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The Benefits of Early Book-Sharing Interventions for Parenting and Child Development: A Meta-Analysis and Experimental Evaluation

DPhil Thesis submitted in partial fulfilment of the Doctorate of Philosophy in Social Intervention by stand-alone papers at the University of Oxford

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Half of South Africa's children have never read a book with a parent or caregiver.

I hope this work can play a small part in changing this.

Thesis Abstract

Background

Children in low- and middle-income countries (LMICs) are at risk for problems in cognitive, social and behavioural development. Factors such as a lack of cognitive stimulation and parenting practices that lack sensitivity are central to the genesis of these developmental problems and are exacerbated in the context of poverty. Interventions that target the intersection of early childhood development, parenting, and early violence prevention are required to meaningfully address these problems.

One promising intervention for improving parenting and child language and cognitive outcomes is caregiver-child picture book sharing. However, there is a paucity of up-to-date systematic evidence regarding the impact of parent-targeted book-sharing interventions on child and parenting outcomes. In addition, little is known about the mechanisms by which these interventions operate, which include the nature of caregiver-child dialogue. Further, it is unknown whether, in LMIC contexts, certain kinds of caregiver utterances are linked to areas of child development such as social understanding, as has been shown in high-income countries (HIC). Similarly, there is a need to address the shortage of research into how such interventions operate in LMIC settings, where the potential for positive change could arguably be the greatest. A further gap in the literature is the virtual absence of inquiry into the impact of book-sharing interventions on outcomes other than child language. This is surprising, given that such interventions target a set of risk and protective factors implicated in the development of child social understanding and behaviour - such as parental sensitivity, reciprocity, and disciplining strategies. Finally, very little research has

looked at moderators that would help to reveal who benefits (or does not benefit) from book-sharing interventions and under what circumstances.

Paper 1

The first paper aims to synthesise and appraise existing evidence from randomised controlled trials (RCTs) on the effectiveness of book-sharing interventions on child language and parent book-sharing outcomes. Interventions that train parents to share picture books with children are seen as a strategy for supporting language development. An extensive and sensitive search of seven academic databases was conducted to identify all relevant studies. Screening, extraction and quality ratings were conducted by two independent authors. Meta-analyses were conducted using robust variance estimation modelling on results from 19 RCTs (N= 2,594; child age = 1 – 6 years). Overall, book-sharing interventions had a small sized effect on both expressive language (d=0.41) and receptive language (d=0.26). They had a large effect on caregiver book-sharing competence (d=1.01). The impact of the intervention on child language was moderated by intervention dosage, with lower dosage associated with a minimal impact. Conversely, group-based intervention format was associated with larger impact. Child age and caregiver education level were unrelated to child outcome. This review and meta-analysis demonstrated the promise of book-sharing interventions for enhancing and accelerating child language development and caregiver book-sharing competence, at least in the short term. *This paper was published in Child Development in 2019 (Impact Factor: 5.02).*

Paper 2

Social understanding or socio-cognitive development refers to our ability to give psychological explanations for human behaviour and provides the foundation for cooperation and pro-social behaviour. This paper reports a study in which 70 LMIC caregiver-child dyads were assessed to investigate individual and family predictors of child social understanding, with an emphasis on the role of caregiver-child talk. Despite much research into individual and family predictors of socio-cognitive understanding in preschoolers, little is known about corresponding predictors in younger children. Similarly, these relationships are yet to be explored in LMICs.

Very little is known about the nature and content of caregiver-child talk in an African context and whether, as has been shown in many HICs, it relates to child social understanding. A better understanding of these relationships could shed light on which elements of caregiver talk could be enhanced in order to aid child socio-cognitive development through an intervention such as book-sharing. For example, this could lay the foundation for addressing the question of whether changes in caregiver talk could in turn lead to improvements in child social understanding.

Seventy families with two-year-old children from Khayelitsha, a low-income peri-urban township in South Africa, participated in this cross-sectional study. Two tasks assessing socio-cognitive understanding were administered to the children and video-based transcripts of caregiver-child interactions were coded for mental state talk, causal utterances, and speech quantity. The relationship between caregiver talk and child socio-cognitive development was investigated. Key child and family demographic variables were taken into account.

Child language, caregiver education, family socio-economic deprivation, and caregiver references to emotions and causal talk were all associated with child performance on socio-cognitive tasks. After controlling for relevant variables, caregiver causal talk emerged as the most salient predictor of child socio-cognitive performance.

This study demonstrated that caregiver talk is associated with child socio-cognitive understanding in a low-income African context. Moreover, it addressed the paucity of research into the nature of this relationship with very young children using measures of fledgling socio-cognitive understanding. The findings suggest that the quality, rather than the quantity, of maternal speech plays an important role in helping children develop socio-cognitive capacities. In particular, speech that involves discussion of causality appears to play a central role.

This paper is under review by Cognition.

Paper 3

The final paper presents the outcome data from an RCT – the Benefits of Early Book-Sharing study – conducted in Khayelitsha, a low-income peri-urban township in South Africa. The purpose was to evaluate a dialogic book-sharing intervention for caregivers of children 21-28 months, designed to promote positive parenting and child cognitive, socio-emotional, and behavioural development. Families were randomly allocated to a book-sharing or a wait-list control group. In the intervention, caregivers were trained in supportive book-sharing with young children. Training was carried out in small groups over a period of eight weeks. Data were collected at baseline, post-intervention and at six months post-intervention. One-hundred-and-forty

caregivers and their 21-28-month-old children (70:70) were assessed at enrolment, with 130 (93%) contributing data at post-intervention and 123 (88%) at a six-month follow-up. Children in the intervention group performed significantly better than controls on a number of observed and caregiver-reported measures of language (d=0.37 – 0.50) and attention (d=0.39 – 0.44). However, few between-group differences were found for observational and caregiver-reported measures of child problem behaviour, pro-social behaviour, and theory of mind. In observed measures, caregivers in the intervention group showed more sensitivity and reciprocity in both book-sharing and free play (d=0.21 - 1.01), and more complex cognitive talk in a narrative task (d=0.65). Further, intervention group dyads engaged in more conversational turns at home (d=0.38), demonstrated through naturalistic measures of the home language environment. Intervention caregivers were also less verbally and psychologically harsh (d=0.19 - 0.43).

The Benefits of Early Book-Sharing (BEBS) programme benefitted a number of domains of parenting and child development and holds considerable promise as an early parenting intervention in LMIC contexts.

The protocol was published in Trials, in 2017. The trial paper is under review by the Journal of Clinical Child and Adolescent Psychology.

Conclusions

This thesis provides a number of new contributions to the field of early childhood development and parenting in impoverished contexts. A meta-analysis confirmed the promise of book-sharing interventions to improve child language and caregiver book-sharing competence. It also challenged previously held notions that only younger

children and more educated caregivers benefit from these interventions. However, it highlighted a gap in the literature regarding effects in LMICs. Further, a detailed investigation into the predictors of child socio-cognitive understanding helped to shed light on the kinds of caregiver language that help to promote their children's socio-cognitive development. The importance of causal talk, in particular, was highlighted. The results from the RCT demonstrated how a book-sharing intervention in a low-income African context could lead to broad improvements in sensitive and reciprocal parenting and improve child language and attention. However, the trial demonstrated limited effects on harsh parenting and child problem behaviour and socio-emotional development, suggesting that more specific and direct programming, possibly within a book-sharing intervention, may be required to address these risk factors.

Acknowledgements

I am indebted to many people for the incredible support I have received over the course of my DPhil. I am most indebted, however, to the caregivers and children from Khayelitsha who so willingly participated in the BEBS study. Their resilience and hope in the face of so many systemic challenges was inspiring.

I am thankful to Nicoli Nattrass for making me believe I was good enough to study at Oxford, and playing a small but significant role in me getting there.

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Similarly, I could not have hoped for a more welcoming, professional and supportive team of assessors, intervention facilitators and admin staff on site in Khayelitsha. I am immensely thankful to the data collection team – Zanele Siqabatiso, Vuyokazi Tasana, Nomandla Mhlaba, Akhona Sambudla, Noluncedo Ntozakhe and Noma Shumani; to Phumza Gwaqka and Vuyo Notholi, whose passion for book-sharing is infectious, and was passed on to so many caregivers over the course of the study; to Hallam Cooper for his work developing the coding schemes for child defiance and maternal discipline and coding video recordings of these behaviours; as well as to Laura Bozicevic, Alina Apostol and Asli Can for their coding of video data. I am grateful to Ylenia Nicoli for her support during sections of fieldwork and for adding a very novel lens to the data collection. I am also grateful to GJ Melendez Torres and Leonardo De Pascalis for their support and guidance in statistical analysis. Many friends and contemporaries at CEBI played an important role in supporting me over

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Finally, I am grateful to my family. To my wife Leila who inspires me every day and has taught me so much about fulfilment and sacrifice involved in working to help others: thank you for creating the home and foundation that has allowed me to pursue this work. To my father Terry, who taught me how to write and how to be curious: thank you for supporting me in every pursuit, for always applying your mind to any question or challenge I face, and for helping me in any way you can. And to my mother, Shannon, for sharing so many books with me when I was a young child and for always listening to me when I wanted to discuss challenges or problems: thank you for always checking in on me. This research journey has made me reflect on my immensely privileged upbringing and fortune in having such incredible parents.

