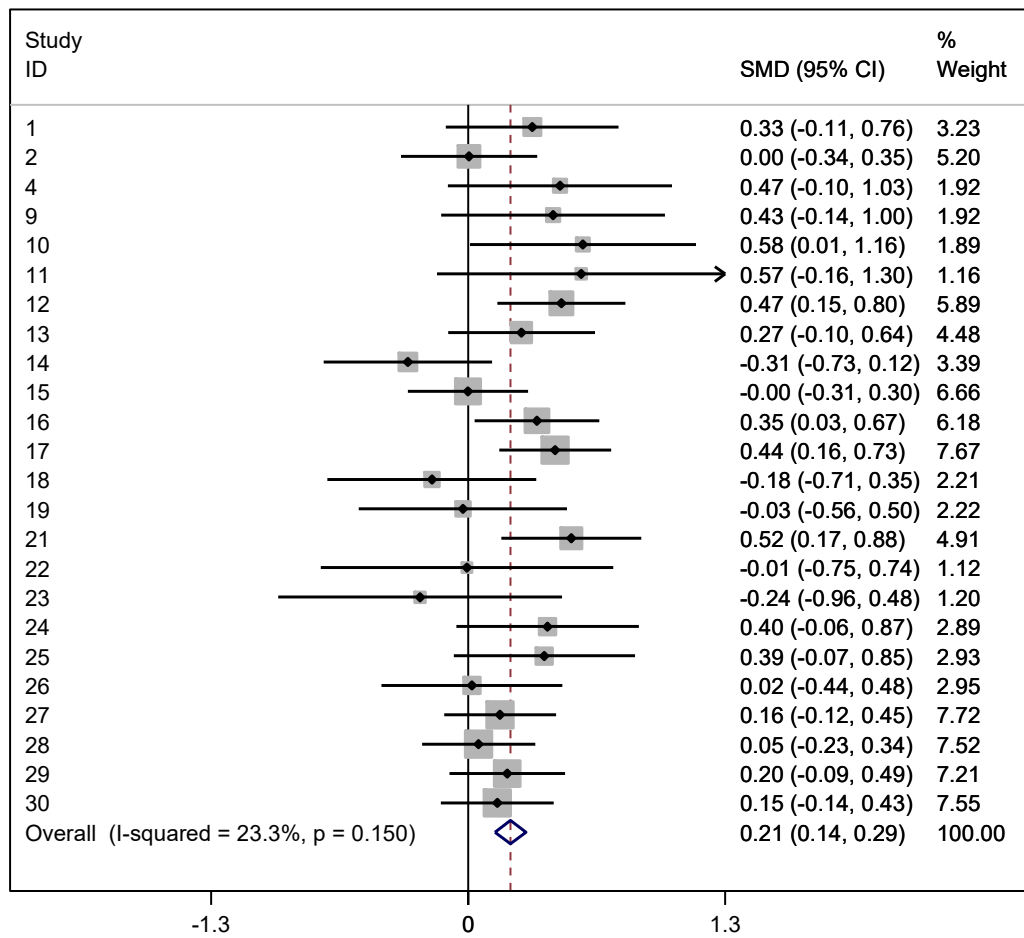


Fig. A2 Mean effect size of book reading interventions on expressive vocabulary

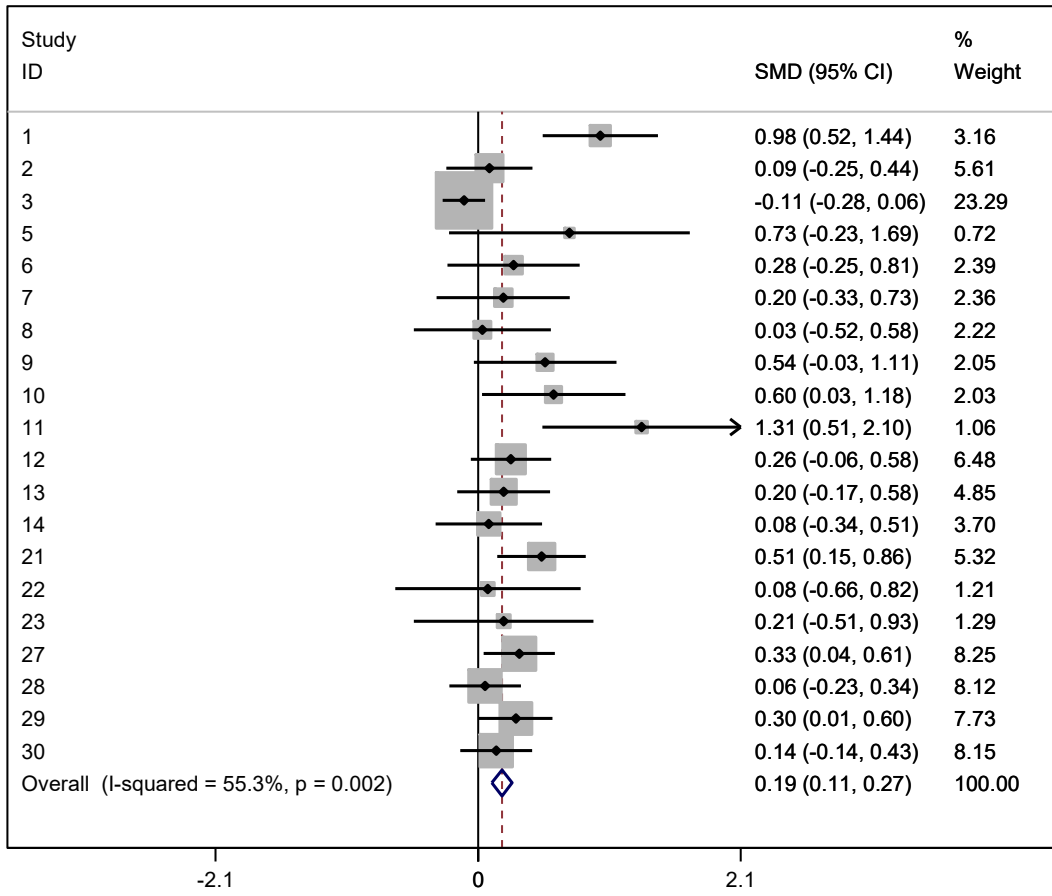
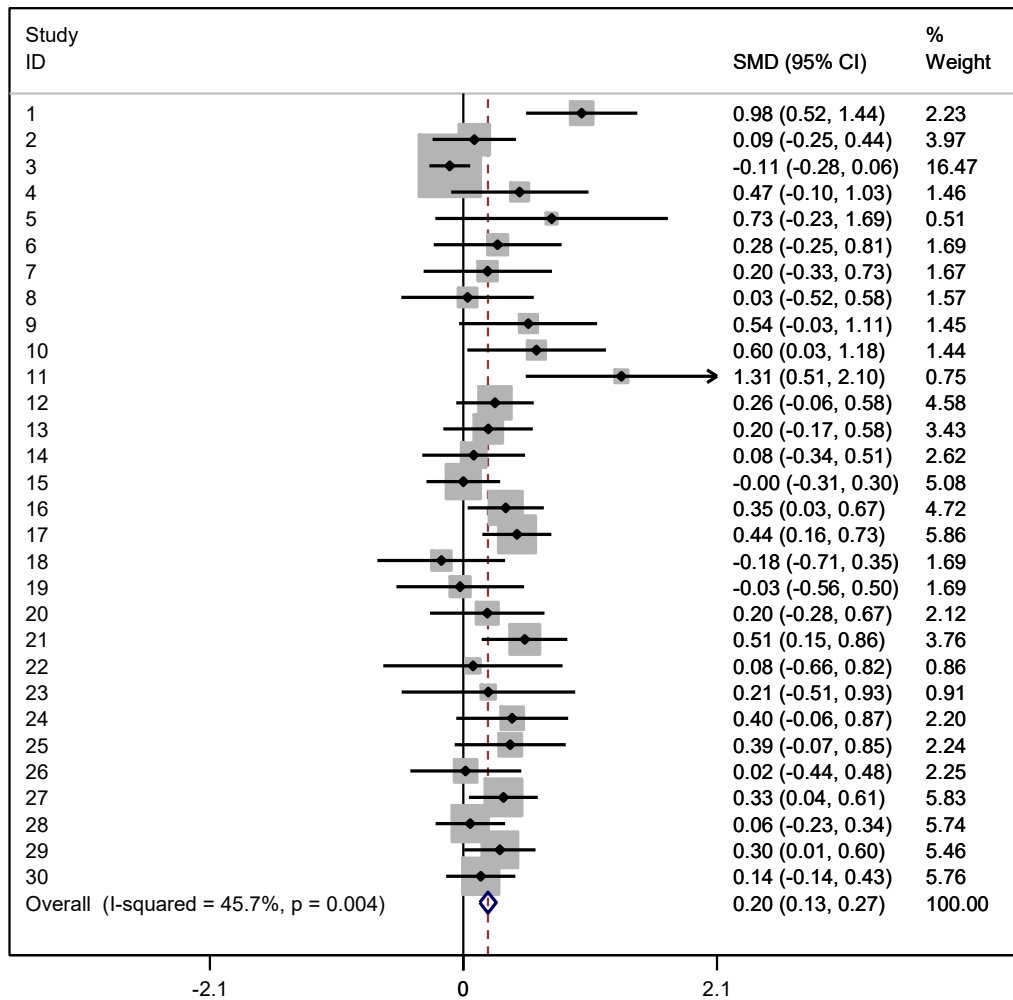


Fig. A3 Mean effect size of book reading interventions on a) expressive vocabulary, b) (if not available) receptive vocabulary; c) (if not available) other measures





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