

The impact of dialogic book-sharing training on infant language and attention: a randomized controlled trial in a deprived South African community

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Background: Dialogic book-sharing is an interactive form of shared reading. It has been shown in high income countries (HICs) to be of significant benefit to child cognitive development. Evidence for such benefit in low and middle income countries (LMICs) is scarce, although a feasibility study of our own produced encouraging findings. Accordingly, we aimed to establish the impact on child language and attention of providing training in dialogic booksharing to carers of infants in an impoverished South African community. **Methods:** We conducted a randomized controlled trial in Khayelitsha, an informal settlement in South Africa. Mothers of infants aged between 14 and 16 months were recruited and randomized to either 8 weeks of manualized training in dialogic book-sharing or a no-intervention control group. Independent assessments were made of infant language and attention at baseline and following training. The trial was registered (ISRCTN39953901). **Results:** Ninety one carer-infant dyads were recruited and randomized to the intervention group ($n = 49$) or the control group ($n = 42$), 82 (90%) of whom were available for follow-up assessments. On a standardized carer report of infant vocabulary, compared to those in the control group, carers who received the intervention reported a significantly greater increase in the number of words understood by their infants as well as a larger increase in the number of words that their infant understood and could vocalize. Intervention group children also showed substantially greater gains on a measure of sustained attention. **Conclusions:** In line with evidence from HICs, a dialogic book-sharing programme delivered to an impoverished South African sample was shown to be of considerable benefit to the development of child language and focussed attention. The training programme, which is simple and inexpensive to deliver, has the potential to benefit child cognitive development in LMIC contexts where such development is commonly compromised. **Keywords:** Dialogic, book-sharing, attention, language.

Introduction

It has been estimated, conservatively, that in excess of two hundred million children in low and middle income countries (LMICs), predominantly from sub-Saharan Africa and Asia, are failing to achieve their developmental potential as a result of poverty (Grantham-McGregor et al., 2007). These children suffer adverse consequences in terms of growth, physical health, socio-emotional competence and cognitive skills. Arguably, it is the cognitive deficits and the associated educational failure that contribute most to the entrenchment of cycles of deprivation. These deficits have an adverse impact on later earnings; in mothers they are related to high fertility and poor child care; and in children, they are associated with poor health and low survival rates (Grantham-McGregor et al., 2007). It has been estimated that only 10%–41% of parents in LMICs provide cognitively stimulating materials to their child, and only 11%–33% actively involve their children in cognitively stimulating activities (Walker et al., 2007). This is of concern, as research from HICs has convincingly demonstrated that providing young children with cognitively stimulating activities

and exposing them to learning opportunities significantly enhances their cognitive and social-emotional competence (Engle et al., 2007). In the light of this evidence, an urgent need has been identified for the development and implementation of interventions aimed at promoting cognitive stimulation of young children in LMICs (Engle et al., 2007; Grantham-McGregor et al., 2007; Walker et al., 2007).

One potential strategy for stimulating cognition in infants and young children that has received scant exploration in LMICs is the promotion of interactive shared carer-child reading, also referred to as 'book-sharing' (BS). The argument for why BS is beneficial to child cognitive development has usually been framed in Vygotskian terms. Vygotsky (1978) argued that child language and wider cognitive development occurred within the context of a social interaction with a knowledgeable other. Carers use BS to scaffold children's mastery of language by initiating, supporting and encouraging the acquisition of new words and concepts. They achieve this by engaging in extensive labelling of objects, questioning, and commenting about the pictures depicted in what is termed 'decontextualized talk', that is, talk that extends beyond the pictorial representations in the book to include additional new and unfamiliar

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concepts (Vygotsky, 1978). The limited application of BS in LMICs is particularly surprising in light of the considerable evidence from HICs of the benefits to child cognitive development of this method of stimulation. Indeed, a considerable body of evidence attests to the benefits of BS for the development of receptive and expressive vocabulary (Sénéchal, 1997), abstract language (van Kleeck, Gillam, Hamilton, & McGrath, 1997), syntactic quality and complexity of sentence construction (Bus, van IJzendoorn, & Pellegrini, 1995; Valdez-Menchaca & Whitehurst, 1992), emergent literacy skills (Lonigan, Anthony, Bloomfield, Dyer, & Samwell, 1999), literal and inferential language (Kleeck, Vander Woude, & Hammett, 2006) and oral narrative skills (Lever & Sénéchal, 2011). Particularly convincing evidence for the value of BS comes from studies where instruction has been provided to carers that aims to improve the quality of their BS skills. These studies have generally assessed the value of training in 'dialogic reading', a method of intervention first described by Whitehurst and colleagues, in which carers are trained, either one-to-one, or else in small groups, to provide high quality BS (Whitehurst et al., 1988). 'Dialogic reading' refers to adults' use of evocative or interactive behaviours during BS with their child, including following the child's interest, asking open-ended questions, following the child's answers with further questions, repeating and expanding on the child's responses, and providing praise and encouragement of the child's participation. Several well controlled studies, mainly carried out in the United States, have demonstrated that carers can be trained to engage in high quality dialogic reading, and that when such training is provided, there are significant benefits to child developmental progress (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Lonigan & Whitehurst, 1998; Whitehurst et al., 1988). The evidence of the benefit of BS to children is so strong that book-sharing has been termed a 'vocabulary acquisition device' (Ninio, 1983).