Publications and Presentations Arising out of this Thesis

The following manuscripts arise directly (first authored papers) or indirectly (co-authored papers) from this DPhil thesis:

1. **Dowdall N**, Murray L, Skeen S, Marlow M, De Pascalis L, Gardner, F, Tomlinson M and Cooper P. (2019). Book-sharing for parenting and child development in South Africa: A randomised controlled trial. *Journal of Clinical Child and Adolescent Psychology* (under review*).*
2. **Dowdall N**, Cooper P, Skeen S, Marlow M, Gardner F, Tomlinson M and Murray L. (2019). The role of caregiver causal talk in promoting child social cognition: A cross-sectional observational study in an impoverished South African community. *Cognition* (under review).
3. **Dowdall N**, Melendez-Torres GJ, Murray L, Gardner F, Hartford L and Cooper P. (2019). Shared picture book reading interventions for child language development: a systematic review and meta-analysis. *Child Development.*
4. **Dowdall N**, Cooper P, Tomlinson M, Skeen S, Gardner F and Murray L. (2018). The Benefits of Early Book-sharing (BEBS) for child cognitive and socio-emotional development in South Africa: study protocol for a randomised controlled trial. *Trials* 18: 118.
5. **Dowdall N**, Cooper P, Murray L, Melendez-Torres GJ, Hartford L. (2017) The effectiveness of shared picture book reading interventions on child language development: a systematic review and meta-analysis. *PROSPERO* 2017: CRD42017057258.
6. Nicoli Y, Murray L, Cooper P, De Pascalis L, **Dowdall N**, Ferrari P. (2019). Effects of a book-sharing intervention on mother and child synchrony: Evidence from thermal imaging. *Paper drafted for submission.*

Academic presentations from this DPhil:

1. *"Measuring the unusual effects of a parenting programme – Evidence from a book-sharing programme in South Africa*". Education Fish Task Monthly Seminar Series – Cape Peninsula University of Technology. June 2018.
2. "*Dialogic Book-Sharing – Research and Rollout*". Parent, Infant and Child Health (PICH) Workshop: Western Cape Department of Health. December 2017.
3. "*Supporting dialogic reading to enhance parenting and improve child cognitive development*". Strengthening Families Through Parenting: National Parenting in Africa Network Conference, UWC School of Public Health. October 2017.
4. "*The Power of Picture Books for Young Children's Learning*". Scottish Book Trust Annual Conference, Edinburgh. August 2017.

Note on Candidate's Role and Contribution to the Research Project

A research grant for the Benefits of Early Book-Sharing study was obtained by Professors Lynne Murray, Mark Tomlinson and Peter Cooper. I joined the team before the study was initiated and took the central role in the management of the study, in the study design and the development of the intervention, and in the development of the assessment protocol and the data coding systems.

I conducted a total of 20 months of fieldwork, acting as project manager. The initial preparatory fieldwork took place from November to February 2015/16. During this time, I worked with colleagues from Stellenbosch University to set up the study, which included the selection and initial training of fieldworkers and intervention facilitators, piloting of assessments and procedures, and logistical planning for the study.

In terms of the assessment protocol, I developed the theory of mind battery of assessments, working with Lynne Murray and obtaining input from various international experts such as Henry Wellman and Alison Gopnik. I also developed the coding scheme for caregiver mental state talk, by drawing on previous schemes by Ruffman and Hughes, and adapting them to the local context. These constituted the primary variables for my second paper, which I conceptualised under the supervision of Lynne Murray.

I led the exploration into the assessment of the home-language environment through the use of the innovative Language Environment Analysis (LENA) tools. This has since become a particularly exciting avenue of research after two papers were

published last year linking LENA parent-child conversational turns data to increased white matter connections in two key language regions of the brain, as well as to longitudinal measures of school performance.

For the intervention study, an initial programme had been developed by Peter Cooper and Lynne Murray for infants (14-month-olds). I led the process of redeveloping the materials for the families of 20–30-month-old children included in the BEBS study, which involved designing sessions on emotions, intentions and perspectives. Further, it involved writing content for slides, arranging and directing short illustrative film clips, and training the facilitators to deliver the sessions. I developed a protocol for the one-on-one feedback sessions that took place between each caregiver and the programme facilitator at the end of each session. Similarly, I developed a protocol for follow-up discussions between facilitator and caregiver when new books were being delivered to caregivers after the official programme had ended.

I oversaw the management and training for all aspects of the study. This included training all assessment and intervention staff, overseeing adaptation, piloting and translation of assessment and intervention materials.

I oversaw recruitment of participants, fidelity (of assessment and intervention) and took full responsibility for general (often challenging) management of the day-to-day running of the study. This included data and staff management. During all assessment periods, I was on site at the research centre to help staff with the various issues that would arise during assessments. I also extracted, labelled and saved all video data at the end of each day of assessments. I systematically checked a sub-sample of videos

for fidelity of assessment administration, and regularly provided feedback to the assessment staff. I also monitored all questionnaire data submitted to the online portal from tablets used by the assessment staff.

Training and piloting were an on-going process, as more measures were included at later time points. For certain measures, such as LENA, I first went through a training programme myself, and then I trained staff and fieldworkers at the research base to use the tools. Similarly, for the Bayley Scales of Infant Development, I was first trained in the administration procedures and then conducted a thorough training and piloting process with staff in Khayelitsha, before it was administered it at the six-month follow-up stage.

A large amount of video footage of caregiver-child interactions was recorded which needed to be coded into quantitative variables. I oversaw these coding procedures and trained local staff in coding schemes. For example, the coding of caregiver-child book-sharing interactions and the early childhood vigilance task both required extensive training of local staff, establishment of reliability and constant quality assurance.

In cases where children were struggling to finish assessments, or whose behaviour was giving assessment staff difficulties, I would make decisions about whether to continue with assessments or to bring them back the following day. In cases where caregivers reported problems (e.g. severe depression or intimate partner violence) that required referrals, I, with my assessment team, would arrange with local organisations or social workers for them to be seen, based on Stellenbosch University protocols.

Declaration of Authorship

I, Nicholas James Dowdall, hereby declare that this thesis is my own work, except where otherwise stated.

Signed:

Date: 7 October 2019

Place: Parktown, Johannesburg

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I. Overview of Thesis Structure

South Africa currently faces an educational crisis, epitomised by the fact that almost 80% of children in the grade four (age nine) cannot read with comprehension. Central to both the genesis of this crisis and its solution is parenting and early learning. This thesis sets out to investigate how to effectively support caregivers from poor families in South Africa to promote their children's development through the powerful activity of book-sharing.

The thesis consists of ten chapters, including three stand-alone papers (chapters 3, 6 and 9), as required by the DPhil-by-publication route in the Department of Social Policy and Intervention at the University of Oxford.

Chapter II: Background and Study Rationale contextualises the thesis by describing the overarching policy context, assessing the challenges to child development and parenting in LMICs, introducing book-sharing as a strategy to combat these challenges and finally, outlining the rationale and aims for the thesis.

Chapter III: (Paper 1) presents a systematic review and meta-analysis of experimental evidence from book-sharing interventions targeting caregivers globally. The analysis demonstrated significant effects on child expressive and receptive language as well as on measures of caregiver book-sharing competence. Meta-regressions revealed that dosage was an important predictor of programme impact, and challenged prior reviews by revealing that child age and caregiver education level did not impact on programme efficacy.

Chapter IV: discusses the implications of the meta-analysis findings for the DPhil thesis as a whole. It highlights certain programme and evaluation gaps in the literature, but also provides some valuable insights to be taken forward into the empirical chapters of the thesis.

Chapter V: Methodology describes the research design and methodological approach that guides the empirical work (Papers 2 and 3). It describes the research setting, sampling strategies, ethical considerations, fieldworker training and selection of measures and data coding processes in more detail than is found in the empirical papers.

Chapter VI: (Paper 2) presents findings of a study on the predictors of child social understanding, particularly as they pertain to parenting behaviours in low-income South African families. The results demonstrated, for the first time in an LMIC context, that the content of caregiver-child talk is systematically related to child social understanding. Certain dimensions of talk, such as references to emotions and causality, were found to be particularly strong predictors of child social understanding.

Chapter VII: discusses the implications of Paper 2 for the evaluation component of the thesis. It emphasises the missing link demonstrated in Paper 2 of how bringing about changes in caregiver talk could have a positive impact on child social understanding.

Chapter VIII: Programme Development describes the 'Benefits of Early Book-Sharing' intervention that is evaluated in this DPhil thesis, with a focus on the new content added for this trial, that was conceptualised by the candidate. Key intervention principles are described as well as training and general procedures.

Chapter IX: (Paper 3) presents findings from the RCT of the Benefits of Early Book-Sharing (BEBS) intervention on a range of child and caregiver outcomes. Results demonstrate that the book-sharing programme had a positive impact on a broad range of outcomes. However, outcomes like child problem behaviour did not show improvement as a result of the intervention and may require more direct targeting through behaviour management strategies.

Chapter X: Discussion provides a summary of the key thesis findings, looks at strengths and limitations of the DPhil, implications for policy and programming, directions for future research and dissemination and impact. The chapter ends with a brief conclusion section.

More detailed information on ethics, coding schemes, examples of intervention session content, and other materials are provided in the Appendices.

II. Background and Study Rationale

1. Policy Context: Early Childhood Development and Parenting

1.1 Global context

Global acknowledgement of the importance of parenting and children's development in the first years of life is stronger and clearer than ever before. A growing body of converging evidence from the behavioural and social sciences, paired with more recent discoveries in neuroscience and epigenetics, indicates that the foundation laid in the early years determines in large measure the trajectory of a child's future health, wellbeing, and ability to learn (Shonkoff, Richter, van der Gaag, & Bhutta, 2012). This, coupled with the widespread acceptance of the economic case for investing in early childhood development (ECD) (Gertler et al., 2014), has led to a steady shift in the international ECD policy context over the past five years.

In 2019, global government policy circles are rapidly adopting ECD as a priority area and a number of prominent international declarations, agreements and initiatives have been crucial in propelling ECD to its current status as a priority policy area. In this regard, the inclusion of ECD as an explicit target in the Sustainable Development Goals (SDGs) in 2015 was a catalyst. The specific target 4.2 stated that by 2030 'all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education' (Le Blanc, 2015). This led a number of international organisations to begin operationalising targets, goals and models of best practice and to strongly campaign for governments and other stakeholders to take tangible steps to reform their ECD policies. Among these, the two key documents were The Global Strategy for Women's, Children's and

Adolescent's Health put forward by the United Nations, and the Nurturing Care for ECD Framework proposed by UNICEF, the World Bank Group and the World Health Organisation. Further, in late 2018, the G20 Group launched its Initiative for Early Childhood Development, which affirmed the importance of ECD as the basis for future health and wellbeing of individuals and societies, and called on its member countries to invest, monitor, collaborate and share resources in order to achieve the goals specified by the SDGs and international organisations. These developments have laid the platform for substantial funding and investment to begin flowing into ECD programming, training, research and infrastructure.

