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Extension of the impact of Early years
Provision in Children's Centres (EPICC)
trial on child cognitive and socio-
emotional development

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Executive summary

Background. A number of programmes have been developed to support parents' use of 'Dialogic Reading', or 'Dialogic Book-sharing' (DBS) with their children. The DBS method is based on extensive observational research on the kinds of parent-child interactions that best promote child development, and particularly language. It refers to a particular way of using a book with a child that sensitively follows and supports the child's interests, and engages them actively in a reciprocal interaction.

In 2017-2018, we conducted a cluster randomized controlled trial (the Early-years Provision In Children's Centres (EPICC) trial) to determine whether, compared to normal Children's Centre input, a DBS intervention delivered as an adjunct to normal Children's Centre input, conducted with parents of children aged 2-4 years in Children's Centres in Reading, UK, was associated with better child developmental outcome and parenting six months post intervention. At the six-month post intervention assessment, there were substantial improvements in parenting in the book-sharing context in the intervention group. Benefits to child development were more limited: consistent with other studies (Dowdall et al., 2020; Burgoyne et al. 2018), and in the range considered promising for educational outcomes, these comprised small to medium effects on measures of language and attention, and these were enhanced where parents engaged well with the intervention. By contrast, there were no benefits to other areas of child outcome (executive function, social development and behaviour). Notably, the difference in performance between intervention and control group children had widened over the period between an immediate post-intervention assessment and that conducted at six months follow up on all dimensions of child development, consistent with the intervention having placed children on a more positive developmental trajectory.

Aims. In an extension to the original trial, reported here, we assessed the children and the home learning environment after children had attended school for two terms, and we examined the possibility that the intervention had placed children on a more positive developmental trajectory, leading to a longer-term benefit of the intervention.

Methods. In the original EPICC trial, 110 participants were randomised to the DBS Intervention and 108 to the Control group. The intervention was delivered by research facilitators in Children’s Centres once a week for seven weeks. It was delivered to small groups of parents for 50 minutes; and after each group session individual parents received support for five-ten minutes. Researchers assessed children and parents at baseline, and then immediately and at six months post-intervention. In the current extension to the study researchers made assessments of child development (early literacy, reading motivation, language, school adjustment, socio-emotional development and Early Years attainment) and the home literacy environment, after the child had attended school for two terms. Assessments were conducted in two waves. The first took place in 2019 and the second in 2020. The second wave of assessments occurred after the onset of the covid 19 pandemic, and adjustments to data collection were made accordingly, with children being assessed on-line rather than in school and teachers providing retrospective assessments of child adjustment and behaviour.

Analyses. The children’s performance on the study measures and the Home Literacy Environment data were analysed according to group (intervention or control), and took account of previous child performance and demographic and family variables. Analysis was also made, within the intervention population, of the subgroup who were judged to have engaged well. Finally, and with regard to the impact of the covid 19 pandemic, analyses were conducted according to the wave of data collection.

Results. Of the 218 participants recruited into the original EPICC trial, 127 (58.3%) consented to be assessed in the extension study: 60 participants in the intervention group and 67 in the control group. A larger proportion of eligible participants took part in Wave 1 (i.e., 75/92 (81.5%)) than in Wave 2 (i.e. 52/108 (48.1%)).

Key findings:

- No differences between intervention and control groups overall, with both performing within expected range.
- No effect found for more engaged parents (effect not detectable due to sample size or not sustained).

- Baseline vocabulary is associated with later child cognitive outcomes.
- Earlier book sharing/home literacy environment is related to later book sharing/home literacy environment and child reading motivation, although this did not translate to child outcomes.
- Assessments normally administered directly to children were successfully adapted for online administration, but lack of availability of online resources meant fewer families could participate in them.
- Evidence that the pandemic negatively affected early reading, increased screen time, and reduced school adjustment.

Interpretation and Conclusion. Relatively low numbers participated in the extension (particularly for the second wave), there were differences in administration of assessments imposed by the covid 19 pandemic, and those retained in the study were, on average, more socio-economically advantaged compared to those who were not retained. So, caution is required when interpreting the results of this extension study. Nevertheless, it is notable that the performance of the two groups of children was very similar, and was in the average range across measures. The fact that there had been an initial large group difference in child language development at baseline favouring the control group, combined with the findings of similar, and average, performance of both groups at the time of the extension, suggests that, while there was no evidence of a statistically significant benefit of the intervention, it may nevertheless have had a 'levelling up' effect, with the initially poorer performance of children in the intervention group being brought into line with that of the control group. Finally, it is notable that child expressive language at baseline, at age two-three years, continued to exert a significant effect on a range of measures of child functioning after two terms in school, a finding that underlines the potential benefit of targeting child development for intervention before this age. There were problems recruiting and retaining more disadvantaged parents, and future interventions need to find ways to overcome these challenges if they are to be successful.

Extension of the impact of Early years Provision in Children’s Centres (EPICC) trial on child cognitive and socio-emotional development

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Background and Overall Objectives

Core skills affecting pre-school children's school readiness (e.g., language, attention, managing behaviour and emotions, and social relationships (Hughes, Daly, Foley, White & Devine, 2015)) show marked disparities linked to socio-economic disadvantage and the home learning environment (Ryan, Fauth & Brooks-Gunn, 2006; Melhuish et al., 2008; Sammons et al., 2015; Sylva, 2014; DfE, 2014). These early childhood differences commonly persist and influence later academic achievements, employment, and adjustment, thereby perpetuating inter-generational cycles of disadvantage (Centre for Social Justice, 2014; Allen, 2011). An important aspect of the home learning environment associated with child development is parental education (Hoff, 2013). Indeed, even within low-income families, the speed of infant language acquisition is positively associated with the level of maternal education (Justice, Jiang, Bates & Koury, 2020). One key way in which parental education exerts its impact is via the amount that parents read to their child. The benefits of being read to are apparent from infancy (Leech, McNally, Daly, Corriveau, 2022), and are especially evident in the preschool years (Fletcher & Reese, 2005; Rodriguez, Tamis-LeMonda, Spellmann et al., 2009). Aside from how *much* parents read to their child, the *quality* of parent-child interaction while reading is important. One style of reading is 'dialogic book-sharing', or DBS (Whitehurst & Lonigan, 1998). This refers to a particular way of using a book with a child that sensitively follows and supports the child's interests, and engages them actively in a reciprocal interaction. The method has been shown to be particularly helpful to child language development. Thus, in an early review of 16 DBS intervention studies, Mol and colleagues (Mol, Bus, de Jong, & Smeets, 2008) reported that this method produced larger gains in children's expressive language than 'normal reading' ($d = .59$) (although this effect was clearer for families with 2- to 3-year-olds versus 4- to 5-year-olds or children at risk for language and literacy impairments (see also McGinty, Justice, Zucker, Gosse & Skibbe, 2012)). Importantly, disadvantaged parents read less to their children than do others and, when they do read to their children, they are less likely to use 'dialogic' techniques (Bus & van IJzendoorn, 1995; Fletcher & Reese, 2005; Heath, 1982; Raikes et al., 2006). Interventions to foster the use of DBS in disadvantaged families with young children could therefore help narrow educational gaps related to family background.

Indeed, a recent meta-analysis of 19 RCTs that focused on training largely disadvantaged parents in DBS has shown significant benefits for child language (Dowdall et al., 2020). The current report concerns a cluster randomized controlled trial of a DBS intervention for parents of 2-4-year-old children attending Children's Centres in Reading (see Murray et al., 2022, and 2023). Intervention group parents (n = 110) had attended 7 weekly small group training sessions in addition to normal Children's Centre attendance, and control group parents (n = 108) had received only usual Children's Centre input. In both groups, parenting and a range of child development outcomes were assessed on three occasions: before the intervention, immediately afterwards, and at 6 month follow up. There were substantial effects of the intervention on parental behaviour during book-sharing: thus, compared to controls, intervention group parents were more sensitive, provided more cognitive scaffolding for the child and they used more mental state talk. Parent-child dyads showed more reciprocal behaviour, but while benefits to child development for the intervention group overall did not reach statistical significance, there were small benefits for language and attention within the range considered educationally worthwhile, and these were larger and statistically significant for children whose parents were more engaged with the intervention. In spite of the overall statistically non-significant results for child outcome, the difference between child groups increased between the immediate post-intervention assessment and 6-month follow-up across domains of child development in favour of the intervention group, indicating that the intervention may have placed children on a more positive developmental trajectory. This pattern was particularly notable because, despite randomization to intervention and control groups, the two groups actually differed at baseline on some measures of child development, as well as on both the reported frequency of book-sharing at home and the quality of directly observed parental book-sharing. Given that attainment gaps between more and less able children tend to widen over time (Cain & Oakhill, 2011; Stanovich, 1986), the findings of no difference between groups at the original study 6-month follow-up are also consistent with the possibility that the intervention had had a buffering effect, preventing the relative decline in performance in the initially lower-performing intervention group that would otherwise have been expected. To examine the possibility that the intervention had placed children on a more positive developmental trajectory and that a clear benefit from the intervention might take time to emerge, we extended the original study to follow the children up at the point where they had completed

their first two terms of school. We assessed child performance on key aspects of development affecting school academic progress and adjustment, using direct assessments and teacher reports, and we also assessed the home learning environment by means of parent report. We tested the hypothesis that the difference between intervention and control groups would be significant at this later time point.

Specific Hypotheses

The hypotheses for the extension are, that compared to control group children, intervention children will evidence:

- 1) significantly better emergent literacy skills.
- 2) significantly better early reading motivation.
- 3) significantly better language.
- 4) significantly better social and emotional development.
- 5) significantly better adjustment to school.
- 6) significantly better early years' attainment.

Methodology

Trial Design

This study was a follow up of the EPICC cluster randomised controlled trial. Twelve of the 13 Children's Centres in Reading, Berkshire, UK were included in the original trial, with one excluded since it was an outlier in terms of the socio-demographic profile of both ward and attenders. Centres were randomly assigned to either A) the intervention (6 centres), receiving training in book-sharing in addition to normal Children's Centre input or B) the control condition (6 centres), receiving only normal input from the Children's Centre. Parents of children of the relevant age (27-45 months) who attended Children's Centres with their child were approached by the trial manager, and given information about the study and invited to join. Exclusion criteria were not regularly speaking English at home and child disability (e.g., Down's syndrome). All parents were told that, as part of a study examining the effects of input provided in Children's Centres, assessments of child development would take place on three occasions over a period of 10 months, and that they would receive gratuities for their participation. The intervention group parents were also told that they would be invited to attend the DBS training programme, once a week over a seven-week period (see Murray et al., 2022, and 2023 for full details). 108 participants were recruited into the Control group, and 110 into the Intervention group. Following completion of the EPICC trial, parents were asked if they would participate again once their child had started school. In this extension, participants were followed up in the final term of their Reception school year or summer holidays/the autumn term of year 1 if necessary.

Randomisation

In the original EPICC trial, randomisation of the Children's Centres to index and control clusters was undertaken by an independent statistician, with minimisation on the index of multiple deprivation (IMD) and ethnic profile of the wards in which each of the Centres is based. These cluster-level variables were used as pseudo variables for Social-Economic-Status (assessed as parent education) and multilingualism at the individual level, as these individual measures could not be measured and used in the minimisation process at the time of randomisation.