We are aware of only three studies that have systematically examined the value of providing BS training in LMIC contexts. In the first of these, two-year-olds in Mexico who had received a book-sharing intervention delivered by nursery teachers were found to perform better in comparison to controls on both receptive and expressive vocabulary tests. Differences in the quantity and quality of language produced were also found, with intervention group children producing more utterances than controls, as well as longer and more complex sentences (Valdez-Menchaca & Whitehurst, 1992). The second study was conducted in rural Bangladesh. Teachers delivered dialogic BS to a sample of 5–6 year old children. Compared to controls who had not received the intervention, the children who had received the BS input evidenced large improvements in expressive vocabulary (Opel, Ameer, &

Aboud, 2009). Finally, we recently conducted a feasibility study in an impoverished South African sample from Khayelitsha, a peri-urban settlement on the outskirts of Cape Town. This is a particularly apposite context in which to evaluate the impact of providing early cognitive stimulation, as the children of South Africa are performing particularly poorly educationally, even in comparison to the children of other LMICs (Twist, 2007). Indeed, in recent years there has been a trend of consistent deterioration of school grade scores achieved by South African children, especially for the key skills of reading and literacy (Department of Basic Education, 2011). In our feasibility study, we compared the outcomes of a small group of children whose mothers received training in dialogic BS with children whose mothers received training in sensitive toy play. We found a significant benefit of the BS training: in comparison to controls, BS intervention group mothers became more sensitive, more facilitating, and more elaborative in book sharing; and, compared to controls, infants whose mothers had received BS training showed larger gains in terms of receptive and expressive vocabulary and sustained attention (Cooper et al., 2014).

The findings of the Mexican and Bangladeshi studies, together with our own preliminary results from South Africa, suggest that providing BS training to carers of young children living in challenging LMIC contexts could be of benefit to child developmental progress. To test this hypothesis, we carried out a randomised controlled trial in South Africa. We assessed the impact of BS training on child language development, as previous studies have done, but we also assessed child sustained attention. Although this has not previously been measured in BS studies, the literature on the benefits to child developmental progress of periods of joint attention between the child and their carer (Mundy & Newell, 2007) suggested that BS training could well benefit infant sustained attention. Further, the fact that praise, displays of warmth, responsiveness and sensitivity, and taking the child's developmental level into consideration during episodes of joint attention – all central features of good BS – support the development of children's attentional skills (Scott et al., 2013) also suggests that child attention should be a key variable in assessing the value of BS training. Notably, early infant sustained attention has consistently been found to be a reliable predictor of later child IQ (Slater, 1995).

Methods

Study design and participants

This study employed a randomized, controlled design. Carers and their young infants were recruited from a peri-urban settlement on the outskirts of Cape Town, Khayelitsha. This settlement is characterised by endemic poverty, mass unemployment, and rampant crime, with many families living in

make-shift shacks with little to no access to sanitation or basic services (Thompson & Nleya, 2012). There are high rates of illiteracy (Aitchison & Harley, 2006). Notably, there is no culture of sharing books with young children within this community. Recruitment of participants was conducted between October and December 2012. A research assistant identified families with young children and dyads from a defined area around the research base, and those who met the following criteria were invited to participate: infant aged 14–16 months at baseline; primary residence in the catchment area; carer competent, able and willing to give informed consent; and a primary caregiver (not necessarily the mother) who was able to attend training sessions. While the great majority of carers were mothers, the sample included 13 grandmothers, two aunts, four fathers, and two neighbours.

Carers provided signed informed consent before the baseline assessment. The trial was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the University of Reading Research Ethics Committee, (2012/007/PC) and the Stellenbosch University Research Ethics Committee (S12/04/088). The trial was registered (ISRCTN39953901).