1.2 South African policy context

South Africa took its first major step towards setting an appropriate and progressive regulatory framework for children when it introduced the Children's Act in 2005 (Atmore, 2013). This piece of legislation was intended to give effect to certain rights of children contained in the Constitution, including provision of early childhood development, care and protection (Atmore, 2013). Further, the National Development Plan (NDP) and the National ECD Policy, launched in 2012 and 2015 respectively, committed South Africa to ensuring that children have access to the full range of ECD services by 2030, which is supported by the current South African administration. However, despite this encouraging policy framework, the current provision of ECD services is severely lacking (Atmore, van Niekerk, & Ashley-Cooper, 2012). Less than half the children aged three-to-four participate in any early learning programme, and of the half that do attend, the quality of programme provided is often inadequate (Hall et al., 2017). This lack of early education coverage has been a key contributing

factor to the current 'reading crisis' the country finds itself in (Spaull, 2015). In the most recent Progress in International Reading Literacy Study (PIRLS) conducted in 2016, South Africa received the lowest reading scores of the 50 countries assessed, despite many countries having fewer resources (Howie et al., 2016). The results indicated that 78% of grade four (age nine) pupils were unable to read for meaning. Further, South Africa scored highest of the 50 countries in terms of bullying, with 42% of grade four learners reporting that they were bullied weekly. Indeed, the concerning PIRLS results have appeared to catalyse action by both Government and other stakeholders, much of which has been focused on ECD. For example, in its election manifesto, the ruling ANC political party committed to providing a comprehensive package of ECD services, to standardise guidelines for ECD and set employment targets for the sector, to work towards universal access to two years of compulsory quality preschool enrolment for four- and five-year-olds, and to promote innovation on different models for delivering home- and community-based ECD. Finally, clear political direction was given by President Ramaphosa in his State of the Nation Address in February 2019 where he stated, "We will proceed towards two years of compulsory ECD for all children before they enter grade one". From this, it is clear that the central role of early childhood development to reduce socio-economic inequality is broadly accepted in South Africa.

2. Child Development and Parenting in Low and Middle Income Countries

2.1 Loss of developmental potential

There is growing concern for the more than 250 million children (43%) under the age of five in Low and Middle Income Countries (LMICs) who are at risk of failing to

meet their developmental potential as a result of poverty (Lu, Black, & Richter, 2016). These children, living predominantly in sub-Saharan Africa and Asia, are exposed to numerous environmental risk factors that threaten their physical, cognitive, social and behavioural development (Grantham-McGregor et al., 2007). Indeed, pervasive extreme poverty and its associated social and economic harms have an adverse impact on subsequent child cognitive and socio-emotional development, future educational performance and future earnings (Black et al., 2008; Gertler et al., 2014; Grantham-McGregor et al., 2007; Stein et al., 2010). This predominantly occurs within a context of severe community stress, often characterised by high levels of violence (Aisenberg & Herrenkohl, 2008).

The human brain develops at an exponential rate during the period of early childhood, widely considered as the first five years of life. It is thought that during this phase, the brain is at its most flexible and malleable so as to accommodate a wide range of experiences and stimuli. The foundation and basic architecture of the brain constructed during these first few years forms the foundation for all learning, health, and behaviour that follow. For example, the neural connections for the sensory pathways (such as vision and hearing) and language peak in the first year of life, with the neural connections for higher cognitive functioning peaking slightly later (Nelson, 2000). However, it is clear that the foundation of these neural circuits is laid in this period of early childhood (Nelson, 2000). Accordingly, children's experience of deprivation and 'toxic stress' during this critical period can be particularly detrimental to their future learning, behaviour, and physical and mental health (Shonkoff, Garner, et al., 2012). Toxic stress, as opposed to positive or tolerable stress responses, occurs when a child experiences adversity that is strong, frequent, and prolonged – such as

chronic neglect, physical or emotional abuse, exposure to violence, and the accumulated burden of family economic adversity – without sufficient support from an adult caregiver. When a child's stress response system is activated for prolonged periods, brain development can be disrupted, and stress-related disease and cognitive impairment later in life can result (Shonkoff, Garner, et al., 2012).

2.2 Parenting and developmental risk

The relationship between a primary caregiver and child is *the* major component in determining a child's developmental progress in the first years of life. In particular, relationships with caregivers that are sensitive and reciprocal form the foundations of the child's brain architecture. For example, when an infant babbles or cries, if their caregiver responds sensitively and contingently, making eye contact and speaking animatedly, this builds and strengthens neural connections for developing communication and socialising (Bornstein & Putnick, 2012). In effect, this regulates or mediates the interactions that the child has with their environment and helps to shape their adaptation to this environment (Bornstein & Putnick, 2012). Certain caregiving characteristics have been consistently associated with early child cognitive and socio-emotional development. These include sensitivity and responsiveness to the child, emotional warmth, and cognitive stimulation (Bornstein, 2001; Bornstein & Putnick, 2012). 'Nurturing care', a term proposed by the WHO, UNICEF and others, encapsulates this kind of caregiving: sensitive to the child's health and nutritional needs, protection from threats, and importantly, provision of opportunities for early learning through interactions that are emotionally supportive, developmentally stimulating, and responsive (Britto et al., 2017).

A useful analogy proposed by academics at the Centre on the Developing Child at Harvard University is the concept of 'serve-and-return' interactions for brain building (Levitt & Eagleson, 2018). The central theme of such interactions is their back-and-forth nature, where caregivers are attentive and responsive. The group (2019) proposes a five-step summary of such interactions. It starts with the caregiver noticing the 'serve' and sharing the child's focus of attention. Following this, the caregiver 'returns' the serve by acknowledging the interest of the child and supporting and encouraging them in their interest. Next, the caregiver 'names' the return by providing the name or verbal description of what the child is seeing, doing or feeling. After this, the caregiver waits and gives the child an opportunity to respond, and then keep the turn-taking process going. Finally, caregivers practise endings and beginnings, in order to accurately perceive a child's signals of when they are finished with the activity.

Parents or primary caregivers are their children's first educators and are usually those with whom children have the most regular contact in these highly formative years. In this context, specific kinds of parenting behaviours promote different aspects of child development. If we consider 'positive caregiving', two domains prevail, broadly summarised as cognitive caregiving and socio-emotional caregiving (Bornstein & Putnick, 2012). From very early on in infancy, children tend to learn about the physical world through cognitive interactions, while at the same time young children are motivated to connect with others through socio-emotional interactions (Bornstein & Putnick, 2012). Together, these two broad types of caregiving relate to children's emotional, social, mental and communicative competencies (Walker et al., 2007). Indeed, certain types of parent-child interactions are particularly supportive of

language development, while other kinds of interactions and stimulation support socio-emotional development. These are briefly reviewed below.

2.3 Parenting to promote cognitive and language development

Cognitive caregiving refers to the range of strategies that parents use to encourage children to engage with and understand their environment through describing, demonstrating, and affording opportunities to learn (Bornstein & Putnick, 2012). Specific examples of cognitive caregiving practices include reading, storytelling, naming and labelling, counting, and drawing, amongst others.

Shared reading and oral storytelling expose children to concepts and vocabulary that may be infrequently used in everyday situations or conversations (Snow & Goldfield, 1983). There is evidence that the complexity and length of responses to children during shared reading is substantially greater than in other everyday contexts such as mealtimes and play (DeTemple & Catherine; Murray, 2014). Consistent exposure to oral storytelling, which promotes a range of language and literacy skills, has been linked to later school success and literacy development (Wells, 1985).

Most cognitive caregiving practices share a common theme of child-directed speech. Indeed, parental speech directed at young children is one of the strongest predictors of subsequent language development (Hart & Risley, 1992), but also demonstrates strong associations with child social and emotional development (Golinkoff, Can, Soderstrom, & Hirsh-Pasek, 2015). When child-directed speech is information-salient (for example pointing to and labelling objects), it is especially strongly linked with language development (Lonigan & Whitehurst, 1998).

A number of reviews point to strong associations between certain parenting practices and child cognitive and language development (Britto et al., 2017; Engle et al., 2007; Rao et al., 2014). Indeed, both cross-sectional and longitudinal evidence show that particular early parenting practices are associated with child cognitive performance: where parental interactions are responsively contingent to the child, and support the child's active engagement in their environment, children perform better on measures of cognitive functioning (Murray, 2014).

A substantial body of literature demonstrates clear associations between caregiver supportiveness – encompassing warmth, responsiveness, acceptance and contingency – and child cognitive and language outcomes (Martin, Ryan, & Brooks-Gunn, 2007; Tamis-LeMonda, Kuchirko, & Song, 2014; Tamis‐LeMonda, Bornstein, & Baumwell, 2001). For example, Martin and colleagues found that both mothers' and fathers' supportiveness (sensitivity, positive regard, cognitive stimulation) during toy play with their two-year-old children strongly predicted math and language outcomes at age five (Martin et al., 2007).

In another salient example, a United States study investigated longitudinal associations between early language exposure in the home and child cognitive and language performance ten years later (Gilkerson et al., 2018). The study showed that caregiver-child 'conversational turns' when children were approximately two years of age, significantly predicted IQ, verbal comprehension and expressive language ten years later, after controlling for socio-economic status.

In a review of 38 parent-focused interventions in developing countries, Rao and colleagues (2014) found that all but one study showed small to large positive effects on child cognitive and language outcomes. The majority of these interventions sought to promote sensitive and responsive caregiver-child interactions through psychosocial stimulation which led to improvements in child cognitive and language performance (Rao et al., 2014). Many of these programmes focused on teaching parents to engage their children in stimulating interactions in the context of play (using homemade toys or household items), verbal stimulation, problem solving, storytelling, or shared reading (Rao et al., 2014). While this evidence is certainly encouraging, the review was not limited to RCTs, and the quality of the studies was varied.

2.4 Parenting to promote social and emotional development

Socio-emotional caregiving engages children in interactions that are characterised by openness, listening, contingent responsiveness, and emotional closeness that makes children feel affirmed, valued and accepted (Bornstein, 2001). Sensitive parenting, as described by Ainsworth (1969), involves a mixture of awareness, responsiveness, cooperation, and acceptance. This type of caregiving helps children to regulate their emotions, and models social relationships for them, helping to form the foundation for child attachment and social and emotional development and wellbeing. Examples include playing with children and singing songs with them. Regardless of the context of engagement – whether play or bath time or some other situation – what matters most is how parents interact with their children. Where caregivers are sensitive to their children's cues, and respond in ways that affirms their child, this helps to form strong and secure attachments.