Blinding

To prevent assessment bias, assessments of children and caregivers were carried out blind to group allocation, including explicitly asking participants not to reveal their allocation to the data collectors. Participants could not be blinded to their allocation. Intervention staff and staff undertaking assessments had no contact with each other, and Children's Centre staff were directed not to discuss the study with assessors. All researchers who worked on the follow-up were also blind to group allocation.

Participants

All participants of the EPICC trial who agreed to be contacted again following the completion of the trial (n=200) were invited to participate in this extension, with data provided by the children, their parents and their class teachers. As the aim of this follow-up was to assess children in their first year of primary school, the original sample was split into two groups, Wave 1 (n=92) and Wave 2 (n=108), according to whether they started school in September of 2018 or 2019. Proportions in intervention and control groups were broadly similar in both waves. Waves 1 and 2 then participated in the study in the summer of 2019 and 2020, respectively. Notably, this meant that Wave 2 children's first year at school was heavily impacted by the covid-19 pandemic, with data collection falling within a lock-down period. This had a marked impact on both recruitment and on data-collection (see below).

Wave 1

Parents of 75 of the 92 (81.5 %) children in the EPICC trial who had now started school were successfully contacted and gave consent for their child's continued involvement in the study. Parents provided information about the 44 schools now attended by participants, all of which were contacted. 42 of the schools consented for data to be collected from both the children and their teachers in school. Two schools did not give consent, and three further schools could not, in the end, provide us with access to the children for operational reasons. We therefore made arrangements to test children attending these five schools at home.

Wave 2

Researchers attempted to contact all 108 Wave 2 children who had participated in the study, initially by phone, with follow-up letters sent where necessary. 52 (48.1%) parents consented to their child's continued participation in the study, and completed parent questionnaires. Many of those who withdrew from the study at this stage cited difficulties with internet access or access to computer/tablet for online data collection as the primary reason. Unlike the previous year, parents were reluctant to give permission for us to contact schools, citing the extreme stress schools were under due to the pandemic, so we agreed to wait until the end of the summer term before getting in touch to ask teachers at the 28 schools involved to provide data on children in the sample. While complete child and parent datasets were obtained for 52 of the wave two children, we were only successful in obtaining data from teachers for around 56% (see Appendix Table 1) of the wave 2 sample. Furthermore, as we were only able to contact the class teachers of these children the academic year after the main data were collected, it should be noted that it was necessary for teachers to reflect back on their view of the children the previous year, which may have implications in terms of the reliability of data.

Materials and Measures

There were three sources of data for this follow-up study: children completed assessments of language and emergent literacy; parents completed a questionnaire reporting on the home literacy environment and providing further demographic and environmental information; children's class teachers completed questionnaires relating to children's prior literacy learning, their social and emotional development and their adjustment to school, as well as providing Early Years Foundation Stage Profiles. These three sources are described in detail below, and summarized in Table 1. Due to the covid-19 pandemic, adaptations to testing procedures were necessary for the Wave 2 cohort. These are described in the procedure section below.

Child measures

Emergent literacy

To assess phonological processing, the Elision & Sound Matching subtests of the Comprehensive Test of Phonological Processing 2 (CTOPP-2; Wagner et al., 2012) were administered to assess phonological awareness, alongside the rapid object and colour naming subtests of the CTOPP as measures of rapid serial naming. The Letter Sound Knowledge and Early Word Recognition sub-tests of the York Assessment of Reading for Comprehension (YARC, Snowling et al., 2009) were used to assess early literacy.

Reading motivation

Children completed the Reading Self-Concept Scale (RSCS; Chapman & Tunmer, 1995), a brief, orally administered questionnaire assessing attitudes to reading, and parents completed selected items from a Home Literacy Environment (HLE) questionnaire concerning the child's reading motivation.

Language

At baseline, the Early Years Toolbox (EYT; Howard & Melhuish, 2017) was used to assess language. At follow up, children completed the British Picture Vocabulary Scale 3 (BPVS3; Dunn, Dunn & Styles, 2009) as a measure of receptive vocabulary.

Parent measures

Socio-economic status (SES) and the home literacy environment (HLE).

As part of the original EPICC trial, parents provided demographic information relating to SES (parental income and education level), as well as information relating to the frequency and duration of shared story book reading, as a measure of the HLE. At follow-up, parents answered the same questions relating to the frequency and duration of shared reading as part of a broader home literacy environment questionnaire (adapted from Atkinson & Powell, 2012; Hamilton, 2013; Senechal & LeFevre, 2002), which also included questions relating to screen time (educational and for pleasure) and the number of books at home. Parents also completed checklist author and storybook recognition tasks (Matthews, 2019; based on Cunningham & Stanovich, 1990) as measures of their children's print exposure.

Teacher measures

School adjustment, social & emotional development, and Early Years attainment.

Children's class teachers completed a questionnaire which included the Brief Early Skills and Support Index (BESSI; Hughes et al., 2015) as a measure of adjustment to school, and the Prosocial and total difficulties scales of the Strengths and Difficulties Questionnaire (Goodman, 1997) as measures of social and emotional development. Schools also provided the children's scores on the Early Years Foundation Scale (EYFS) Profile at Wave 1. However, EYFS profiles were not completed by schools during the covid-19 pandemic, so no data were available for Wave 2.

Procedure

Due to the covid-19 pandemic, it was necessary to adapt assessment procedures for Wave 2. Procedures for the two waves of children are therefore reported separately below.

Wave 1

Data collection for this phase of the study took place between around one and two years after the completion of the original EPICC trial, as participants approached the end of Reception, their first year of school. Data were collected from children during school visits undertaken by two researchers. Each child spent around forty minutes with a researcher, completing the set of measures in one of two orders (counterbalanced to reduce order effects) with a short break in the middle. Where possible, data collection took place in a quiet environment within the school, though it was necessary to test five children at home. Data were collected from parents/caregivers of child participants by postal questionnaires, and from children's class teachers by questionnaires provided by the researchers during school visits.

Wave 2

The following summer, the younger children from the original EPICC sample were assessed. Schools were closed at this time due to covid-19, so all children were tested online, using video conferencing technology (Zoom), with children using either a tablet or a computer at home. In most cases, the tasks could be administered very similarly to the standard administration employed with Wave 1 children. Where tasks involved visual stimuli and

required a verbal response (CTOPP sound matching, and rapid object and colour naming subtests; YARC letter sound knowledge and early word reading subtests) stimuli were scanned from test materials into MS PowerPoint slides, and displayed to children using the screen-sharing function in Zoom. However, the BPVS3 requires a point response, where on each trial a child must point to the one of four pictures that they think corresponds with a cue word given by the researcher. Such a point response was not possible to interpret in the context of an online test session. Therefore, each of the BPVS3 pictorial stimuli was scanned, with small, different colour diamonds superimposed on the four picture stimuli for each trial. The BPVS3 standard instructions were amended to accommodate this change. For example, on the practice trials, children were told “Each of the pictures has a coloured diamond on it – can you see – this one has a blue diamond on it, this one is yellow, this one is pink and this is brown. I will say a word then I want you to tell me which colour diamond is on the picture that shows what I have said. Let’s try one. Look at these pictures. Tell me the colour of the diamond that is on the ‘cup’ picture.” Apart from this change to allow for colour coding of stimuli, the BPVS3 was administered exactly as per the standardized instructions. As in Wave 1, testing was carried out in sessions of around 40 minutes, including a short break, with tasks completed in one of two orders.

Protocol Deviations

As this study involved consenting and collecting data from participants, parents/guardians and teachers at a single timepoint there are no defined protocol deviations. However, COVID-19 has resulted in some data collection taking place online, rather than face to face, as described above.

Objectives and Outcome Measures

Table 1: Study Objectives and Measures

Objective	Measures	Specific Measures
1. To assess Emergent Literacy Skills	Comprehensive Test of Phonological Processing (CTOPP)	1. Phonological Awareness Composite Score (PACS) <ul style="list-style-type: none"> • Ellison total score • Sound matching total score 2. Rapid Symbolic Naming Composite Score (RSNCS) <ul style="list-style-type: none"> • Rapid colour naming • Rapid object naming
	York Assessment of Reading Comprehension (YARC) - Early Reading	Letter Sound Knowledge Early word Recognition
2. To assess Early Reading Motivation	Reading Self-Concept Scale (RSCS)	Difficulty, Competence, attitude, total
	Home Literacy Environment Questionnaire (HLEQ)	Questions from HLEQ <ul style="list-style-type: none"> • Q9: During storybook reading, how often does your child engage in the following activities? • Q10: How often does your child ask to be read to? • Q11: How often does your child read or look at books on his/her own? • Q12: How would you rate your child's enjoyment of storybooks?
3. To assess Language	British Picture Vocabulary (BPVS3)	BPVS3 standard score
4. To assess Social & Emotional Development	Strengths & Difficulties Questionnaire (SDQ)	Prosocial subscale Total difficulties score
5. To assess Adjustment to School	Brief Early Skills & Support Index (BESSI)	Language and cognition Daily living skills Family support
6. To assess Early Years Attainment	Early years Foundation Stage Profile (EYFS-P)	EYFS-P Total Score
7. To assess Home Literacy Environment and children's exposure to print	Home Literacy Environment Questionnaire	Home book-sharing (minutes per week) Number of books at home Screen time amount (educational and non-educational)
	Print exposure	Storybook Recognition Task Author Recognition Task

Statistical Methods

Child and parental ethnicity groups were combined to create four categories: Asian, Black, White and other. Parental education levels were grouped to create 5 groupings: 1, None/GCSE; 2, A level/Post school qualification; 3, Degree; 4, Post-graduate degree; 5, not answered.

Demographic characteristics of those who participated in the extension study and those who did not were summarised and compared using t-tests and chi-squared tests. Additionally, data for those participating were summarised and compared similarly according to whether they were in the intervention or the control group.

Values for CTOPP, YARC, RSCS, BPVS3, BESSI, SDQ, EYFS-P, home literacy questionnaire and story book/author tasks were listed and summarised without knowledge of intervention group, using standardised scores where available. Where outcomes had more than one measure, these were assessed for correlation and/or agreement to determine either the preferred measure to analyse or a composite score, as applicable. For each measure, completeness was assessed and boxplots created by intervention group (Appendix 2).

Composite scores or individual measures were modelled, according to the examination of correlations/agreement noted above, where sufficient data were collected. Objectives were then analysed separately using linear mixed models. Intervention was fitted as a fixed effect, and Children's Centre as a random effect. Measures collected in the original trial (SDQ: total problems and pro-social) were analysed as repeated measures, including data collected at baseline, post-intervention and at 6-month follow-up, with child's age in months included as a random effect.