Randomization and masking

A sample of 112 families was identified with a child of the appropriate age (see Figure 1. CONSORT). The socio-economic profile of those in this neighbourhood is representative of Khayelitsha in general. Ninety one carer-infant dyads were recruited into the study. Ten training slots for each week were specified (Monday to Friday, morning and afternoon) and, following consent, carers opted for the slot most convenient to their schedule. Two groups of three to five carers and their infants were thereby constituted for each slot. When all slots had been filled, for each one of the ten time frames (e.g. Monday morning) the two groups were assigned to receive the training immediately (index group) or after 10 weeks (control group) by randomly drawing a one (index) or a two (control) from a bag. This resulted in 49 carers and their infants assigned to the group to whom the training programme in dialogic shared reading was to be provided immediately, and 42 to a control group who received no input from the research team, apart from the assessment.¹ The two groups were similar with regard to demographic features (see Table 1). The carer-infant dyads then visited the research centre to complete

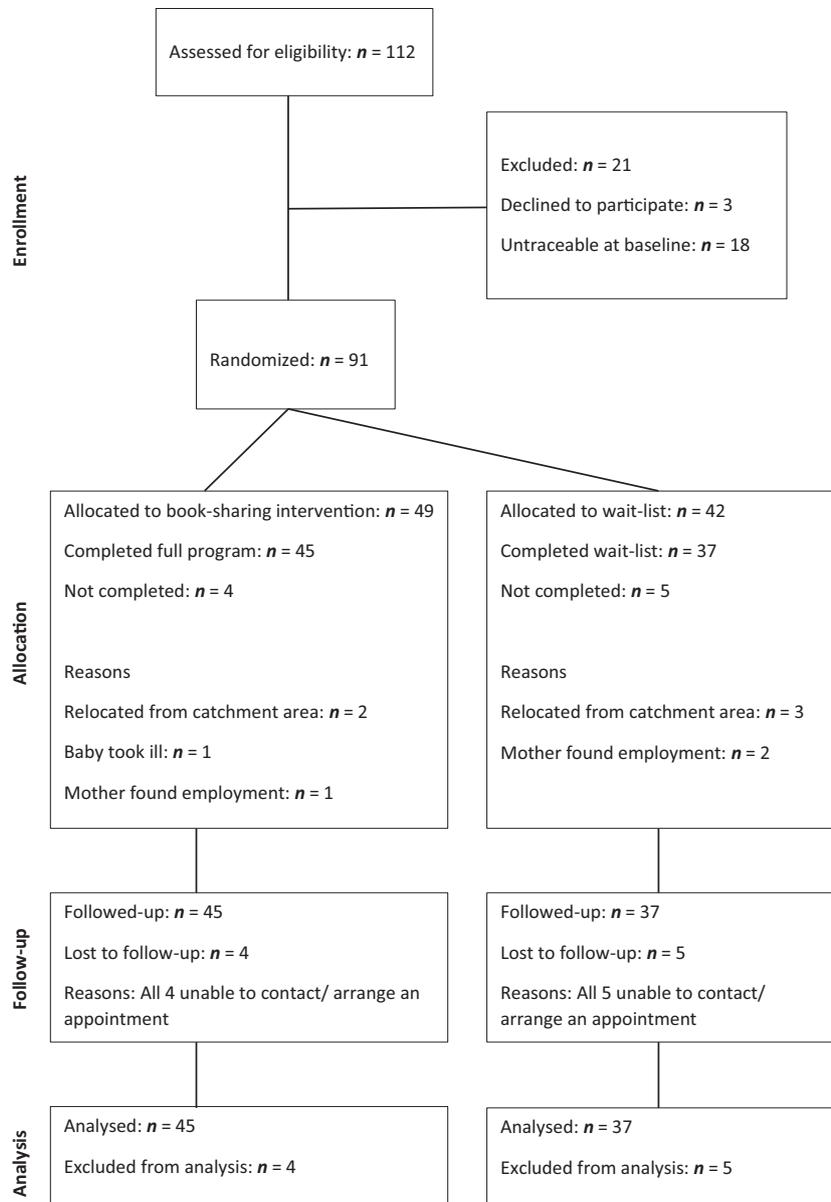


Figure 1 CONSORT diagram showing flow of participants through trial

Table 1 Demographic characteristics of sample at baseline

	Intervention (n = 49)	Control (n = 42)
Infant age (Months)	15.45 (0.71)	15.29 (0.77)
Mother/Caregiver age (Years)	33.35 (10.21)	31.76 (8.49)
Infant gender		
Male	33 (67%)	26 (62%)
Female	16 (33%)	16 (38%)
Mother/Primary caregiver years of education ^a		
Less than 8 years	4 (8%)	1 (2%)
Between 8 and 12 years	43 (88%)	39 (93%)
More than 12 years	2 (4%)	2 (5%)
Family household income per month ^b		
No cash income	7 (14%)	4 (9%)
Between R1 and R500	0 (0%)	1 (2%)
Between R501 and R1000	7 (14%)	7 (17%)
Between R1001 and R2000	13 (27%)	17 (40%)
Between R2001 and R3000	10 (21%)	7 (17%)
Between R3001 and R4000	5 (10%)	2 (5%)
Between R4001 and R5000	1 (2%)	2 (5%)
More than R5000	6 (12%)	2 (5%)
Mother marital status		
Single	26 (53%)	25 (60%)
Divorced/ Separated	2 (4%)	0 (0%)
Married	20 (41%)	16 (38%)
Widowed	1 (2%)	0 (0%)
Living with partner	0 (0%)	1 (2%)
Family housing circumstances		
Shack	20 (41%)	15 (36%)
Brick House	28 (57%)	27 (64%)
Room/Garage	1 (2%)	0 (0%)
Previously shared books		
No	33 (67%)	30 (71%)
Yes	16 (33%)	12 (29%)

Data are mean (SD), or n (%).

^aIn South Africa, the first 7 years of school are the primary school years. High school follows from years 8 to 12 with graduation from Grade 12 considered to be completed education and equivalent to A-level completion in the UK.

^bAccording to the Rand-Pound Sterling exchange rate as at 9 May 2014, R500 = £28, R1000 = £56, R2000 = £113, R3000 = £170, R4000 = £227, R5000 = £283. Unlike the UK where there is a national minimum living wage, in South Africa this is industry-specific. For farm labourers for example, the Ministry of Labour has set the minimum living wage at R2274 per month (£129).