Play, as a context for social learning, appears to be common to almost all mammals. Indeed, the philosopher and evolutionary psychologist Karl Groos proposed in 1898 that, "Animals cannot be said to play because they are young and frolicsome, but rather they have a period of youth in order to play; for only in so doing can they supplement the insufficient hereditary endowment with individual experience, in view of the coming tasks of life" (Groos, 1898, p. 75). In many parts of the world, caregivers consider play with children to be part of their parental function, believing it to be essential for their child's wellbeing and development (Haight, Wang, Fung, Williams, & Mintz, 1999; Zosh et al., 2017). For example, pretend play, which involves a fundamental contrast between the real and the imagined, has a strong influence on child social understanding (Murray, 2014). Joint pretend play helps children think about other people's experiences and the distinction between appearance and reality. Similarly, role play helps children negotiate and understand different social roles that in turn, promotes understandings of other people's experience and perspective (Murray, 2014).

A central aspect of child social development is their ability to give psychological explanations for human behaviour in accordance with their own and other's desires, intentions and perspectives (Wellman, 2002). This refers to a social understanding or 'theory of mind' and is a cornerstone of human social interaction. Children's conversational environments are thought to play a crucial role in shaping their social understanding. Within these conversational environments, caregiver mental state talk has been shown to be a particularly salient contributing factor (Devine & Hughes, 2018). Mental state talk is language that involves references to emotions, desires, intentions, causality, and cognitive states. For example, Dunn et al. found that

parental talk about feeling states (emotions) when children were three years of age, predicted child emotion understanding when the children were aged six (Dunn, Brown, & Beardsall, 1991). Other studies have shown strong associations between cognitive talk (e.g., 'think' and 'know'), desire talk (e.g., 'want', 'wish'), and causal talk (providing causal explanations) and theory of mind (Adrian, Clemente, Villanueva, & Rieffe, 2005; Laranjo, Bernier, Meins, & Carlson, 2010; Ruffman, Slade, & Crowe, 2002). While most of this research has been based on correlational, cross-sectional studies, a number of longitudinal study designs have helped to build a stronger case for the causal role of mental state talk in supporting child theory of mind (Devine & Hughes, 2018; Ensor, Devine, Marks, & Hughes, 2014).

However, there is a paucity of evidence from LMICs on the caregiver behaviours that support child social understanding and socio-emotional development more broadly.

2.5 Challenges to parenting and early childhood development

While there is clear evidence for the positive influence of certain parenting practices on child cognitive and socio-emotional development, there are numerous factors that hinder or prevent parents from engaging in these kinds of interactions with their children. Indeed, these kinds of interaction patterns and caregiver behaviours are subject to the influence of distal and proximal environmental factors such as poverty and depression (Grantham-McGregor et al., 2007; Parsons, Young, Rochat, Kringelbach, & Stein, 2012). As such, provision of quality caregiving is substantially more difficult in circumstances where family resources, both financial and psychological, are strained.

For example, a substantial body of literature confirms the negative effects on child development as a result of maternal depression (Murray, Fiori‐Cowley, Hooper, & Cooper, 1996). Children of depressed mothers are less likely to form secure attachments and more likely to display behaviour problems (Parsons et al., 2012). How maternal depression is expressed in parenting behaviours mediates this association. Depressed mothers tend to exhibit higher levels of irritability and withdrawn behaviour during interactions with their children (Murray & Cooper, 1997). This manifests in a number of ways, including missing important child cues, being overly intrusive, displaying a lack of contingent responsiveness, and being less engaged and warm (Murray, Fiori‐Cowley, et al., 1996; Parsons et al., 2012).

Significantly, the prevalence of maternal depression is considerably higher in LMICs compared to HICs (Parsons et al., 2012). Recent meta-analytic data from 53 studies in LMICs estimated the prevalence of antepartum depression to be 25% and post-partum depression to be 19% (Gelaye, Rondon, Araya, & Williams, 2016). Findings from South Africa (Murray, Fiori‐Cowley, et al., 1996), India (Patel, DeSouza, & Rodrigues, 2003) and Barbados (Galler, Harrison, Ramsey, Forde, & Butler, 2000) demonstrate increased behaviour problems and decreased cognitive functioning of children with depressed mothers.

What often compounds the effect of maternal depression on child development is the co-occurrence of poverty, toxic stress and exposure to violence. The relationship between poverty and compromised child development is well-established (Black et al., 2017). Poverty has been associated with several domains of child development such as language and cognition, executive function, and IQ (Fernald, Weber, Galasso,

& Ratsifandrihamanana, 2011; Schady et al., 2014). It is not simply exposure to poverty *per se* that impacts on children; evidence has shown that critical mediating factors include parental education and quality of the home environment (Hamadani et al., 2014). Indeed, caregivers who themselves have been educationally disadvantaged are likely to replicate sub-optimal childrearing and interactional practices that contribute substantially to the early basis of cognitive deficits (Walker et al., 2011). Thus, the early developmental deficits that obtain in impoverished contexts play a central role in the entrenchment of cycles of poverty and deprivation through their impact on literacy, educational outcomes, future employment opportunities and earning potential (Gertler et al., 2014; Heckman, 2008). Arguably, the consequence of many of these challenges to parenting is inadequate cognitive stimulation for a child, which is reflected across their developmental spectrum.

2.6 Parenting programmes as a strategy to overcome these challenges

Already a well-established strategy for improving child outcomes in HICs, parenting programmes (as a way to support the capacity of caregivers to provide the early learning environments that their children need) have begun to show considerable promise in LMIC settings (Black et al., 2017). Thus, a growing body of evidence from LMICs shows that interventions designed to increase early learning opportunities and cognitive stimulation have brought about considerable gains in these areas, which are often shown to persist well after the intervention has come to an end (Eickmann, Guerra, Lima, Huttly, & Worth, 2003; Jeong, Pitchik, & Yousafzai, 2018; Powell, Baker-Henningham, Walker, Gernay, & Grantham-McGregor, 2004).

In a recent meta-analysis of 13 RCTs that evaluated the effects of early childhood stimulation interventions on caregiver skills and capacities in LMIC settings, medium to large benefits (d=0.44 - d=0.91) were found on measures of the home caregiving environment, mother-child interactions and maternal knowledge of ECD (Jeong et al., 2018). Caregiver skills programmes focused on cognitive stimulation may have benefits that extend beyond just early learning, and strengthen management of difficult child behaviour, support socio-emotional development and reduce harsh forms of parenting (Black et al., 2017).

Traditional caregiver-directed interventions that aim to affect 'positive parenting' behaviours to reduce child problem behaviours tend not to put much emphasis on cognitive stimulation and tend not to have an impact on this developmental domain. Conversely, cognitive stimulation interventions often lack positive parenting and child behaviour management components and as such, are rarely able to reduce child behaviour difficulties (Rao et al., 2014).

A number of research reviews have attempted to identify characteristics of successful parenting interventions in LMICs (Engle et al., 2007; Rao et al., 2014). Factors such as programme intensity, appropriate training and supervision for implementing staff, presence of both caregiver and child at intervention sessions, opportunities to practise activities with the child during the session and receive feedback, and conducting interventions in group-based settings were all associated with successful outcomes through both descriptive and meta-analytic techniques.

Parenting interventions that target child cognitive and language development are in the main, comprehensive and complex in nature, and long-term – commonly 12-24 months in duration (Nores & Barnett, 2010). This may explain the relatively low levels of government investment in these programmes, despite the growing weight of evidence demonstrating their positive effects. Beyond the initial substantial financing needed to implement them, the logistics and human resources required to roll out such programmes at scale are likely to deter public investment, particularly in contexts where such expertise and resources are limited. As such, there has been an interest in alternatives to long-term intensive interventions, which are seldom practicable in the settings with the greatest need.

Since parents or primary caregivers are their children's first educators and with whom children have the most regular contact during these highly formative years, interventions that successfully target the quality of the caregiver-child interaction are likely to be of maximal benefit to children's cognitive and language outcomes (Engle et al., 2007). This benefit could be realised by improving both the frequency and the quality of engagement between primary caregivers and children.

3. Book-Sharing As a Strategy to Combat These Challenges

This chapter has outlined a number of parenting styles, strategies and activities that are associated with optimal child cognitive, language, and social and emotional development. Caregivers can engage in serve-and-return interactions in a number of everyday contexts. However, certain types of activities appear to be particularly well suited to supporting various areas of development. One activity that is widely regarded to be of benefit to children's cognitive and language development is shared

picture book reading or ‘book-sharing’. Indeed, it is such an important parental activity that the American Academy of Pediatrics recently issued a policy statement recommending book-sharing from birth as part of child care, effectively categorising this activity as one fundamental to child wellbeing (High et al., 2014).

As far back as the 1970s, Chomsky (1972) hypothesized that book-sharing was causally related to language development and subsequent school achievement; however, only recently has this question been approached with rigorous quantitative methods of research. As a consequence of this research, it has been concluded that some of the most educationally beneficial interactions take place during book-sharing (Hargrave & Sénéchal, 2000; Murray, 2014).

Research into book-sharing spans well over three decades and dates back to the seminal work carried out by Ninio and Bruner (1978) on the achievement and antecedents of children’s capacity to give verbal labels to objects, events and emotions. This early research was located within the Vygotskian conceptual framework (Vygotsky, 1978). Vygotsky postulated that children acquire language through interactions with knowledgeable others in what he referred to as the ‘zone of proximal development’. This early research considered book-sharing to be a particularly effective behaviour for scaffolding a young child’s cognitive and language development (Van Kleeck, 1998). Scaffolding behaviours are the supportive strategies used by caregivers to help guide children towards succeeding in cognitive tasks while also developing their autonomy within the process. In this process, the picture book functions as the stimulus through which parents facilitate language acquisition.

Indeed, it has been argued that picture books for infants embody specific features that make the books an especially potent vehicle for language learning (Murray, 2014). They tend to present the essential features of an object or event devoid of detail or elaboration and often in simple line drawings. They commonly do so repetitively, with minor variation. This repetition and variation, Murray (2014) argues, facilitates acquisition of the concepts depicted. This acquisition is also supported by the fact that unlike the fleeting presentations of real life phenomena (and in particular, actions or emotions), in a picture book the child can review and rehearse at will. The pictures also provide an opportunity for more complex conceptual elaboration, such as reflection on the meaning of events, their causes, and characters' intentions (Adrian, Clemente, Villanueva, & Rieffe, 2005). They also allow for lexical development in relation to objects not encountered in the child's experience (such as exotic animals). Finally, an infant's experience of how books work – i.e., which way up they go and the fact that, at least for most languages, they proceed from left to right – provides further fundamental cornerstones of the acquisition of literacy (Murray, 2014).