We took into account a number of variables known to have effects on child language and literacy development. This was particularly important in the current study as we had previously identified some unanticipated differences in the characteristics of our intervention and control group participants (Murray et al., 2022, and Murray et al., 2023) and was set out in a pre-specified analysis plan. Thus, child's age in months at the extension

assessment, gender, multilingualism, parent education and collection wave (2019 or 2020) were fitted as covariates (fixed effects). Expressive language at baseline, time since baseline (months), baseline book-sharing, parenting skill and intervention group interaction with time were assessed for inclusion. The Kenward-Roger adjustment for the degrees of freedom (ddfm=KR) was used. Adjusted means and intervention group differences along with 95% confidence intervals and standard errors were calculated and p-values presented for the difference between groups at the extension assessment.

In the original EPICC trial, an “engaged” subgroup was identified by facilitators assessing the extent of participants’ active engagement in the training sessions amongst those in the intervention group, measured on a 4-point scale from “not at all” to “highly/a great deal”. Sensitivity analyses were performed, as in the original study, comparing the engaged subgroup to the controls.

All applicable statistical tests were two-sided and were performed using a 5% significance level. All confidence intervals presented are 95% and two-sided. No formal correction was made for multiple testing of the outcomes in the extension, but account will need to be taken where multiple statistical tests have been performed with regards interpretation of results. Interpretation of results will also take account of consistency across outcomes as well as clinical plausibility based on prior knowledge. Analyses were performed using Stata/IC 15.1.

Key Findings

Study Population

As described previously, the trial population consisted of 127 participants across two collection waves (2019 and 2020). More individuals were followed up in wave 1 (n=75) than wave 2 (n=52), but the proportion of those in the intervention group vs control group was broadly the same across both waves; 40 (53%) for wave 1 and 27 (52%) in wave 2.

Table 2 shows a comparison of those who participated in the extension study with those who did not. Those who remained in the follow-up had a higher education level, higher family income and a mean maternal age which was three years older (35.2 years compared to 32.2 years) compared to those who did not. Over half (50.6%) of those not participating in the extension study were in the two most deprived IMD categories compared to just 27.5% who were followed up. Additionally, more families in the intervention group who participated in the extension had followed the original study protocol (attending at least 5 of the 7 training sessions) compared to those who did not participate (93.3% vs 76%).

Table 2: Comparison of baseline characteristics between those followed up and not followed up from original study

Total	Did Not Participate n=91	Participated n=127	p-value
Allocation: N (%)			
Control	41 (45.1%)	67 (52.8%)	
Intervention	50 (54.9%)	60 (47.2%)	
Child age: mean (SD), months	33 (5.2)	35.1 (5.4)	*
Maternal age: mean (SD), years	32.2 (5.8)	35.2 (6.2)	**
Child: Male N (%)			
Female	35 (38.5%)	56 (44.1%)	
Male	56 (61.5%)	71 (55.9%)	
Parental Ethnicity: N (%)			
Asian	15 (16.5%)	16 (12.6%)	
Black	11 (12.1%)	11 (8.7%)	
Other	1 (1.1%)	4 (3.1%)	
White	64 (70.3%)	96 (75.6%)	
Multilingual: N (%)			
No	62 (68.1%)	92 (72.4%)	
Yes	29 (31.9%)	35 (27.6%)	
Parental Education: N (%)			
None/GCSE	21 (23.9%)	16 (12.6%)	
A-level/Post-school	27 (30.7%)	25 (19.7%)	*
Degree	25 (28.4%)	48 (37.8%)	
Post-grad	15 (17%)	38 (29.9%)	
Not Answered	3	0	
Parental Income: N (%)			
<£16,000	22 (25.6%)	17 (13.6%)	
£16-25,000	17 (19.8%)	15 (12%)	
£25-33,000	11 (12.8%)	21 (16.8%)	*
£33-50,000	31 (36%)	56 (44.8%)	
£50,000+	5 (5.8%)	16 (12.8%)	
Not answered	5	2	
IMD quintile: N (%)			
1 (most deprived)	19 (20.9%)	7 (5.5%)	
2	27 (29.7%)	28 (22%)	
3	21 (23.1%)	38 (29.9%)	*
4	4 (4.4%)	16 (12.6%)	
5 (least deprived)	20 (22%)	38 (29.9%)	
Intervention Protocol: N (%)			
Not Followed	12 (24%)	4 (6.7%)	*
Followed	38 (76%)	56 (93.3%)	
Engaged Intervention: N (%)			
Not Engaged	13 (35.1%)	15 (26.3%)	
Engaged	24 (64.9%)	42 (73.7%)	
Missing	13	3	
Book-sharing: mean (SD), mins/week	84.4 (66.1)	99.5 (71.6)	

* $p < 0.05$, ** $p < 0.001$ (chi-squared/t-tests)

IMD: Index of Multiple Deprivation

As had been the case in the original study sample, some differences were apparent at the time of the current extension study between intervention and control group participating families, and were controlled for in analyses: more parents in the intervention group self-identified as belonging to a minority ethnicity group (Asian, Black or Other) than the control group (38.3% vs 11%), with a higher rate of family multilingualism (38.3% vs 17.9%). 16.7% of parents in the control group earned less than £25,000 compared to 35.6% of those who completed the intervention. Finally, children in the control group at extension follow up were, on average, three months older than those in the intervention group (Table 3).

At the original, baseline assessment, no difference was seen between SDQ total problem scores (control 11.3, SD 4.5; intervention 11.6, SD 5.0), but SDQ prosocial scores were slightly lower amongst those attending the intervention (control 7.3, SD 1.6; intervention 6.7, SD 2.1). Notably, baseline expressive language was much higher in the control group (22.4, SD 8.4), reflecting above average ability, compared to those in the intervention (15.0, SD 8.9), where ability was broadly average (Howard & Melhuish, 2017). Finally, parents in the control group had spent more time each week reading to their children at baseline than did those in the intervention group (115.5 vs 72.4 minutes).

Table 3: Comparison of baseline characteristics between those in control and intervention groups

Total	Control n=67	Intervention n=60	p-value
Child age: mean (SD), months	36.6 (5.5)	33.6 (5.0)	*
Maternal age: mean (SD), years	35.4 (6.7)	34.9 (5.6)	
Child: Male N (%)			
Female	29 (43.3%)	27 (45.0%)	
Male	38 (56.7%)	33 (55.0%)	
Parental Ethnicity: N (%)			
Asian	5 (7.5%)	11 (18.3%)	
Black	1 (1.5%)	10 (16.7%)	*
Other	2 (3.0%)	2 (3.3%)	
White	59 (88.1%)	37 (61.7%)	
Multilingual: N (%)			
No	55 (82.1%)	37 (61.7%)	*
Yes	12 (17.9%)	23 (38.3%)	
Parental Education: N (%)			
None/GCSE	10 (14.9%)	6 (10.0%)	
A-level/Post-school	11 (16.4%)	14 (23.3%)	
Degree	27 (40.3%)	21 (35.0%)	
Post-grad	19 (28.4%)	19 (31.7%)	
Not Answered	0	0	
Parental Income: N (%)			
<£16,000	4 (6.1%)	13 (22.0%)	
£16-25,000	7 (10.6%)	8 (13.6%)	
£25-33,000	14 (21.2%)	7 (11.9%)	**
£33-50,000	41 (62.1%)	15 (25.4%)	
£50,000+	0 (0.0%)	16 (27.1%)	
Not answered	1	1	
IMD quintile: N (%)			
1 (most deprived)	1 (1.5%)	6 (10.0%)	
2	17 (25.4%)	11 (18.3%)	
3	16 (23.9%)	22 (36.7%)	
4	10 (14.9%)	6 (10.0%)	
5 (least deprived)	23 (34.3%)	15 (25.0%)	
Intervention Protocol: N (%)			
Not Followed	-	4 (6.7%)	N/A
Followed	-	56 (93.3%)	
Engaged Intervention: N (%)			
Not Engaged	-	15 (26.3%)	
Engaged	-	42 (73.7%)	N/A
Missing	-	3	
Book-sharing: mean (SD), mins/week	115.5 (69.8)	72.4 (63.3)	**
SDQ Total: mean (SD)	11.3 (4.5)	11.6 (5.0)	
SDQ Prosocial: mean (SD)	7.3 (1.6)	6.7 (2.1)	
Expressive Language: mean (SD)	22.4 (8.4)	15.0 (8.9)	**

* $p < 0.05$, ** $p < 0.001$ (chi-squared/t-tests)

IMD: Index of Multiple Deprivation

SDQ: Strengths and difficulties questionnaire

Measures Used in Analyses

Appendix Table 1 displays descriptive statistics for each study outcome across all study participants, as well as the level of data completion by each collection wave. Child and parental measures were well collected in wave 1 (2019), with most at least 90% complete. Wave 2 (2020) saw a reduction in child measures being recorded (range 75-83%). Conversely, parental completion increased compared to wave 1. However, due to disruption caused by covid-19, the number of those participating in 2020 (wave 2) was lower than in 2019 (wave 1) (52 vs 75), despite similar proportions across school years participating in the original trial.

Having considered the distributions and correlations of scores, as well as whether measures could be considered conceptually similar, the outcomes shown in Table 4 were used in analysis. Those marked with an asterisk represent outcomes where a composite measure was used.

Table 4: Measures Used in Analysis

	Outcomes Used in Analysis	Specific Measures Included	Scoring
1*	Early reading and reading-related skills composite	Phonological Awareness Composite Score (PACS) <ul style="list-style-type: none"> · Ellison total score · Sound matching total score Rapid Symbolic Naming Composite Score (RSNCS) <ul style="list-style-type: none"> · Rapid colour naming · Rapid object naming Letter Sound Knowledge, Early word Recognition	Age-standardised scores, where 100 is average
2	RSCS Total score	Difficulty, Competence, attitude	1 (low reading self-concept) to 5 (high reading self-concept)
3*	Home Literacy Environment composite	HLEQ Q9, Q10, Q11 HLEQ Q12 dropped from analysis	Range 0 to 5 -
4	British Picture Vocabulary age-standardised scores	BPVS3 standard score	Age-standardised scores, where 100 is average
5	SDQ Prosocial subscale	Prosocial subscale	0 to 10 (6-10 close to average)
6	SDQ Total difficulties score #	Total difficulties score	0 to 40 (0-11 close to average)
7	BESSI Language and cognition #	Language and cognition,	0 to 6
8	BESSI Daily living skills #	Daily living skills	0 to 6
9	BESSI Family support #	Family support	0 to 6
10	EYFS-P Total Score	EYFS-P Total Score	Average scores 2019 ¹ : Girls 35.8 Boys 33.4
11	Book-sharing	Home book-sharing	Minutes per week
12	Books at Home	Number of books at home	Count
13	Non-educational Screen Time	Non-educational screen time amount	Hours per week
14	Educational Screen Time	Educational screen time amount	Hours per week
15*	Storybook and Author Exposure composite	Storybook Task Author Task	Maximum 30 (negative scores possible)

* Composite Scores

Lower scores better

¹ <https://www.gov.uk/government/statistics/early-years-foundation-stage-profile-results-2018-to-2019>

Unadjusted Mean Scores

Table 5 provides unadjusted means according to intervention group. Outcome 1 (Early Reading Composite) and outcome 3 (BPVS3) scores are standardised, where 100 represents the population average. Both the control and intervention groups mean scores are over 100, with just the intervention group BPVS3 confidence interval including 100, suggesting above average abilities in these areas across both sets of subjects. Unadjusted scores within outcome 2 (Early Reading Motivation) were almost identical between the two participant groups.