baseline assessments. These included a background interview concerning demographic information, as well as measures of infant language and attention (see below). The assessor who conducted the baseline and outcome assessments was experienced in the assessment of children, having worked as a data collector in our research group for several years. She received 3 days of training in the assessment battery before the commencement of the study, consisting of training in the administration procedure for each assessment and several practice assessments. She carried out both baseline and follow-up assessments unaware of group assignment. The researchers who performed the scoring/ coding of assessment data were similarly unaware of group assignment.

Training

We developed an eight session BS training programme that we specified in a session by session manual (available on request). The structure and content of the programme was informed by the original Whitehurst model, as well as subsequent research conducted on dialogic training (Arnold

et al., 1994; Lonigan & Whitehurst, 1998; Whitehurst et al., 1988). We were also able to draw on our own pilot work (Cooper et al., 2014). This training programme involved the carer and infant attending a 90-min session weekly for eight consecutive weeks. Training was delivered in groups of four to five carers and infants. In order for the training programme to be presented to carers in their own language (isiXhosa), we recruited two women from the local community and trained them in BS principles and in how to use the manual to deliver the intervention. They were provided with weekly supervision throughout the conduct of the study. Each training session consisted of a group-delivered didactic presentation, accompanied by demonstration video clips, as well as time for individual guidance provided to each carer-infant dyad while they engaged in BS.

The training sessions were designed to build up sensitive book-sharing skills incrementally. In the first session the benefits to infants of book-sharing were outlined and the key features of sensitive BS described. At the end of the didactic session there was a 20 min group discussion focused around the picture book they were to take home for the week. The carers were encouraged to practise book sharing with their infant, using the book, for at least 10 min every day. The session ended with each carer and infant provided with individual attention from one of the trainers for 10–15 min while sharing the book. The trainer also modelled optimal behaviours with the infant while the carer observed. Following this introductory session, there were a further five sessions concerned with following the infant's lead, pointing and naming objects and actions, making elaborative links between the book's content and the infant's own experience, and talking about emotional content. The final two sessions were dedicated to individual guidance where carers were given opportunity to practise while a trainer observed and provided with individual feedback. Table 2 shows the key learning points around which the BS guidance was provided.

Assessments

The assessments were conducted by a local native isiXhosa-speaking woman who received training from our team in the administration of the assessments and worked alongside one of us during the course of the study (ZV). Assessments were conducted within the research base with each carer and child at baseline and then again immediately following the 8 week training programme.