In line with these considerations of gains that can be promoted during book-sharing, a number of early observational studies (Snow & Goldfield, 1983; Wells, 1985) showed that during shared reading, in comparison to other activities, mothers tend to label objects more frequently, have higher mean length of utterance, talk with greater complexity and children are provided with more consistent and informative feedback (DeTemple, Snow, van Kleeck, Stahl, & Bauer, 2003; Whitehurst et al., 1988).

In the early 1990s, the most successful techniques for sharing books with children began to be formalized under the term 'dialogic reading'. This method of interactive

shared infant-carer reading was pioneered and formalized by Whitehurst and colleagues (Whitehurst et al., 1994; Whitehurst et al., 1988) in the United States. What distinguishes this form of reading from other forms is its interactive quality and its use of evocative behaviours, such as asking open-ended questions that extend beyond the content of the book, and providing encouragement and praise for child participation (Lonigan & Whitehurst, 1998). It also makes use of extensive pointing and labelling from the carer who responds to the child's focus of interest, thereby helping the child to forge associations between the object of interest and the verbal label. This use of an ostensive cue to enhance child learning entails child-focused speech development of exactly the sort that has been found to predict later successful cognitive development (Murray, Kempton, Woolgar, & Hooper, 1993). Finally, dialogic book-sharing has been shown to include the parents' engagement in 'decontextualised talk', where the discussion extends beyond the content or pictures in the book and includes concepts that are novel and unfamiliar to the child (Lonigan & Whitehurst, 1998).

3.1 Theory of change

Book-sharing interventions aim to increase parental support for the child in order to enhance cognitive and language development. Here, the theory of change draws on Vygotsky's (1978) model of parenting in 'the zone of proximal development': improvement in child cognition and language comes about through contingent, structured interactions in which the parent follows the child's cues and focus of interest and provides stimulation that enhances the child's experience of their environment (e.g., pointing to the focus of the child's interest and naming the relevant object during dialogic book-sharing). Indeed, the particular features of picture books

for infants (highlighted above) provide specific pathways to optimal linguistic outcomes. Notably, while with very young children (under two-years) picture books are a highly effective means of increasing vocabulary, as children develop and become more intellectually sophisticated, such books also present opportunities for more elaborate language, cognitive and socio-emotional learning. Thus, when the child and parent attend to pictures that depict different characters involved in various activities, more talk is elicited about thoughts, feelings, intentions and differences in perspective, which in turn predict better social understanding (Adrian et al., 2005).

If the earliest interaction around books and 'structured' learning is via a caregiver who interacts warmly, responsively and sensitively, it is likely that a secure parent-child relationship will be fostered (Bus & van Ijzendoorn, 1997), and a positive precedent and predisposition to engage with other carers will be established (Berlin, Cassidy, & Appleyard, 2008). Book-sharing can, therefore, help to establish a positive model for the important teacher-learner relationship that forms a key part of learning with enthusiasm, pleasure, and focus. Early experience of sensitive interactions with the parent around book-sharing is also likely to encourage future positive attitudes to learning itself (Murray, 2014). In other words, this early reinforcing and affirming experience sets up positive expectations that are likely to transfer to learning in later settings.

Effective book-sharing is also of benefit to the child in so far as it helps to draw the caregiver into a role of involvement, engagement and affirmation that supports early childhood development (Murray, 2014). Sensitive and facilitatory book-sharing, once it is established, sets up a pattern that is self-sustaining because of the intrinsic

rewards to both parent and child. The reward for the caregiver would lie in the appreciation that they are helping their child's preparation for formal education, as well as in the responsiveness of the child in this form of interaction.

3.2 State of the evidence: book-sharing interventions

3.2.1 Book-sharing interventions: setting, delivery, format and location

Book-sharing interventions have been applied in a variety of contexts with promising results in promoting expressive and receptive vocabulary (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Sénéchal, 1997), emergent literacy skills (Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999; Wasik & Bond, 2001), oral narrative skills (Lever & Sénéchal, 2011) and the syntactic quality of sentence construction (Bus, Van Ijzendoorn, & Pellegrini, 1995). These interventions generally consist of a number of sessions where parents, either individually or in groups, are given instructions on how to share picture books effectively with their children. The process commonly involves guiding parents through a number of core techniques that typically involve the use of *evocative strategies* tailored to elicit a verbal response from the child − for example, the use of 'what/where/who' (wh-) questions, as opposed to 'yes/no' questions (Whitehurst et al., 1988). Parents are also taught to use informative *feedback* such as expansions and corrective modelling. Following the formal verbal explanation of the requisite skills and techniques, many programmes include participatory role play demonstrations between participants and the instructor where good practice is demonstrated and modelled. Intervention programmes also often given out accompanying materials such as summary sheets (Arnold et al., 1994) containing key lessons for parents to take home and use as reminders. Many programmes provide picture books for participating caregivers to take home.

There has been much interest in the delivery of book-sharing interventions in maternal and child-healthcare settings. The rationale has been to encourage new parents to adopt shared reading habits with their children from birth (High et al., 2014). There is considerable potential for scale with this particular delivery model, particularly in countries with well-established universal obstetric and paediatric services.

A well-recognised example of this kind of delivery model is the Reach Out and Read (ROR) programme established by paediatricians in Boston in the early 1990s (Zuckerman, 2009). The ROR network now serves 4.2 million children annually and donates over seven-million books a year in the United States (High et al., 2014). It involves a network of trained nurses and paediatricians who talk to parents about the importance of reading aloud to their infants and at each regular paediatric check-up, children from six months to five years receive a new book to take home. ROR programme sites create a space in waiting rooms for parents and volunteers to read aloud to young children. This provides the opportunity for parents to be mentored in interactive shared reading techniques (Mendelsohn et al., 2001). A recent iteration of this model is the Video Interaction Project that films mothers reading to children and then provides constructive feedback and materials for them to continue these activities at home (Mendelsohn et al., 2001). There have been several controlled studies of the value of the ROR programme which have shown success in improving the expressive and receptive vocabularies of intervention children compared to controls (High, LaGasse, Becker, Ahlgren, & Gardner, 2000; Sharif, Rieber, Ozuah, & Reiber, 2002),

as well as an improvement in the frequency and parental enjoyment of book-sharing (Golova, Alario, Vivier, Rodriguez, & High, 1999).

Another format that has been applied to interactive reading interventions is video-based instruction, the advantages of which are cost efficiency and consistency in delivery of the intervention (Blom-Hoffman, O'Neil-Pirozzi, & Cutting, 2006). Video formats have also proven effective in delivery of other parenting programmes (e.g., (Webster-Stratton, 1984)). This method was first evaluated in relation to book-sharing by Arnold and colleagues (1994). The presentation of a video that introduced all the dialogic reading techniques, narrated and described each of them, and provided examples of these in practice, was compared with a 'reading as usual' control group in an RCT. The findings indicated that the children in the intervention group acquired better expressive and receptive language. More recently, the 'Read Together, Talk Together' instructional video developed by Whitehurst (2002), was evaluated in a small-scale RCT in Australia. It revealed positive effects on both parenting book-sharing techniques and child language (Blom-Hoffman et al., 2006).

Most research of book-sharing interventions has taken place in the United States and other HICs. There has, correspondingly, been rather little research on book-sharing conducted in LMICs. The first trial, a kindergarten-based programme for two-year-old children, was conducted in Mexico (Valdez-Menchaca & Whitehurst, 1992). Compared to controls, children in the intervention group demonstrated significantly better expressive and receptive vocabulary as well as the use of longer and more complex sentences. A second trial carried out in rural Bangladesh evaluated a classroom-based intervention for five-year-olds, with index children showing

significantly improved expressive vocabulary compared to controls (Opel, Ameer, & Aboud, 2009). An RCT conducted in an impoverished urban South African township, in which parents received training in small groups, provided strong evidence for the efficacy of dialogic book-sharing on child language and attention outcomes (Vally, Murray, Tomlinson, & Cooper, 2015). More recently, an RCT in Brazil where parents were trained through monthly workshops hosted in local childcare centres (Weisleder et al., 2017) demonstrated gains in child vocabulary, working memory and IQ compared to controls, and an RCT in Kenya demonstrated improvements in child expressive language and the quality of reading interactions through providing dialogic book-sharing training and culturally appropriate books to caregivers (Knauer, Jakiela, Ozier, Aboud, & Fernald, 2019).

3.2.2 Reviews and meta-analyses

An early meta-analysis of frequency of parent-child book-sharing on language development, emergent literacy and reading achievement, conducted by Bus, Van Ijzendoorn & Pellegrini (Bus et al., 1995), revealed an overall effect size of d=0.59 for the association between naturally occurring book-sharing and language and literacy outcomes. Importantly, however, this study did not consider intervention studies. A later meta-analysis of 16 studies assessed the impact of dialogic reading interventions and included observational studies, quasi-experiments, and RCTs (Mol, Bus, de Jong, & Smeets, 2008). This review reported an overall effect on child vocabulary outcomes of d=0.42, CI: 0.30, 0.53. It also showed, as had the review by Bus and colleagues (Bus et al., 1995), the importance of child age, with younger children (two–three-year-olds) appearing to benefit more from these parental strategies compared to older children in kindergarten (d= 0.50 and 0.14 respectively).

Both these reviews, however, lacked rigour in that they focused their searches only on psychology and education databases. This overlooked an important and growing body of research into book-sharing interventions in healthcare settings (High et al., 2014).

3.3 Gaps in the literature

The sharing of picture books with young children is regarded as being of considerable benefit to their language development and pre-literacy skills. Intervention studies in HICs where carers have been trained in supportive book-sharing skills have found that book-sharing leads to substantial improvements in child language outcomes. The limited evidence from LMICs indicates that similar benefits are obtained. In addition to the benefit of book-sharing to child language development: because picture books can be rich in mental themes, they can also be effective tools for prompting rich mental state discussion between parents and young children. Indeed, recent observational research has shown associations between book-sharing and child social understanding (Adrian, Clemente, & Villanueva, 2007; Adrian et al., 2005). Thus, there is preliminary evidence that not only is book-sharing a fitting context for parents to promote the development of child language skills, but it may also be particularly suited to parents talking about mental states and thereby promote child social understanding.