In outcome 4 (Social & Emotional Development) average scores for the control group were better in both the prosocial (where higher scores indicated fewer issues) and the total (lower scores equivalent to fewer potential issues) scales, with the mean for both groups classified as “close to average”

<https://www.ehcap.co.uk/content/sites/ehcap/uploads/NewsDocuments/236/SDQEnglishUK4-17scoring-1.PDF> .

Across all three measures in outcome 5 (School Adjustment), the intervention group performed slightly worse than the control group, although all means suggested little concern (the highest being 0.8 out of a possible 6, where lower scores are better) (Hughes & White, 2015).

In outcome 6 (Early Years Attainment), collected only for wave 1 (2019), on average the control group performed better than those in the intervention group. However, each group’s scores were above the national average of 34.9 for academic year 2018/2019 ([ps://www.gov.uk/government/statistics/early-years-foundation-stage-profile-results-2018-to-2019](https://www.gov.uk/government/statistics/early-years-foundation-stage-profile-results-2018-to-2019))

Outcome 7 contained five measures; the Storybook and Author tasks showed no difference according to intervention group. Parents of the control group reported both more time sharing books and more books at home than those in the intervention group. Screen time for educational purposes was reportedly higher in the intervention group and for non-educational was higher in the control group.

Table 5: Summary Table of Unadjusted Means and 95% Confidence Intervals by Intervention Group

Outcome	Measure	Intervention		Control	
		N	Mean (95% CI)	N	Mean (95% CI)
1 Emergent Literacy	Early Reading Composite	58	108.5 (105.6, 111.3)	58	110.3 (107.4, 113.2)
2 Early Reading Motivation	Reading Self-Concept	54	3.7 (3.5, 3.8)	56	3.6 (3.5, 3.8)
	Home Literacy Environment (HLE)	57	10.2 (9.6, 10.9)	65	10.3 (9.7, 10.8)
3 Language	British Picture Vocabulary Score	57	101.1 (98.6, 103.5)	57	104.4 (101.2, 107.5)
4 Social/Emotional Development	SDQ Prosocial	37	6.9 (6.0, 7.7)	39	8.1 (7.4, 8.8)
	SDQ Total [#]	37	6.1 (4.1, 8.2)	39	4.5 (3.3, 5.8)
5 School Adjustment	Language & Cognition [#]	37	0.4 (0.1, 0.7)	39	0.2 (0.0, 0.4)
	Daily Living [#]	37	0.8 (0.5, 1.2)	39	0.5 (0.1, 0.9)
	Family Support [#]	37	0.7 (0.3, 1.1)	39	0.3 (0.1, 0.6)
6 Early Years Attainment	EYFS-P	28	35.7 (32.2, 39.2)	29	38.8 (36.2, 41.4)
7 Home Literacy Environment (HLE)	Storybook & Author	54	10.9 (9.0, 12.8)	64	10.9 (9.2, 12.6)
	Book Sharing (mins/week)	54	124 (104.4, 143.5)	66	144 (128.8, 159.1)
	Books at home	57	54.9 (49.1, 60.7)	66	59.8 (54.5, 65.2)
	Non-Ed Screen (hours/week)	56	10.8 (9.1, 12.6)	65	14.1 (11.9, 16.2)
	Edu Screen (hours/week)	56	5.2 (4.0, 6.5)	65	4.4 (3.2, 5.6)

[#] Lower scores better

Modelling Results

Highlights of the main results of modelling are shown in Table 6.

Effect of intervention

The intervention was not found to have had a positive impact across any of the recorded measures. There was some indication of differences between subject groups in outcome 5 (School Adjustment), but with the intervention group performing less well than those in the control in all three BESSI measurements. SDQ prosocial and SDQ total measures were recorded at multiple timepoints during the previous study in addition to the trial extension: at baseline, during study follow-up (3 months) and post-study (6-month follow-up). The coefficients reported should therefore be interpreted as the effect of intervention at any point in time. The findings are compatible with no effect of intervention seen.

Effect of collection wave

All models included an adjustment for collection wave. This was found to have an impact on some outcomes, with wave 2 in particular showing a notable reduction on Early Reading Composite scores, albeit with a wide confidence interval of values (-16.2, 95% CI -31.7 to -

0.7, $p=0.040$). With regard to School Adjustment, in two of the three BESSI scores, Language & Cognition and Daily Living, scores were increased for those in the second wave, representing poorer results, with particularly large effect sizes taking account of a maximum score of 6 (L&C: 2.1, 95% CI 0.6 to 3.6, $p=0.007$; DL: 2.6, 95% CI -0.1 to 5.3, $p=0.059$). Perhaps expectedly, both types of reported screen time were higher in wave 2, although with the 95% confidence interval for *non-educational* screen time containing zero, suggesting that this difference was not statistically significant. Conversely, reported books at home decreased in wave 2, although again with the 95% confidence interval containing zero (-8.8, 95% CI -18.9 to 1.3, $p=0.088$).

Since EYFS profile scores could only be collected in wave 1, owing to the suspension of such assessments in 2020, these are not adjusted for collection wave.

Interaction between allocation and collection wave

The effect of intervention on the Storybook & Author task and book-sharing measures were found to differ according to collection wave, assessed by the inclusion of an interaction term (Storybook & Author $p=0.0192$, Book-sharing $p=0.0138$). Table 7 demonstrates these effects; in collection wave 1, parents of the control group performed better on the Storybook & Author task than the intervention group, whereas the converse was true during the second collection wave, although intervention/control confidence intervals overlap in each case, suggesting that the results are consistent with no true difference. Conversely, the intervention group reported more minutes per week of book-sharing than the control group in the first wave and the opposite in wave 2, again with intervention/control confidence interval overlap.

Effect of baseline vocabulary score

For all but one child measure (SDQ total problems), baseline vocabulary score was found to be associated with improved outcomes, namely Early Reading, Reading Self-Concept, HLE Questionnaire Reading Motivation, BPVS3, SDQ Prosocial, BESSI Language & Cognition, BESSI Daily Living and EYFS profile. It was not found to have an effect on any of the five measures included in outcome 7 (Home Literacy Environment).

Effect of baseline book-sharing

The inclusion of book-sharing at baseline was assessed in all models but was found only to be of importance within the Home Literacy Environment, Book-Sharing and Books at home outcomes, with more baseline book-sharing associated with improved scores. However, although statistically significant, the effect of book-sharing was small. For example, each additional 10 minutes of book-sharing at baseline increased follow up book-sharing by 3.9 minutes per week (95% CI 2.0 to 5.8, $p < 0.001$).

Table 6: Coefficients and 95% Confidence Intervals (CI) of adjusted models

	Measure	Intervention	Collection Wave	Baseline Vocabulary Score	Book-sharing (per 10 mins)	Parental Engagement
1	Early Reading Composite ^a	-1.6 (-7.5, 4.3)	-16.2 (-31.7, -0.7)	0.80 (0.5, 1.0)	-	-
2	Reading Self-Concept ^a	0.0 (-0.4, 0.4)	-0.1 (-1.3, 1.0)	0.02 (0.00, 0.04)	-	-
	HLE Reading motivation ^{a, b}	0.6 (-0.5, 1.7)	-3.4 (-6.6, 0.3)	0.04 (-0.01, 0.09)	0.07 (0.02, 0.12)	-
3	BPVS3 ^a	1.2 (-3.8, 6.2)	-1.4 (-17.1, 14.3)	0.82 (0.56, 1.07)	-	-
4	SDQ Prosocial ^a	-0.3 (-1.1, 0.4)	-1.1 (-3.3, 1.1)	0.06 (0.02, 0.09)	-	-
	SDQ Total #	0.7 (-1.2, 2.5)	0.2 (-1.1, 1.6)	-	-	-
5	BESSI Language & Cognition ^{a, d} #	0.4 (-0.1, 0.9)	2.1 (0.6, 3.6)	-0.03 (-0.05, -0.01)	-	0.4 (-0.2, 0.9)
	BESSI Daily Living ^a #	0.7 (-0.1, 1.6)	2.6 (-0.1, 5.3)	-0.04 (-0.07, 0.00)	-	-
	BESSI Family Support #	0.4 (-0.1, 0.9)	0.1 (-0.4, 0.7)	-	-	-
6	EYFS-P ^a	-1.0 (-6.3, 4.2)	N/A	0.48 (0.22, 0.75)	-	-
7	Storybook & Author ^c	¥	¥	-	-	-
	Book-Sharing ^{b, c, d}	¥	¥	-	3.9 (2.0, 5.8)	51.9 (6.2, 97.6)
	Books at home ^b	-0.1 (-10.9, 10.6)	-8.8 (-18.9, 1.3)	-	0.8 (0.2, 1.4)	-
	Non-Ed Screen Time	-2.5 (-6.0, 0.9)	2.6 (-0.8, 6.1)	-	-	-
	Educational Screen Time	0.5 (-2.8, 3.9)	2.6 (0.4, 4.9)	-	-	-

All measures adjusted for child age, gender, multilingualism, parental education, collection wave, Children’s Centre as random effect.

^a Adjusted for baseline expressive language and time (months) since baseline

^b Adjusted for baseline book-sharing

^c Allocation x Wave interaction

^d Parental engagement (intervention group only)

Lower scores better

¥ See Table 7 for marginal means by wave/allocation group.

Table 7: Marginal Means of Intervention Group by Collection Wave

	Wave	Intervention	Control
Storybook & Author	1	10.1 (7.8, 12.3)	12.7 (10.6, 14.8)
	2	11.6 (8.7, 14.6)	8.7 (5.6, 11.7)
Book-sharing	1	138.1 (117.3, 158.9)	129.9 (110.9, 148.9)
	2	104.4 (80.1, 128.7)	153.3 (127.2, 179.4)

Effect of parental engagement

The original trial found evidence of an improvement in outcome scores amongst those participating in the intervention where research staff reported more parental engagement. This effect of increased engagement in the intervention was not, however, found for most extension trial outcomes. There was some evidence ($p=0.045$) suggesting that parental engagement should be included in the model when considering scores on the BESSI Language & Cognition Outcome, but the confidence interval for its effect included zero (0.4, 95% CI -0.2 to 0.9, $p=0.159$), consistent with there being no effect of parental engagement. For book-sharing (objective 7), parental engagement showed a large effect, but with a wide confidence interval, suggesting that a large range of possible values were plausible (51.9 95% CI 6.2 to 97.6, $p=0.027$), i.e., increasing weekly book-sharing by between 6.2 to 97.6 minutes.