Child language. Child language was assessed by interviewing the mother, using the MacArthur-Bates Communicative Development Inventory (CDI; Fenson et al., 2000) which we translated into isiXhosa. The translation was performed by a group of research assistants, all of whom were isiXhosa-speaking residents of Khayelitsha, who had previously undertaken translation of English psychometric instruments. First, the 89 items on the CDI checklist were screened by two of the translators to determine whether the words were appropriate for the Khayelitsha context. Seven words were excluded and replaced with culturally acceptable alternatives. Second, the 89 CDI items were forward translated into isiXhosa by two translators working independently. Third, the two translators, together with a third translator, checked for discrepancies between the two versions. Ambiguities and discrepancies were discussed and resolved by consensus. Fourth, the isiXhosa inventory was translated back into English by two additional translators working independently, resulting in two back-translated versions, and again ambiguities or discrepancies were discussed and resolved. Finally, all five translators convened to agree a final version of the instrument. This interview was administered to mothers at baseline and following the training period, providing a continuous measure of child language comprehension and production.

Table 2 The training programme included the following basic components of dialogic reading and endeavoured to provide guidance in acquiring these necessary skills (Whitehurst et al., 1988)

1. *Active child participation:* The infant should be encouraged to actively participate in the book-sharing experience rather than simply being a passive listener being read to. The carer is encouraged to follow cues from the infant; to support and encourage the infant's active participation, and to facilitate the infant's handling of the book, by helping the infant to turn pages and steady and orient the book.
2. *Pointing and naming:* The carer is encouraged to point to and name objects in the infant's visual field, indexed by simple looking, patting, banging, or scratching the picture. The carer is encouraged to respond to these behaviours by pointing to and naming the object (or action, or emotion, for more cognitively sophisticated children) that has attracted the infant's attention.
3. *Emphasize the stimuli to which the baby attends:* The carer is encouraged to support the infant's interest in whatever is named by animating what is shown (e.g. moving their hand up and down to mark the bouncing of a pictured ball).
4. *Active questioning using 'where' style questions:* For words the infant understands, the carer is encouraged to prompt the infant to point to a particular object or character, asking questions starting with 'Where is the ...?', or 'Can you find the ...?'
5. *Active questioning using 'what' or 'who' style questions:* Later, when the infant knows how to say the word for an object, the carer is encouraged to ask questions like 'What is this?' while pointing to the relevant aspect of the picture for the infant to name.
6. *Active linking of book content to the baby's real world:* The carer is encouraged to link the content illustrated in the book to the infant's own experience (e.g. encourage the infant to imitate a character's actions; take turns to point to a pictured animal's nose, and then find their own nose and the carer's nose, the carer saying the word along with each point). Linking should be appropriate to the infant's age and cognitive sophistication. Thus, with young infants such linking is located in the here and now; whereas with older infants the carer may choose to elaborate what is on the page to the infant's wider experience (e.g. the pictured dog is 'just like the dog next door'; or perhaps the picture can be linked to a recent visit to the shop when the mother and baby bought groceries 'just like the mother and baby here in the book').

In view of the possibility of biased reporting, a measure of language comprehension was developed, modelled on the Peabody Picture Vocabulary Test Revised (PPVT-R; Dunn & Dunn, 1981). A series of four picture cards was created, each showing four objects. The final set of items was established following discussion with a focus group of local mothers who confirmed that all the objects depicted would be familiar to the children. The words denoting the objects were translated and back-translated into a final set of isiXhosa-words, following the procedures outlined by Sousa and Rojjanasrirat (2011). Administration of this test followed the same procedures used for the PPVT-R (Dunn & Dunn, 1981). The child was seated in a high chair or on their mother's lap and shown four cards in sequence, each one showing four pictures. For each item, over a period of 10 s, the isiXhosa-speaking researcher asked the child to identify a particular object by saying: 'Look at all these things. Where is the XXXX?'; 'show me the XXXX'; 'point to the XXXX'. Each card was presented four times to cover the full set of 16 pictures. Since many of the children were so inhibited that they would not point or verbalize, a small camera was attached to an easel behind the presentation card, positioned at the infant's eye level, to monitor the direction of infant gaze. If the infant pointed to the correct picture, the assessor scored this immediately as a correct response. Pointing was rare, but when it occurred was invariably to the correct item. In the absence of pointing the task was scored by an independent research assistant who later viewed the recorded video material. If the infant focused his/her gaze on the correct picture for more than half of the 10-s presentation time, this was scored as correct comprehension of the item (Houston-Price, Mather, & Sakkalou, 2007).