However, there is a paucity of up-to-date systematic evidence regarding the impact of parent-targeted book-sharing interventions on child outcomes, and little systematic investigation of the parenting behaviours that underpin them. There has been no systematic review or meta-analysis that has focused exclusively on the findings of RCTs of the efficacy of book-sharing interventions with caregivers of children. Such

a review and analysis would constitute the most scientifically rigorous examination to date of the impact of book-sharing interventions on child development. It has been over a decade since the publication of the last review of the impact of book-sharing interventions on language development, although several randomised controlled trials have been conducted since then. Further, previous reviews have not considered any outcomes other than child language. Likewise, there is a need to address the shortage of research into how such interventions operate in LMIC settings, where the potential of positive change is arguably greatest.

There is some preliminary evidence that parenting behaviours and discourse during book-sharing could benefit child socio-emotional development and in particular, social understanding. However, no research has investigated the associations between these parenting variables and child outcomes in LMICs. Further, despite much research from HICs into individual and family predictors of social understanding in preschoolers, little is known about corresponding predictors in younger children. Similarly, the relationship between caregiver talk and child social understanding has yet to be explored in a low-income country context, where context and parenting norms may be different. Of considerable interest is whether caregiver-child talk plays a role in the development of child social understanding, as has been shown in HICs. If these associations were found to be similar to those established in HICs, then evaluating the impact of changes in these critical maternal behaviours on child social understanding would be of particular interest and importance.

A significant gap in the literature is the virtual absence of inquiry into the impact of book-sharing interventions on outcomes other than child language. This is surprising,

given that such interventions target a set of risk and protective factors that not only are associated with poor child language outcomes, but are also associated with child social understanding, child behaviour, and parenting practices, such as serve-and-return. There is a need to understand whether such an intervention could have an impact on these wider child outcomes and the parenting behaviours relevant to them, such as mental state talk, disciplining strategies, and positive parenting.

4. Research Aims and Questions

This DPhil thesis aims to advance both the scientific and applied understanding of the impact of book-sharing interventions on parenting and child development in impoverished contexts. In so doing, the aim is to contribute to informing policy decisions relating to programme selection for investment in the fields of ECD and parenting. Specifically, this DPhil is guided by the following key research questions:

Research Question 1 (Paper 1): What is the state of quantitative experimental evidence on the effectiveness of book-sharing interventions for child language and caregiver book-sharing outcomes globally?

This question will involve systematically identifying and synthesising existing evidence worldwide from RCTs to examine whether book-sharing interventions are successful in promoting (1) child language outcomes; (2) caregiver book-sharing competence. The review intends to identify participant- and programme-level moderators, as well as identify gaps in the current literature in terms of study contexts, child outcomes beyond that of language development, and quality of trials on book-sharing.

Research Question 2 (Paper 2): What are the individual and family-level predictors of social understanding in young South African children?

This question involves investigating caregiver and child predictors of child social understanding, with a specific focus on caregiver-to-child narrative content, particularly mental state references, using cross-sectional observational data from caregiver-child dyads in an impoverished South African township.

Research Question 3 (Paper 3): What is the impact of a specially tailored book-sharing intervention on a range of child and parenting outcomes for low-income isiXhosa-speaking families in South Africa?

This question aims to address several gaps in the literature identified in my systematic review by evaluating the effect of a specially tailored book-sharing intervention for caregivers on a broad range of parenting and child cognitive and socio-emotional outcomes through an RCT in an impoverished South African peri-urban township. The objective was to determine the impact of a book-sharing intervention on a broad range of child and caregiver variables, including those located on the early pathways to later aggression and violence. It was hypothesized that the intervention would improve child language, attention, socio-cognitive understanding, and behaviour. It was also hypothesized that caregivers would evidence more behavioural sensitivity, both in book-sharing and non-book-sharing contexts, and that interactions would be more reciprocal: that caregivers would engage in more mental state talk with their

children, and would be more supportive and less harsh in situations that challenged parenting.

III. Paper 1: Shared Picture Book Reading Interventions for Child Language Development: A Systematic Review and Meta-Analysis

This is the first paper of the DPhil thesis and is based on secondary data. It aims to present the highest standards of evidence by presenting a systematic review and meta-analysis of randomised controlled trials of book-sharing interventions. This paper has been published in ***Child Development***.

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Statement of Authorship

I confirm that I completed the great majority of the work in this study. I conceptualised the study and research questions, and ran the process including PROSPERO registration, developing the search strategy, data extraction, effect size calculation, analysis and write up. Co-authors contributed to data extraction and quality assessment. I wrote the paper and co-authors contributed to editing and revising the paper and to offering suggestions on interpretation of the findings.

Abstract

Interventions that train parents to share picture books with children are seen as a strategy for supporting child language development. We conducted meta-analyses using robust variance estimation modelling on results from 19 RCTs (N_{total} = 2,594; $M_{childage}$ = 1 – 6 years). Overall, book-sharing interventions had a small sized effect on both expressive language (*d*=0.41) and receptive language (*d*=0.26). They had a large effect on caregiver book-sharing competence (*d*=1.01). The impact of the intervention on child language was moderated by intervention dosage, with lower dosage associated with a minimal impact. Child age and caregiver education level were unrelated to child outcome. This review and meta-analysis confirm the promise of book-sharing interventions for enhancing and accelerating child language development.

1. Background

For almost four decades, following the seminal work of Ninio and Bruner (1978) and framed within a Vygotskian (1978) approach, researchers have investigated how sharing books with young children affects their development. This has been considered a particularly effective technique for scaffolding a young child's cognition and language (Van Kleeck, 1998) and indeed, it has been argued that children's picture books embody specific features that make them an especially powerful vehicle for language learning (Murray, 2014). Good picture books tend to present the essential features of an object or event: devoid of detail or elaboration, often in simple line drawings. They commonly do so repetitively with minor variation, which facilitates acquisition of the concepts depicted. This acquisition is also supported by the fact that, unlike the fleeting presentations of real life phenomena (and, in particular, actions or emotions), in a picture book the infant can review and rehearse at their own pace. The pictures also provide an opportunity for more complex conceptual elaboration, such as reflection on the meaning of events and their causes, and the characters' intentions and perspectives (Murray, 2014). Notably, a number of early observational studies showed that in comparison to other activities such as play or meal times, during shared reading mothers tend to label objects more frequently and children are provided with more consistent and informative feedback (Snow & Goldfield, 1983; Wells, 1985).

Despite the considerable potential benefits of book-sharing, research points to a number of barriers preventing children and caregivers from engaging in this activity. Thus, in contexts of socio-economic adversity, families are less likely to have access to books and learning materials (Le Roux, 2012). Accordingly, in such contexts

caregivers engage in substantially less shared reading with their children (Berkule, Dreyer, Huberman, Fierman, & Mendelsohn, 2007; Cooper, Vally, Cooper, Radford, et al., 2014; Le Roux, 2012). This is important because meta-analytic data have shown that frequency of shared reading is a strong predictor of language development (Bus et al., 1995). Further, parents do not always use the most effective techniques to support their child's development in the book-sharing context (Ninio, 1980; Weigel, Lowman, & Martin, 2007). Notably, observational studies have shown that families experiencing high levels of adversity are less likely than more advantaged families to use a style of book-sharing associated with positive language outcomes (Berkule et al., 2007; Bornstein & Putnick, 2012; El Moussaoui & Braster, 2011; Van Kleeck, 1998). These socio-economic barriers raise the question of the extent to which an intervention designed to promote and enhance carer book-sharing skills in low socio-economic status (SES) contexts would be of benefit to child language development.

1.1 Book-sharing interventions and the basis for their effectiveness

The dialogic book-sharing interventions that have been developed are based on the Vygotskian principle (Vygotsky, 1930-1934/1978) that improvements in child cognition and language come about through contingent, structured interactions pitched at the child's developmental level, in which the parent follows the child's cues and focus of interest and provides stimulation that enhances their child's experience of the environment. Whitehurst and colleagues (1994; 1988) were the first to formalize a set of dialogic book-sharing techniques based on this principle. Importantly, what distinguishes these techniques from simply reading to a child is their interactive quality and the use of evocative behaviours. This includes asking open-ended questions that extend beyond the content of the book, and providing

encouragement and praise for child participation (Lonigan & Whitehurst, 1998; Whitehurst et al., 1988). It also includes extensive pointing and labelling from the carer in response to the child's focus of interest, thereby helping the child to forge associations between the object of interest and the verbal label. Finally, interactive book-sharing facilitates caregiver engagement in 'decontextualised talk', where the discussion extends beyond the content or pictures in the book to concepts that are novel and unfamiliar to the child (Lonigan & Whitehurst, 1998).

Dialogic book-sharing interventions generally consist of a number of sessions where parents, either individually or in groups, are provided with guidance on how to share picture books effectively with their children. The process commonly involves introducing parents to core techniques that involve the use of *evocative strategies* tailored to elicit a verbal response from the child: for example, more open 'what' or 'where' or 'who' questions, as opposed to more closed 'yes' or 'no' questions (Whitehurst et al., 1988). Parents are also taught to use informative *feedback* in the form of expansions and modelling. Many programmes include participatory role play between participant and instructor, where good practice is demonstrated and modelled. Intervention programmes also often provide accompanying materials such as summary sheets containing key lessons for parents to take home to use as reminders (Arnold et al., 1994). Several programmes provide picture books for participating caregivers to take home.

1.2 Book-sharing interventions: Setting, delivery, format and location

Book-sharing interventions have been carried out in a wide variety of settings, from community centres, to preschool halls and participants' homes. One prominent setting

has been in and around clinics or paediatric rooms. The rationale for including book-sharing interventions in paediatric settings has been to encourage new parents to adopt shared reading habits early in the lives of their children. There is considerable potential for reach and scale with this particular delivery model, especially in countries with well-established universal obstetric and paediatric services. Typically, programme sites create a space in waiting rooms for parents and trained volunteers to read to young children. This provides the opportunity for parents to be mentored in interactive shared reading techniques (Mendelsohn et al., 2001). One iteration of this model is the Video Interaction Project that films mothers reading to children and then provides constructive feedback and materials for them to continue these activities at home (Mendelsohn et al., 2011). A small number of controlled studies evaluating video-based programmes have shown success in improving the expressive and receptive vocabularies of intervention children compared to controls (High et al., 2000; Sharif et al., 2002), as well as an increase in the frequency of book-sharing and caregiver enjoyment (Golova, Alario, Vivier, Rodriguez, & High, 1999b).