Implications and Recommendations

The results of the original EPICC trial had suggested that the intervention may have placed children on a more positive developmental trajectory, and possibly buffered them against an expectable decline in their functioning relative to their initially better-performing control group peers. In order to evaluate the significance of the intervention further and explore whether a clear benefit from the intervention might take time to emerge, we conducted a further follow up of the children after they had attended school for two terms. Some caution is required when interpreting the results of the current extension study given the relatively low numbers participating (particularly for the second assessment wave), the differences in administration of assessments imposed by the covid 19 pandemic, and the fact that those retained in the study were, on average, more socio-economically advantaged compared to those not retained. Nevertheless, it is notable that the performance of the two groups of children was very similar and was in the average-above average range across measures. Notably, there had been an initial large group difference in child language development at baseline favouring the control group, which contrasts with the findings of similar performance of both groups at the time of the extension. Our results showing similar performance in the two groups at follow up remains consistent with the possibility that, while there was no evidence of a statistically significant benefit of the intervention, it

may nevertheless have had a 'levelling up' effect, with the initially poorer performance of children in the intervention group being brought into line with that of the control group. It is relevant to this interpretation of a possible 'levelling up' effect of the intervention to note that, despite being recruited from areas of relative deprivation, our final study population was not an extremely disadvantaged one, with some indication that the most disadvantaged families were less likely to participate. This demographic profile of study participants raises to issues: First, we found that baseline language scores, even for the intervention group children who performed relatively poorly compared to controls, still fell within the normal range for their age group. Bearing this in mind, the pattern of our results suggests that the intervention might have been more effective if delivered to more disadvantaged families, where children are likely to have had even more ground to catch up in terms of their linguistic and social development. Unfortunately, because there was more attrition in participants who were socio-economically disadvantaged, this hypothesis could not be formally evaluated. Second, the fact that the most disadvantaged families may have been less willing than others to participate is consistent with wider research (e.g. Gibbard et al. 2021). The reasons for this selective take up of interventions are considered complex and multi-faceted, but they are likely to include structural barriers to participation (e.g., availability of transport, competing work demands limiting available time), parental perspectives on their role and time availability, and the nature of the personnel delivering interventions, where evidence suggests that participant engagement is better when interventions are conducted by personnel with whom families have already established relationships of trust.

A particularly striking aspect of the study findings was that child expressive language assessed at baseline (i.e., at age two-three years) continued to exert a significant effect on a range of measures of child functioning after two terms in school. It is not clear from our study whether this is because early language is a particularly good marker of more general developmental skills, such as cognitive representation, whether it has specific developmental benefits, or whether it aids child developmental progress by influencing the child's subsequent learning environment. Whatever the mechanism, the finding that early vocabulary is such a strong predictor of future child functioning underlines the potential benefit of targeting child development for intervention at an early age, when language

development is taking off. The fact that previous studies of book-sharing interventions have indicated that benefits to child language development might be more likely to be obtained when delivered to parents of children younger than those in the EPICC trial (e.g., Vally et al, 2015) further reinforces the case for implementing training in book-sharing with parents of children between one and two years of age when language skills show particularly rapid development.

Conclusion

Our findings have implications for the field of parenting interventions, and particularly for the samples to be targeted: thus, they suggest a dialogic book-sharing intervention may be particularly effective when delivered to disadvantaged populations, to parents of young children whose language is on a rapid developmental trajectory, at one to two years of age, and to those whose children have initially lower language abilities than their same-age peers. Such an intervention, aiming to change the Home Literacy Environment, needs to be sensitive to the needs and perceptions of parents experiencing socio-economic disadvantage and likely requires sustained input and support for parents if it is to achieve lasting change.

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Appendix Table 1: Completeness and summary statistics of study measures by collection wave

Outcome	Measure	Composite	Specific Measure	N	Mean	SD	Wave 1 Complete %	Wave 2 Complete %	Completed by	
Total				127			75	52		
1	Emergent Literacy	CTOPP	PACS	Composite "PACS"	115	107.28	12.82	97.3%	80.8%	Child
				Ellison	115	11.44	2.46	97.3%	80.8%	Child
				Sound Match	115	10.67	2.39	97.3%	80.8%	Child
		RNNCS	Composite RNNCS	107	104.09	15.31	89.3%	76.9%	Child	
			Rapid Colour	110	10.53	2.44	89.3%	76.9%	Child	
			Rapid Object	110	10.51	2.99	94.7%	75.0%	Child	
		YARC	Letter Sound Knowledge	116	112.91	13.40	92.0%	78.8%	Child	
			Early Word Recognition	116	114.05	12.85	97.3%	82.7%	Child	
2	Early Reading Motivation	Reading Self-Concept	Total	Composite RSC	110	3.64	0.62	94.7%	75.0%	Child
			Difficulty	110	3.33	0.79	94.7%	75.0%	Child	
			Competence	110	3.67	0.79	94.7%	75.0%	Child	
			Attitude	110	3.92	0.80	94.7%	75.0%	Child	
		Home Literacy Environment	Q9 (How often engage)	123	29.06	8.28	94.7%	98.1%	Parent	
			Q10 (How often read to, 1-5)	123	3.55	0.88	96.0%	98.1%	Parent	
			Q11 (How often read on own, 1-5)	122	3.47	1.13	96.0%	98.1%	Parent	
			Q12 (Child's enjoyment, 1-7)	122	6.36	0.95	94.7%	98.1%	Parent	
3	Language	British Picture Vocabulary		114	102.70	10.82	97.3%	78.8%	Child	
4	Social/Emotional Development	Strengths & Difficulties	Total	76	5.32	5.06	62.7%	55.8%	Teacher	
			Prosocial	76	7.51	2.44	62.7%	55.8%	Teacher	
5	School Adjustment	BESSI	Language & Cognition	76	0.32	0.73	62.7%	55.8%	Teacher	
			Daily Living	76	0.66	1.15	62.7%	55.8%	Teacher	
			Family Support	76	0.50	0.97	62.7%	55.8%	Teacher	
6	Early Years	EYFS-P		57	37.26	8.04	76.0%	0.0%	Teacher	
7	Home Literacy Environment	HLEQ	Book-sharing	120	134.96	66.77	92.0%	98.1%	Parent	
			Book Number	123	-	-	96.0%	98.1%	Parent	
			Screen time	Non-educational	121	12.56	7.92	94.7%	96.2%	Parent
			Educational	121	4.79	4.78	94.7%	96.2%	Parent	
		Story Book & Author Exposure	Story Book	118	12.86	7.77	96.0%	88.5%	Parent	
			Author	118	8.95	6.64	96.0%	88.5%	Parent	

Appendix 2: Box Plots of Outcomes by Intervention Group

Figure 1: Box plot of Early Reading & Reading-Related Skills scores by intervention

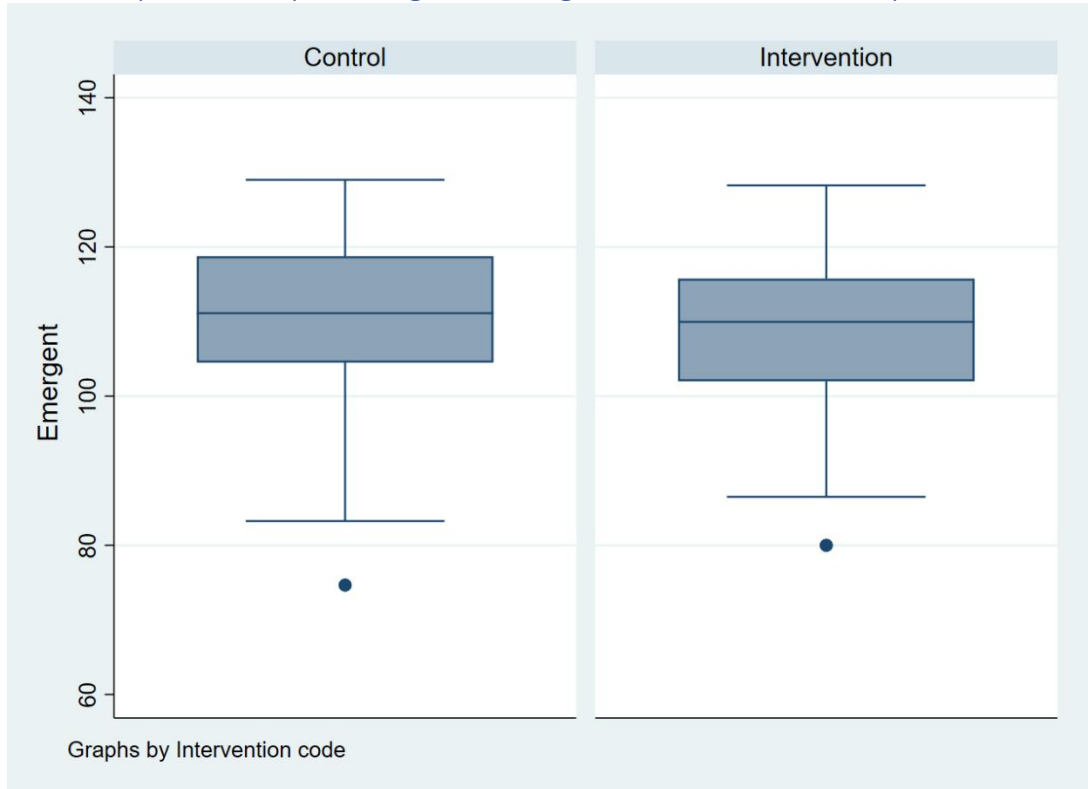


Figure 2: Box plot of Reading Self-Concept Scale (RSCS) Total by intervention

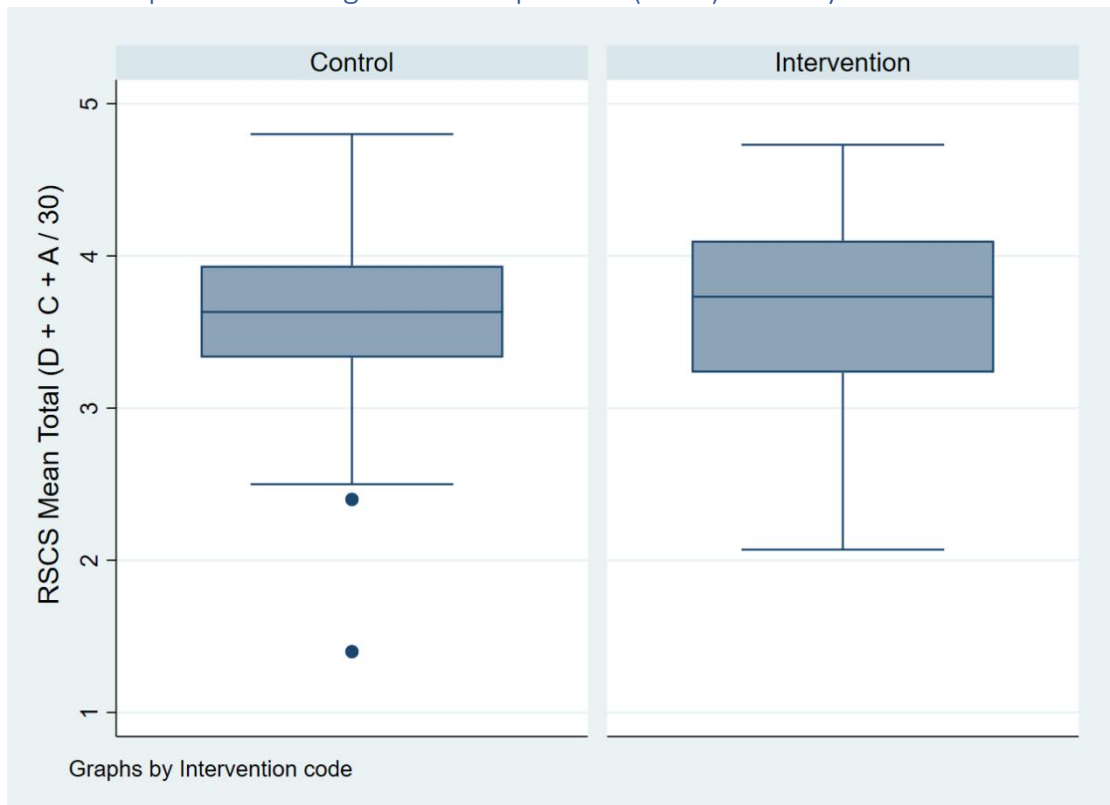


Figure 3: Box plot of Home Literacy Environment Questionnaire (Q9, Q10, Q11) by intervention