Infant attention. To assess infant sustained attention, we used the Early Childhood Vigilance Task (ECVT; Goldman, Shapiro, & Nelson, 2004), a computer-administered assessment in which the child views interesting moving cartoon stimuli. The child monitors the screen as images appear, disappear, and then reappear over a period of seven minutes. Infant sustained attention is indexed by the number of seconds the child attends to the screen. Two assessors made ratings from video recordings of infant gaze. Inter-rater-reliability was excellent for both the baseline and the follow-up assessment ($r = .976$ and $.972$ respectively).

Data analysis

We used the SPSS-17 (SPSS Inc, 2006) software package for descriptive and inferential statistical analyses. Post-training mean scores for each measure were compared between experimental groups using an analysis of covariance (ANCOVA), with baseline scores included in the computation as a covariate to partial out the potential effect these scores may have had on the outcome measure (Van Breukelen, 2006). This procedure was followed in all analyses where the distributions conformed to the necessary assumptions for an ANCOVA analysis. Where this was not the case, a non-parametric analysis of covariance was employed following the procedure suggested by Quade (1967). The differences between the intervention and control groups are expressed in terms of effect size using *partial* η^2 .

Results

Participants

Figure 1 provides a CONSORT diagram. Nine participants (9.9%) were lost to follow-up. The reasons were relocation from the catchment area ($n = 5$), the mother finding employment and having to discontinue participation ($n = 3$), and infant illness ($n = 1$). Attrition was not related to group assignment or to any demographic factor. Amongst those in the index group, the great majority attended all eight training sessions ($n = 43$, 88%).

It can be seen from Table 1 that the training group and the control group were very similar with respect to background demographic features. Almost a third of the carers said that they had at some point shared books with their child; however, none reported this as a regular practice.

Child language

On the CDI, compared to control group carers, carers who had received the training reported a

significantly greater number of words understood by their infant (post-intervention mean scores of 55.82, $SD = 8.77$ vs. 44.46, $SD = 9.88$). The difference in post-training performance, after controlling for baseline scores, was highly significant ($F(1, 79) = 28.34, p < .001, \text{partial } \eta^2 = .27$). Compared to controls, infants whose carers had received training reported that their infants could both understand and vocalize a significantly greater number of words (mean scores of 26.04, $SD = 18.72$ vs. 9.62, $SD = 14.07$). This difference, after controlling for baseline scores, was also highly significant, ($F(1, 80) = 24.224, p < .001, \text{partial } \eta^2 = .23$). Figures 2A,B show the extent of the improvement for both groups on the two inventories of the CDI. These effects of training can, according to Cohen (1988), be regarded as of large and medium magnitude respectively.²

As can be seen from Figure 2C, on our own measure of comprehension, compared to control group children, children whose carers had received the training correctly identified a greater number of items [$M = 3.19$ ($SD = 1.67$) vs. $M = 2.62$ ($SD = 1.85$)]. After controlling for the effect of baseline performance, however, the difference was not quite significant, ($F(1, 79) = 3.54, p = .06, \text{partial } \eta^2 = .04$). In view of the distributions shown in Figure 2C, a comparison of gain scores (i.e. post minus pre-intervention score) was also made. This showed a significant benefit of training (mean ranks of 46.83 vs. 35.01 respectively, $U = 592.500, z = 2.266, p < .05$, and a medium effect size of Cohen's $d = .5$).

Sustained attention

As can be seen from Figure 3, in terms of infant sustained attention as measured by the ECVT, children whose carers received training showed a substantial increase, while those in the control group showed no change over the 8 week period (post-training mean scores of 45.79, $SD = 18.47$ vs. 30.12, $SD = 14.60$ for the index and control groups respectively). This difference in performance, after controlling for baseline scores, was highly significant, ($F(1, 79) = 27.10, p < .001, \text{partial } \eta^2 = .26$). This effect is of large magnitude (Cohen, 1988).

Discussion

The study was the first large scale RCT of book-sharing carried out in a LMIC. The benefit of the

training to the child developmental outcomes assessed was substantial. The impact of the training on infant attention is particularly striking. While, as expected,