Book-sharing interventions are typically held in small groups, with a facilitator guiding parents through key lessons and principles. However, researchers have experimented with various alternative delivery formats. One that has received considerable interest is dispensing with a facilitator and delivering the intervention entirely on a video. The advantages of using video formats are cost efficiency and consistency in delivery of the intervention (Blom‐Hoffman, O'Neil‐Pirozzi, & Cutting, 2006). Video formats have proven effective in the delivery of other parenting programmes (Webster-Stratton, 1984). This method was first evaluated in relation to book-sharing by Arnold and colleagues (1994). Participants were randomised to a no

treatment control group or to a group that received presentation of a training video. This video introduced each of the dialogic reading techniques, described them, and provided examples of these in practice. The children in the intervention group acquired better expressive and receptive language than control group children (Arnold et al., 1994). More recently, the 'Read Together, Talk Together' instructional video developed by Whitehurst was evaluated in a small-scale randomised controlled trial (RCT) in Australia. It revealed positive effects on both parental book-sharing techniques and child language (Blom‐Hoffman et al., 2006).

Most research and evaluation of book-sharing interventions have taken place in the United States and other HICs. There has been very little research on book-sharing conducted in LMICs. The first such trial, a kindergarten-based programme for two-year-old children, was conducted in Mexico (Valdez-Menchaca & Whitehurst, 1992). Compared to a no intervention control group, children in the intervention group demonstrated significantly better expressive and receptive vocabulary following training, as well as the use of longer and more complex sentences. A second trial carried out in rural Bangladesh evaluated a preschool classroom-based intervention for five-year-olds, with index children also showing significantly improved expressive vocabulary compared to controls (Opel et al., 2009). Most recently, two studies conducted in an impoverished urban South African township provided evidence for the efficacy of dialogic book-sharing in LMIC settings. A small pilot RCT (Cooper, Vally, Cooper, Radford, et al., 2014) of weekly group book-sharing training over eight weeks with carers of 14-18-month-olds, showed benefits to carer book-sharing skills and to child attention and language outcomes. In a subsequent larger RCT, compared to a control group that received no intervention, the 14-16-

month-old children whose carers received the dialogic book-sharing training showed significant and substantial improvement in expressive and receptive language, as well as in focal attention (Vally et al., 2015).

1.3 Earlier reviews

An early meta-analysis by Bus and colleagues (1995), including 29 studies, examined the association between frequency of parent-child book-sharing at home and language development, emergent literacy and reading achievement. This revealed an overall medium effect size of *d*=0.59 on the collective language and literacy outcomes (Bus et al., 1995). These effects were independent of family socio-economic status. Importantly, however, this review included only cross-sectional observational research and did not consider intervention studies. A more recent meta-analysis of 16 studies assessed the added value of dialogic reading and included both quasi-experiments and RCTs (Mol et al., 2008). This review reported an overall effect of dialogic reading interventions on child vocabulary outcomes of *d*=0.42, CI: 0.30, 0.53. It also showed, as had the review of observational studies by Bus and colleagues (1995), the importance of child age, with younger, preschool children (two-three-year-olds) benefitting more from these parental interventions than older children in kindergarten (four-five-year-olds) (i.e. d= 0.50 and 0.14 respectively).

1.4 Rationale and objectives

There has been no systematic review or meta-analysis focusing exclusively on the findings of RCTs of the efficacy of interactive book-sharing interventions with carers of children. Such a review and analysis would constitute the most scientifically rigorous examination to date of the impact of interactive book-sharing interventions

on language development in young children. It has been a decade since the last review of the impact of book-sharing interventions on language development was published (Mol et al., 2008) although several randomised trials have been conducted since then. Further, previous reviews have focused exclusively on psychological and educational evidence and not searched medical and public health databases, such as Medline and EMBASE. The current review involved a wide search and expands on previous reviews by considering a novel secondary outcome (caregiver book-sharing competence), and by examining the sources of variation in impact (e.g. intervention dosage). Finally, the present study used robust variance estimation, a relatively novel application for meta-analysing data, which permitted the inclusion of all relevant effect sizes in each meta-analysis. This is an important improvement on past strategies, which either averaged effect sizes within studies, or selected a single outcome. Our method permitted inclusion in the models of all relevant outcome data from each study.

The objective of the current systematic review and meta-analysis is to answer the following primary question: To what extent does the evidence from RCTs of shared picture book-reading interventions delivered to caregivers support the conclusion of a benefit to child expressive and receptive language outcomes? The review includes consideration of the impact of child age, dosage (brief versus more intense interventions), modality (individual versus group), country income level (HIC versus LMIC), and parental education (post-school (tertiary)) versus non-tertiary).

The current review also investigated the extent to which these interventions lead to an improvement in caregivers' book-sharing competence. In other words, with what

degree of fidelity are these interventions being delivered *by* caregivers *to* their children. This outcome has not previously been considered in meta-analyses but is worthy of investigation. There has been at least one formal mediation analysis (Murray et al., 2016) that showed how improvements in caregiver book-sharing competence associated with training accounted for much of the improvement in child language. Given that the aim of these interventions is to enhance caregiver book-sharing behaviour, we believe that any outcomes measuring this construct should be included in the meta-analysis.

2. Methods

2.1 Protocol, registration and reporting standards

A protocol was submitted to the PROSPERO registry for systematic reviews (CRD number: 42017057258) with child language as the primary outcome. While this registered protocol also specified assessment of child socio-emotional outcomes as a secondary outcome, a recent meta-analysis (Xie, Chan, Ji, & Chan, 2018) focused directly on this question, rendering this analysis redundant. PRISMA guidelines of reporting were followed.

2.2 Eligibility criteria

Types of studies. We included RCTs in which caregiver and child dyads were allocated to intervention or control groups either individually or by cluster. Only English-language publications were considered. No publication date or publication status restrictions were imposed.

Types of participants. The population of interest was defined as children between the ages of one and six years (12 - 72 months), regardless of language, country,

income level, race, or other socio-demographic indicators. This specific age group was chosen in line with the findings of previous research that suggested that book-sharing, particularly in the first six years of life, was related to language development, emergent literacy, and reading achievement (Bus et al., 1995). Any primary caregiver of a child (e.g. mother, father, grandmother) was eligible for inclusion for the caregiver competence secondary outcome.

Types of interventions. Studies that evaluated the impact of shared picture book reading interventions that targeted caregivers were eligible for inclusion. Studies were included if they were designed to promote techniques involved in effective book-sharing (regardless of whether the intervention was described as 'dialogic reading' or 'interactive reading'). The intervention dose was expected to vary between studies, and both brief interventions and more intensive interventions involving multiple sessions were eligible for inclusion. All modes of delivery were considered, including 'live' face-to-face delivery and video-based interventions. Control conditions were considered that were passive (i.e. no intervention or waiting list) and active (i.e. treatment as usual or a non-book-sharing intervention).

Types of outcome measures. To be eligible for inclusion, a study needed to have assessed at least one quantitative outcome of child language. The most common infant and child language assessments used in book-sharing intervention studies were the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1981), the Expressive One Word Picture Vocabulary Test (EOWPVT) (Gardner, 1990) and the MacArthur-Bates Communicative Development Inventory (CDI) (Fenson et al., 2000). However, other language assessment instruments were also considered.

Secondary outcomes were measures of caregiver book-sharing competence. Since this examination was novel and exploratory, no restriction was placed on the nature of the

outcome or the method of assessment. Outcomes of caregiver book-sharing competence assess the degree to which the caregivers – to whom the intervention is directed – are able to apply the techniques included in the intervention. This competence is commonly referred to in the literature as book-sharing 'facilitation', or 'sensitivity'.

2.3 Search methods for identification of studies

Information sources. We used a comprehensive search strategy to search an extensive range of relevant electronic databases systematically. The search was applied to PsycINFO, and then adapted for each of the following databases: MEDLINE, EMBASE, ERIC, Education abstracts (H.W. Wilson), Cochrane Central Register of Controlled Trials (CENTRAL), and CINAHL. This range of education, psychology, and medical databases provides considerable breadth.

Since initial background reading suggested that there were not many relevant RCTs, we opted for a sensitive literature search in order not to overlook any potentially important studies (Petticrew & Roberts, 2006).

2.4 Search

The following key concepts were identified: 'Reading', 'Parent or Caregiver', 'Randomised Controlled Trial'.

These concepts were expanded to include related terms, synonyms and subject headings specific to each database. The search strategy made use of multiple sensitive searches that reflect the different elements of the primary question. Appropriate search options − including Boolean operators, MESH terms, truncation and proximity

operators − were used to construct and combine searches separately for each of the databases. All final searches were conducted on 22/03/2018. The list of databases searched, details of the number of articles retrieved for each database and the full search strategy for the PsycINFO database are presented in Appendix 1.

Reference lists of known RCTs as well as previous relevant reviews, were scanned for further studies that may have been missed in the initial electronic search. In one case, where a full manuscript could not be located, the author (Towson, 2014) was contacted and provided the necessary material.

2.5 Study Selection

All identified records were exported into EndNote reference manager after which duplicates were removed. Articles were independently screened by two researchers (ND and LH) and sequentially excluded according to the eligibility criteria. Initially titles were screened to reduce the number of initial records and then the abstracts of the remaining records were scanned to confirm appropriateness. Following this, full text publications of the remaining studies were obtained and read by the same two researchers in order to make final decisions on whether to include or exclude them. Any disagreements over the eligibility of particular studies were resolved through discussion with a third reviewer (PC).

2.6 Collection process

A tailored data extraction form (based on the Cochrane Handbook recommendations) was developed in order to obtain all the necessary information from the included studies. Two reviewers (ND and LH) extracted data independently into excel and

discrepancies were identified and resolved through discussion with a third reviewer (GM).

2.7 Data items

We extracted data from included studies on the following key dimensions: characteristics of the trial setting and population, inclusion and exclusion criteria, baseline characteristics of participants, research design and analysis methods, type and details of intervention, type of outcome measures, risk of bias, results of interventions on relevant outcomes.