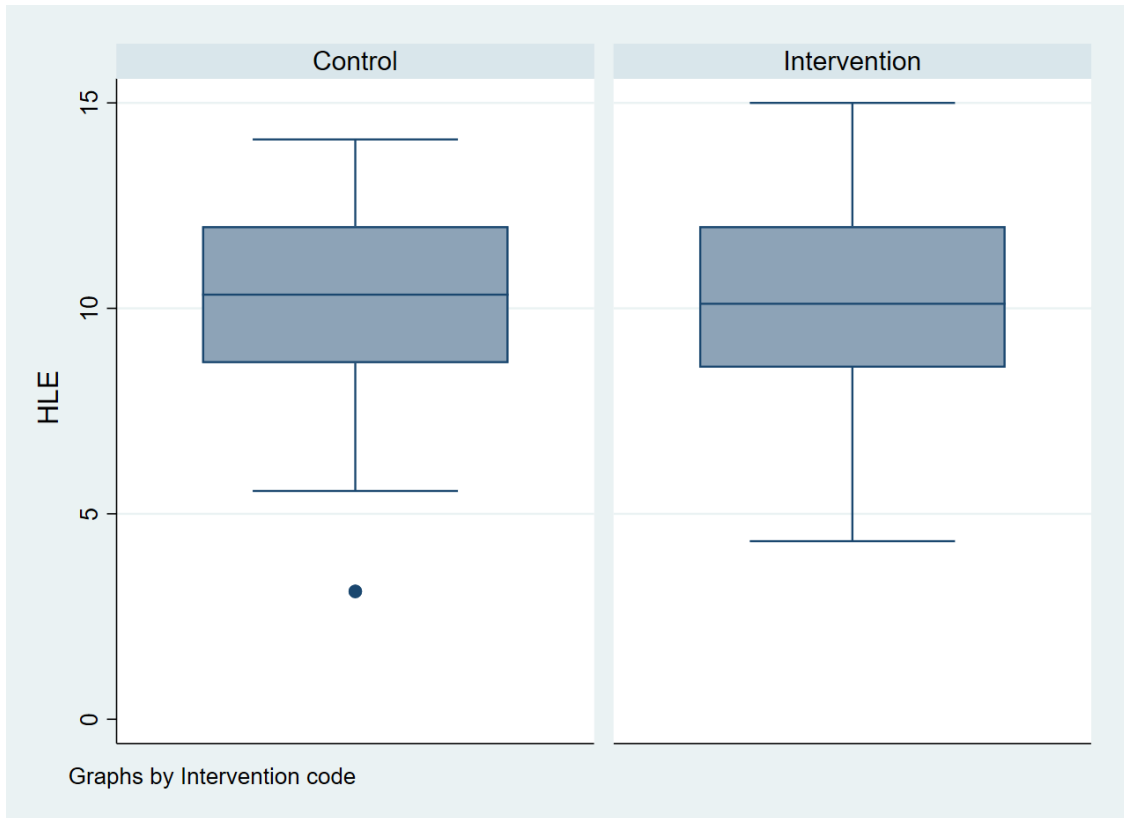


Figure 4: Box plot of British Picture Vocabulary Score (BPVS) by intervention

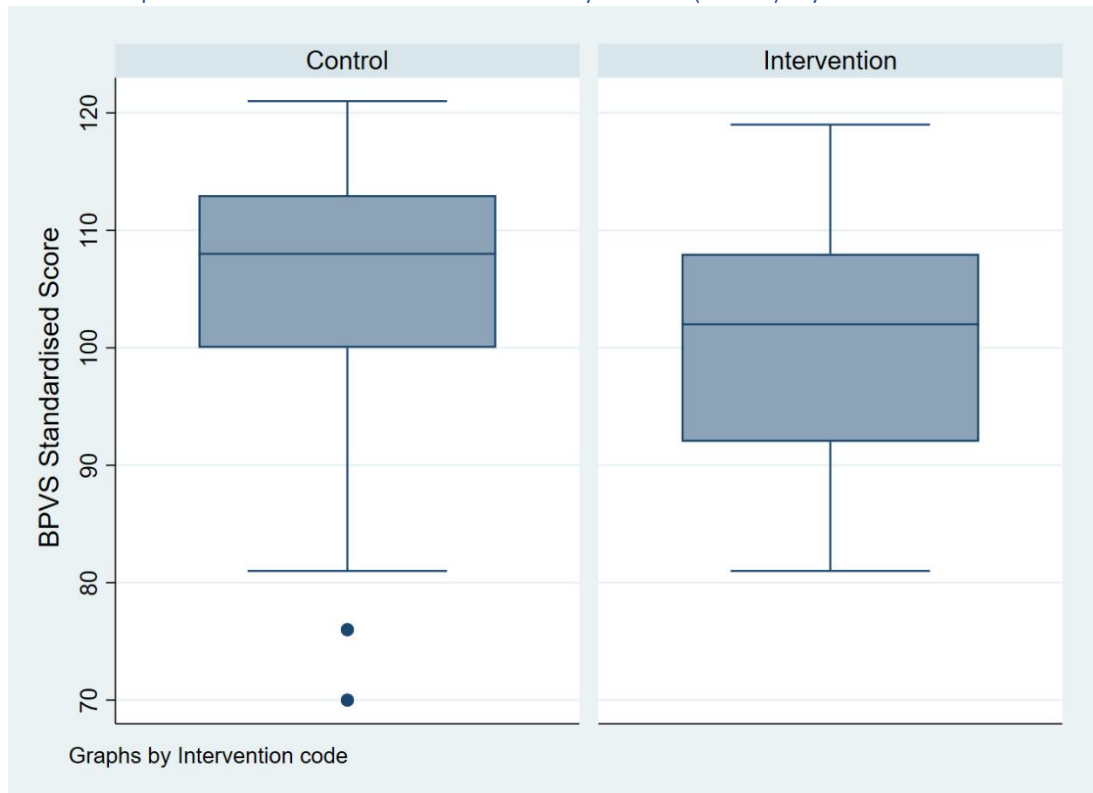


Figure 5: Box plot of SDQ Prosocial by intervention

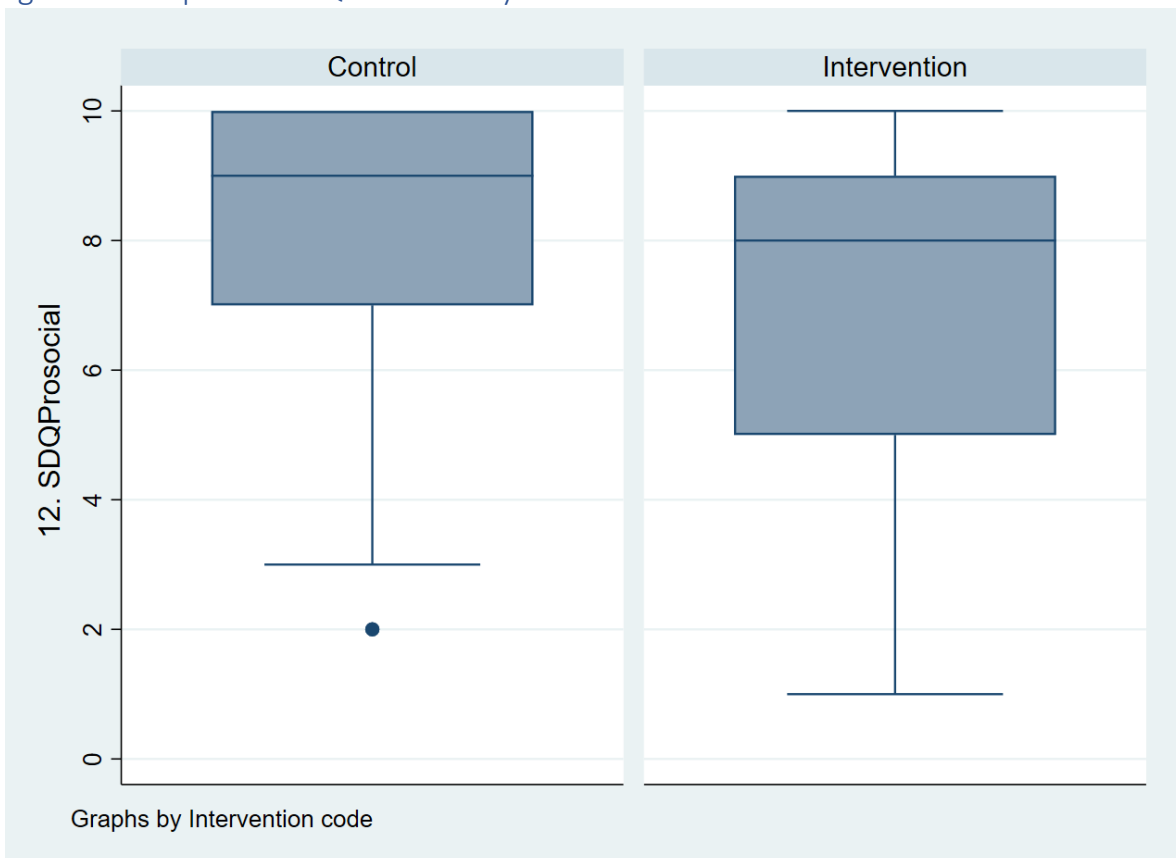


Figure 6: Box plot of SDQ Total by intervention

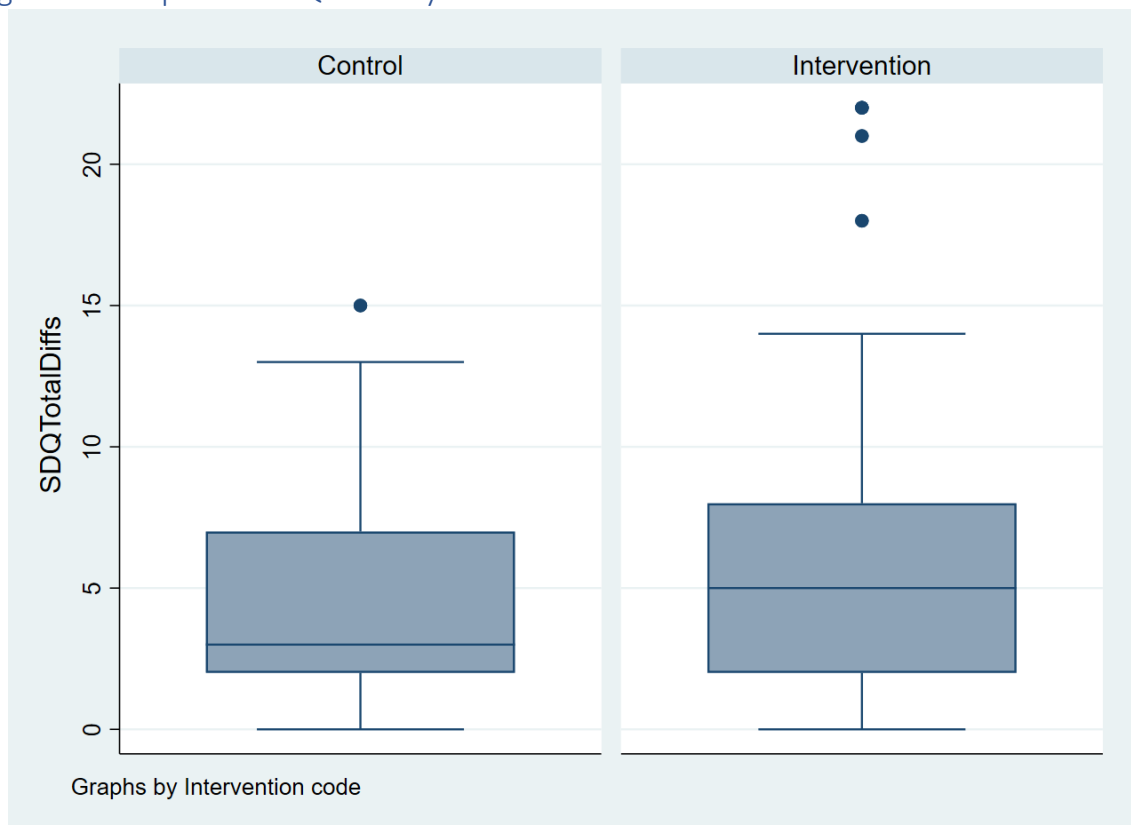


Figure 7: Box plot of BESSI Language & Cognition by intervention