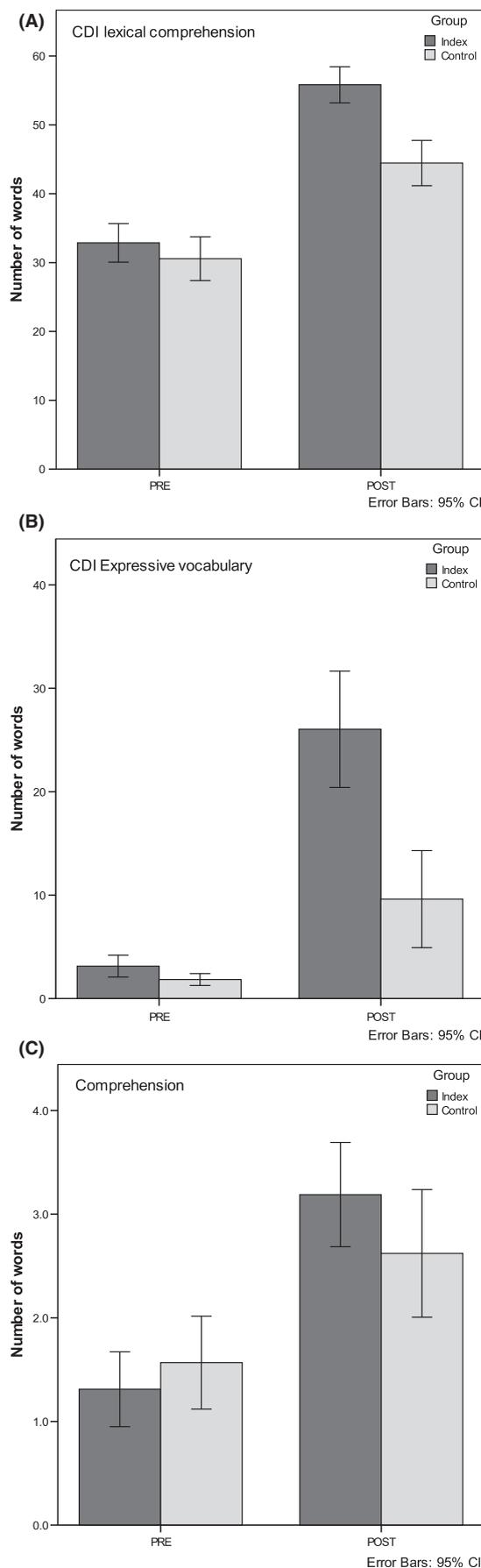


Figure 2 (A) Mean scores (i.e. number of words) for the CDI parental report of lexical comprehension at pre- and post-training for index and control groups. (B) Mean scores (i.e. number of words) for the CDI parental report of expressive vocabulary at pre- and post-training for index and control groups. (C) Mean scores (number of words) of comprehension performance at pre- and post-training for index and control groups

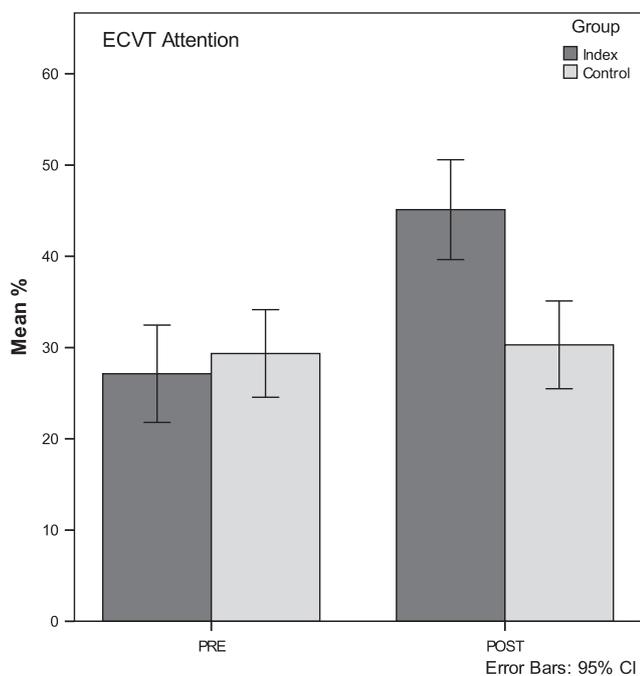


Figure 3 Mean scores (i.e. proportion of time) of ECVT performance at pre- and post-training for index and control groups

those in the control group, evidenced small improvements in both lexical production and comprehension over the 9 weeks of the study, they showed no change in the attention measure. The training group, in contrast, evidenced an improvement in attention that was both reliable and substantial. This is especially significant in light of the fact that measures of sustained attention in infancy have been found to be strong predictors of later cognitive performance and IQ (Choudhury & Gorman, 2000; Slater, 1995).

The BS training had a benefit of moderate magnitude on infant lexical production, and of large magnitude on infant comprehension, as assessed by the CDI. There was a similar benefit of training on our own measure of comprehension. There are no comparable studies from LMICs with which to compare our data. Our findings are, however, consistent with the results obtained in HICs (e.g. Arnold et al., 1994; Lever & Sénéchal, 2011; Lonigan & Whitehurst, 1998), with the findings of Valdez-Menchaca and Whitehurst (1992) with older children in Mexico, as well as with our own pilot findings from Khayelitsha.