Figure 8: Box plot of BESSI Daily Living Skills by intervention

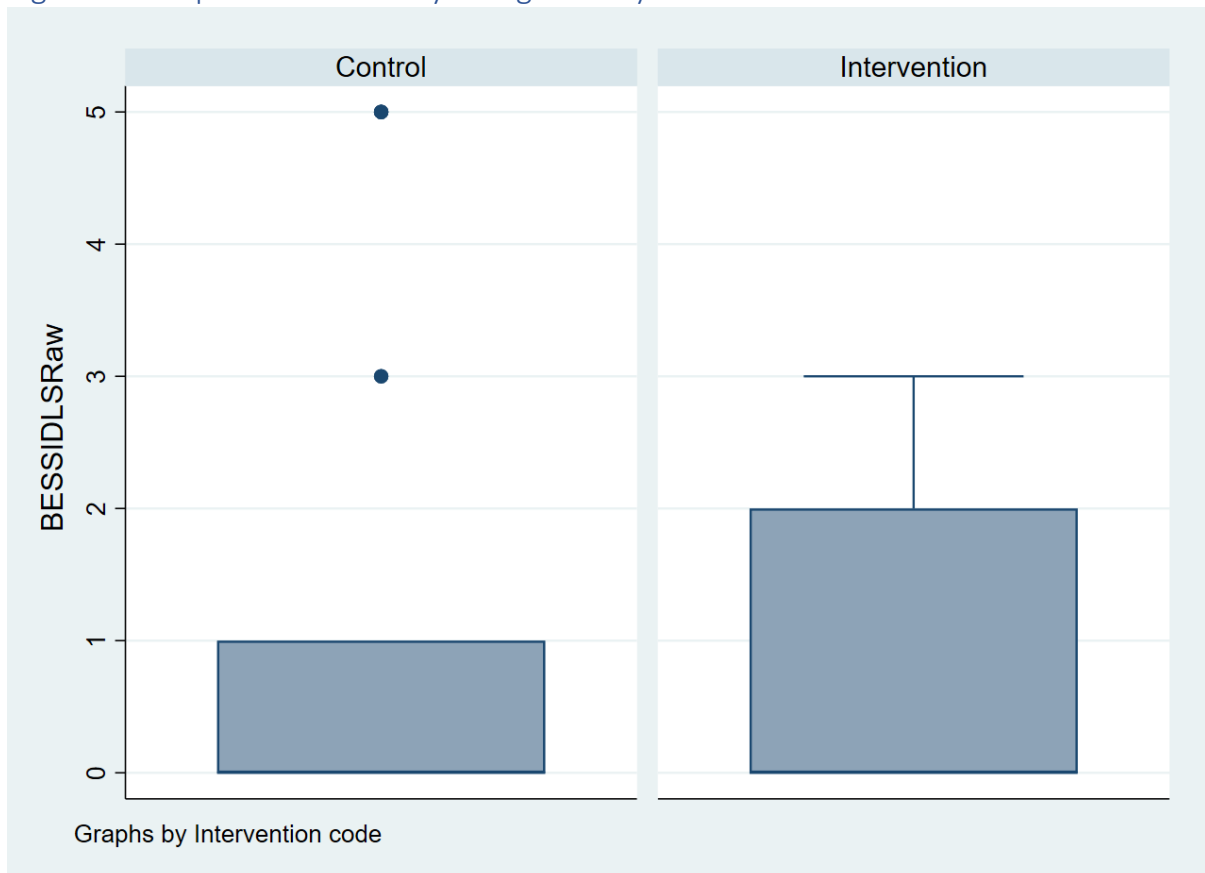


Figure 9: Box plot of BESSI Family Support by intervention



Figure 10: Box plot of Early Years Foundation Stage Profile by intervention

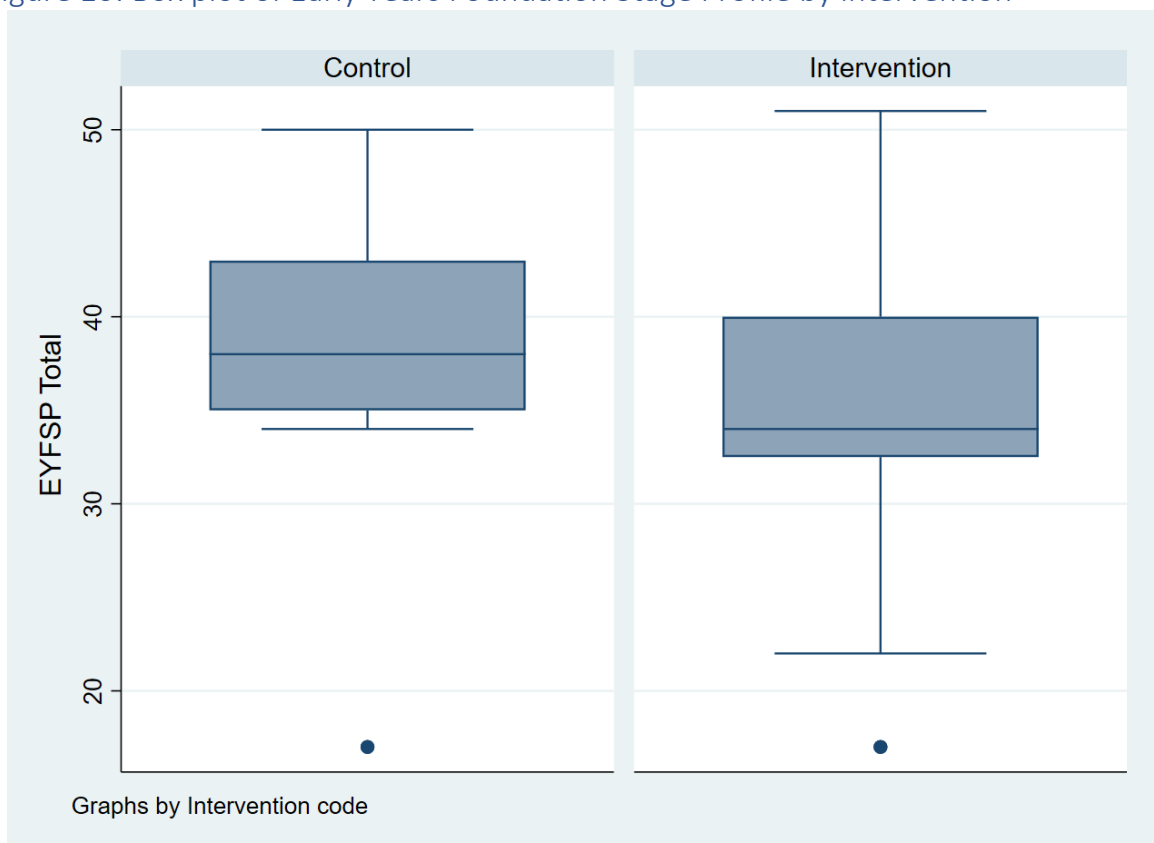


Figure 11: Box plot of Book-Sharing by intervention

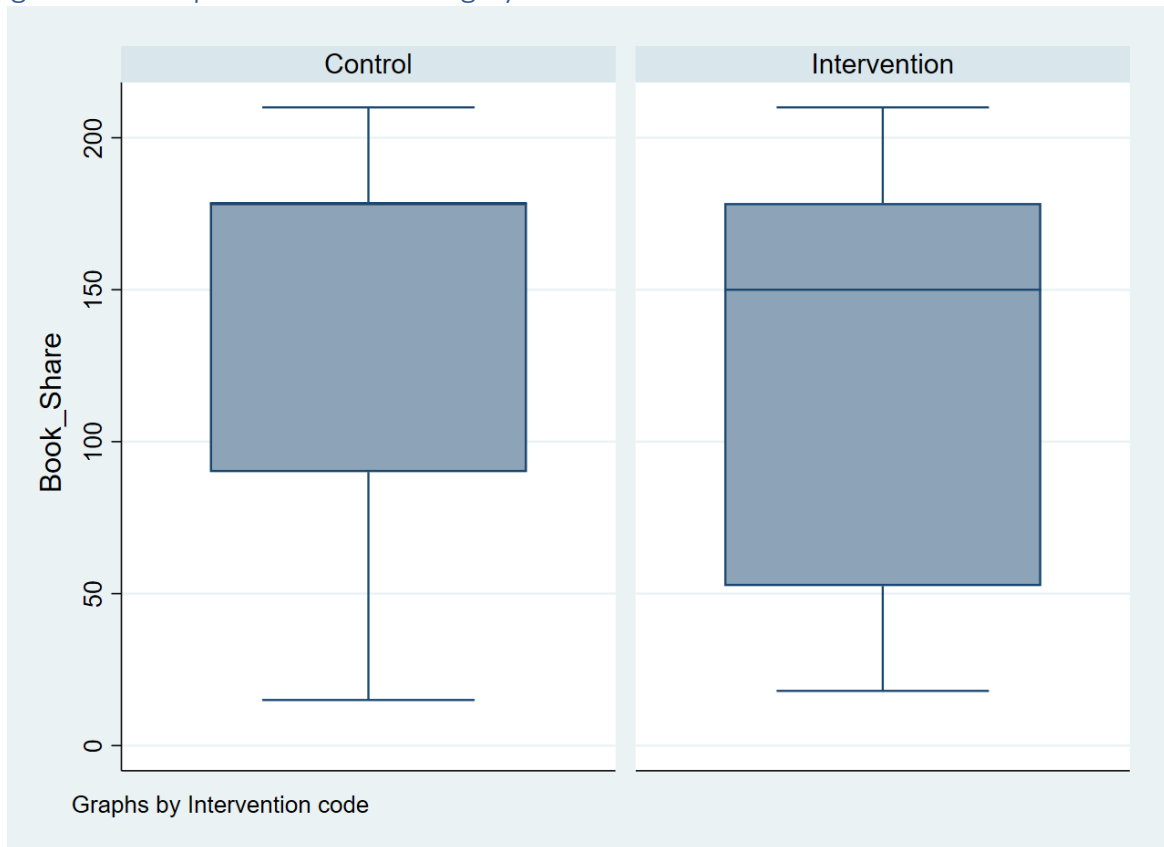


Figure 12: Box plot of Books at Home by intervention

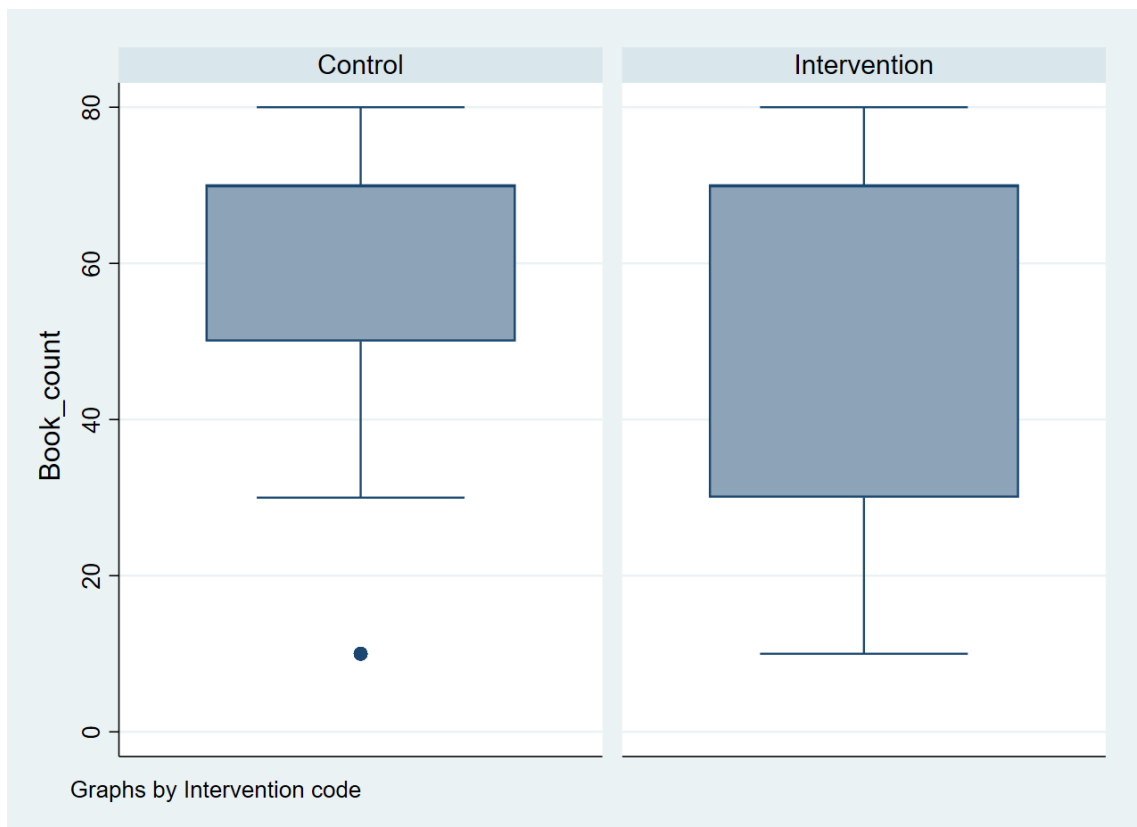


Figure 13: Box plot of Non-Educational Screen Time by intervention

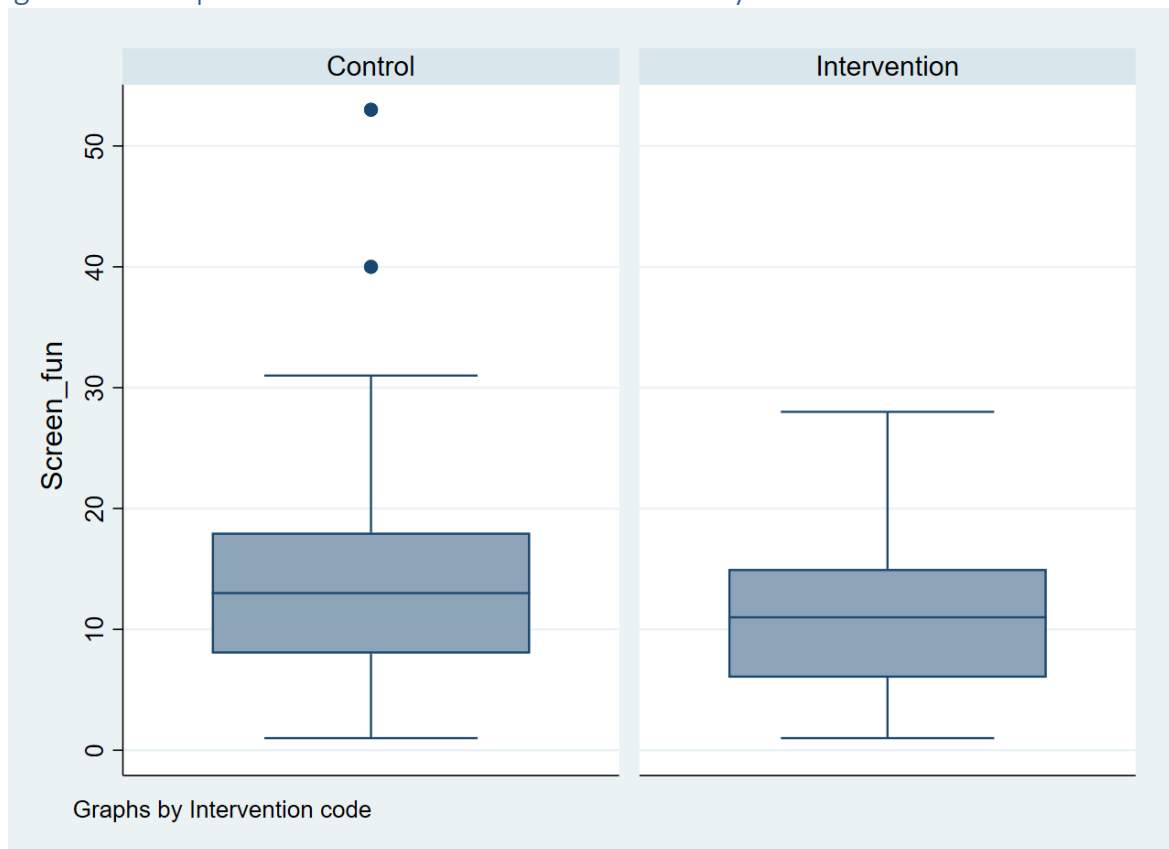


Figure 14: Box plot of Educational Screen Time by intervention

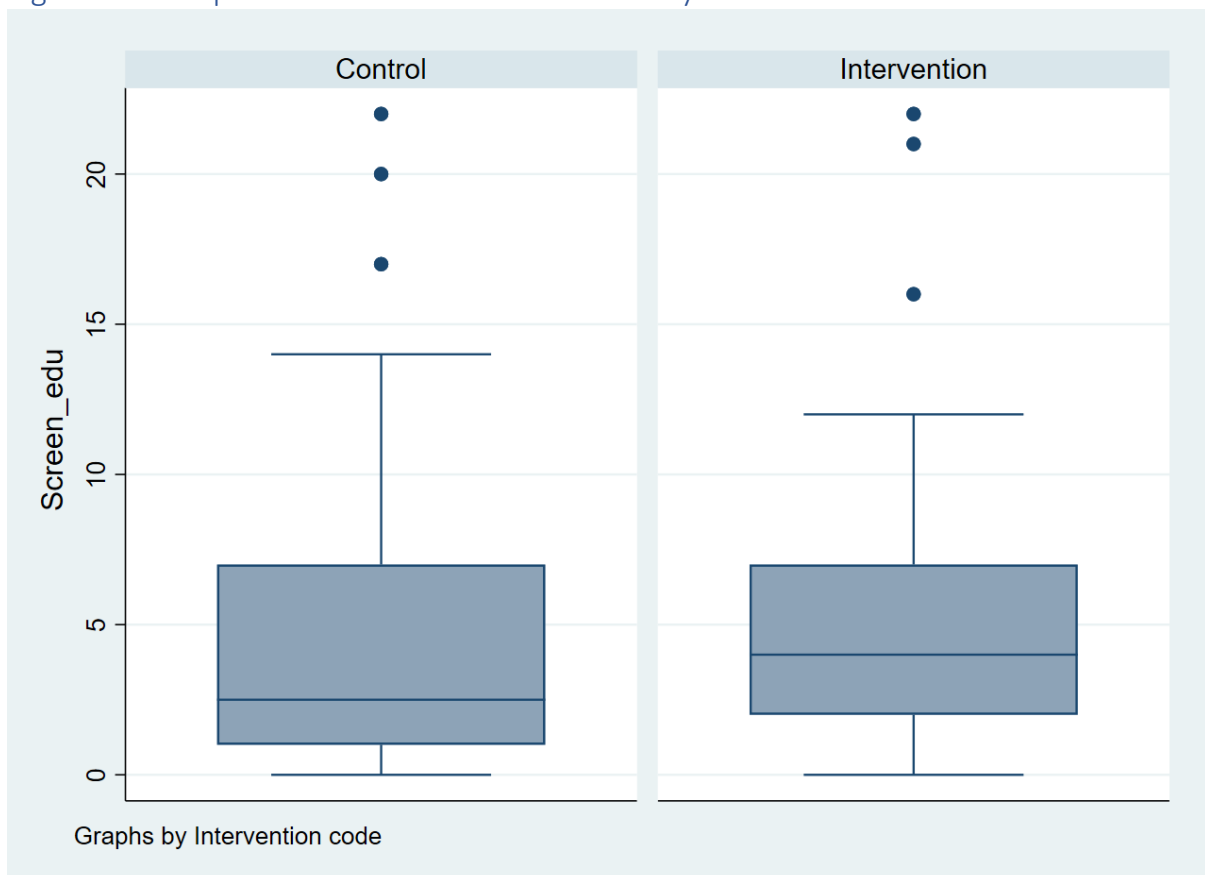


Figure 15: Box plot of Storybook & Author Exposure by intervention