We did not find a particular benefit for expressive as opposed to receptive vocabulary, as has been previously reported (Opel et al., 2009; Whitehurst et al., 1988). Sénéchal (1997) contends that the development of expressive vocabulary is especially supported during BS via imitation and prompts for labelling, whereas receptive vocabulary is nurtured by increased frequency and exposure to novel vocabulary in the context of BS. It would appear from the broadly equivalent impact on expressive and receptive language of the form of BS training we provided that it promoted both classes of BS skills equally.

The isiXhosa version of the CDI we used had not been standardised. As such, the comparison between index and control groups was made on raw scores. While there is no problem with interpreting the data – and, indeed, there is precedent for this analytic approach (e.g. Pan, Rowe, Spier, & Tamis-LeMonda, 2004) – it does mean that we cannot make claims about percentile improvement. While this is unfortunate, our conclusion that the training group improved significantly more on the CDI than the control group seems uncontroversial. However, there remains, of course, concern about the reliability of a parent report measure of child language (a concern that would exist even if standard scores were available). Previous examinations of the reliability of the CDI have been reassuring (Feldman et al., 2000, 2005; Pan et al., 2004); and the training we provided to the assessor, and the monitoring we set in place, did ensure that the CDI was administered in a rigorous and standardised manner. However, it remains possible that the observed effects on the CDI were a function of carers' increased awareness of their child's linguistic abilities, rather than a true representation of any improvement in child language. This potential problem does not apply to our own measure of child comprehension, which was a direct child measure. The fact that the findings using this measure of comprehension are very much in the same direction as the CDI findings provides some reassurance that the CDI data do, indeed, reflect a veridical training effect.

The final assessment in the current study was made immediately after the 8 weeks of training. Without follow up assessment, the durability of the training effect is indeterminate. Previous research has found that 9 months following the completion of a successful BS intervention, while a positive training effect was still evident, the magnitude of effect had diminished (Whitehurst et al., 1988); and, in a sample of children from low-income families who attended subsidized day-care centres in New York, the benefits to child language resulting from carers having received training in BS were no longer evident at a 6 month follow-up assessment (Whitehurst et al., 1994). Given this potential decay of training effects on child language outcomes, it would seem that any implementation of BS should include ongoing support.

The BS training was well received by the Khayelitsha participants. While the carers were commonly initially sceptical about the idea of sharing books with their infants, once the purpose had been explained to them and, especially when they had seen some videos of local infants successfully sharing books with their carers, they were most enthusiastic about participation. Further, after the first week or two of the programme, carers reported being aware of the positive impact on the infants of their sharing books with them, which itself served to sustain their motivation. The fact that almost all carers attended all eight training sessions is testimony to their commitment.

The findings of the current study demonstrate that the well established benefits to infant cognitive development of training in dialogic BS found in HICs similarly obtain in the deprived peri-urban conditions of Khayelitsha. In societies where there is no or little culture of BS, and no alternative form of early interpersonal engagement which could serve an equivalent educative function, the introduction of dialogic BS interventions could be of profound benefit to child intellectual development.

Given the scarcity of human resources and the financial constraints that obtain in LMICs, it is essential that interventions to promote child intellectual development are developed that can be delivered in a group format with relatively few sessions, and that can be integrated into other delivery platforms. Our booksharing intervention satisfies these criteria. Further, it is delivered by local community workers, again, an important economic consideration for scale up. Following the impressive effects on child language and attention evident in the current trial, it is our intention now to

test the intervention at a community, neighbourhood or district level.

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Key points

- Previous evidence, almost all from HICs, has revealed that parents and carers of infants can be instructed in the skills needed for sensitive book-sharing, and that this is of benefit to infant language development.
- The current study, carried out in a LMIC (South Africa), found a clear benefit of providing book-sharing training to carers in terms of both infant language (production and comprehension) and attention.
- The demonstrated benefits of book-sharing training to infant intellectual development in the current study were substantial. The introduction of such training in environments of social and economic deprivation could have a profound impact on the children's development.

Notes

1. The controls received training after the second round of assessment. Unfortunately, there were no resources to assess the impact of training on the controls.
2. Cohen's (1988) rule of thumb on magnitude of effect sizes have been used throughout. Accordingly, for *partial*², an effect size of 0.02–0.12 is deemed small, 0.13–0.25 medium, and 0.26 and higher large.

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