2.8 Risk of bias in individual studies

The Cochrane Handbook (Higgins & Green, 2011) risk of bias tool was applied to all included studies. The tool ranks each risk of bias domain as a 'high', 'low', or 'unclear' risk. The domains of risk reported are: random sequence generation; allocation concealment; blinding of participants; blinding of outcome assessment; handling of incomplete outcome data; and selective reporting of outcomes. Two reviewers assessed each study for risk of bias (ND and LH) and any discrepancies were resolved through discussion involving a third reviewer (PC).

2.9 Data preparation and summary measures

For all included studies we computed the standardised mean difference (*d*) and the 95% confidence intervals for measures of expressive and receptive language and caregiver competence. These *d* values and 95% *CIs* were entered into Microsoft Excel and the standard error (SE) was obtained according to the Cochrane Handbook Guidelines (Higgins & Green, 2011). To account for the design effect, the sample size

of cluster-randomised trials was reduced to the effective sample size by using the intra-cluster correlation coefficient. Details of the data transformations are provided in Appendix 2.

2.10 Analysis

A robust variance estimation meta-analysis model was chosen as the most suitable approach for the analysis to account for multiple effect sizes per study per outcome, or multiple intervention arms (Hedges, Tipton, & Johnson, 2010). This approach allows for the inclusion of any number of dependent effect size estimates within a single analysis. For example, it is possible to include within a single analysis multiple measures of expressive language from multiple follow-up points from a study with multiple intervention arms. This approach meant that we did not ignore any appropriate outcomes, make arbitrary decisions about the 'most appropriate' outcome that matched our criteria, or create synthetic average effect sizes within single studies (Tanner‐Smith & Tipton, 2014).

Expressive language, receptive language and caregiver book-sharing competence were all analysed separately. Meta-analysis was conducted using Stata 15 software and package: robumeta (Hedberg, 2011). To assess risk of publication bias, we plotted each trial's effect against the standard errors (Sterne et al., 2011), creating a single effect size per study per outcome. Where there were multiple outcomes per study, the effect sizes and variances were combined (Borenstein, Hedges, Higgins, & Rothstein, 2009). These were then represented as Egger's plots through the Stata metabias command and output. We used Egger's regression asymmetry tests to quantify any visible bias (Egger, Smith, Schneider, & Minder, 1997).

2.11 Additional analyses

We planned to conduct five pre-specified subgroup analyses on primary outcomes, provided that there were sufficient studies available for a meta-regression analysis. These were intervention dosage, child age, parental education, modality (individual versus group-based), and country income level (HIC versus LMIC) (Bank, 2018). To examine the impact of dose on the outcome variables, a binary variable for intervention intensity was created based on the distribution of durations: 'low intensity' (less than 60 minutes of contact time), and 'medium to high intensity' (more than 60 minutes), corresponding closely to a median split of intensity for the 19 studies. Second, studies were categorised according to parental education level because of previous reports that parental education may have a bearing on whether the intervention is delivered to the child with fidelity (Mol et al., 2008). A binary variable was created: studies were grouped according the whether a majority (>50%) of parents had some form of tertiary education. For child age, based on indications that intervening early in a child's life is associated with greater improvement in child outcome than later intervention (Mol et al., 2008), child age was dichotomized at the most common point of preschool attendance: those with mean child age at baseline of less than 36-months (younger) and those with mean child age of 36-months or greater (older). Finally, for the modality moderator analysis, only direct instruction (face-to-face) interventions were considered. Interventions that consisted of only video- or phone-based intervention (n=3) were excluded from this analysis.

3. Results

3.1 Study selection

The results of the systematic search are documented in a PRISMA flow diagram in Figure 1 below. In total, the search yielded 6,448 eligible studies, after duplicates had

been removed. Of these, 6,411 were identified via the electronic search and a further 37 by hand searching the reference lists of the two relevant prior reviews and meta-analyses (Bus et al., 1995; Mol et al., 2008) as well as recent evaluation studies. The 6,411 studies were then screened for eligibility and 254 potentially eligible studies were identified. The abstracts of these studies were then read: in the process, 201 studies were discarded because they did not meet the inclusion criteria. This produced a final list of 53 studies for which full-text articles were sourced. A reading of these led to 33 being excluded for reasons listed in the flow diagram.

3.2 Study characteristics

The search yielded a total of 19 RCTs (from 20 papers) that met the inclusion criteria. The study characteristics appear in Table 1. Of the included studies, 11 were conducted in the United States, while the remaining eight studies were distributed across other HICs (including two each in Hong Kong and Australia) and middle-income countries (South Africa (two), Brazil, and Turkey). The included studies varied according to length of intervention (dosage), participant characteristics, intervention setting, intervention modality, and specific outcomes measured.

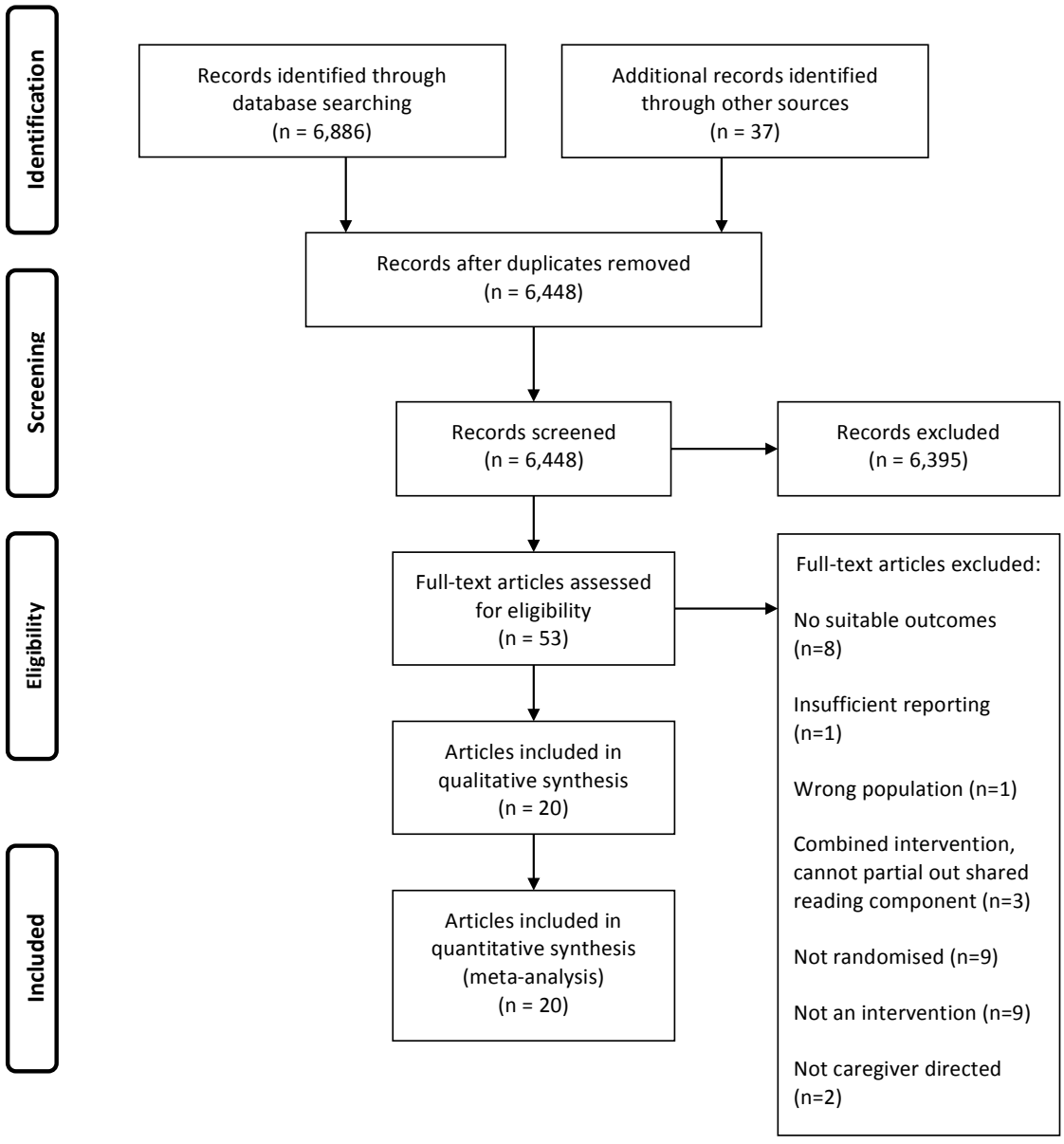


Figure 1 PRISMA Flow chart

3.3 Outcomes measured

All language outcomes measured were categorised as either ‘expressive’ or ‘receptive’. The table in Appendix 3 provides details of all the language measures used in the included studies, as well as the languages in which they were used. The two most common measures of expressive language were the Expressive One Word Picture Vocabulary Test (EOWPVT) and the verbal subset of the Illinois Test of Psycholinguistic Abilities (ITPA). One study (Sim, Berthelsen, Walker, Nicholson, & Fielding-Barnsley, 2014) used the Hundred Picture Naming Test (HPNT) (Fisher & Glenister, 1992) for expressive language outcomes. The MacArthur-Bates Communicative Development Inventory (CDI) was used in three studies with young children as a measure of expressive language (Cronan, Cruz, Arriaga, & Sarkin, 1996; High et al., 2000; Vally et al., 2015). One study (Blom‐Hoffman et al., 2006) used child on-task verbalizations during shared reading as the measure of expressive language. Two studies used standardised measures of mean length of utterance (MLU) as a measure of expressive language (Dale, Crain-Thoreson, Notari-Syverson, & Cole, 1996; Huebner, 2000), with the latter also using total utterances and variety of words used during book-sharing as measures of expressive language. Receptive language outcomes were predominantly measured with the Peabody Picture Vocabulary Test (PPVT). Goldfeld and colleagues (2012) made use of the Clinical Evaluation of Language Fundamentals, Australian edition (CELF-P2). Cronan and colleagues (1996) measured receptive language using the PRIMER language comprehension book. Outcome data on caregiver competence were reported in six studies. The variables that represented this outcome included ‘facilitating verbalizations’ (Blom‐Hoffman et al., 2006), caregiver ‘expansions and follow-up questions’ (Dale et al., 1996), book-sharing ‘sensitivity’ and ‘reciprocity’ (Cooper,

Vally, Cooper, Radford, et al., 2014; Murray et al., 2016) and 'interactive reading style' from the Adult/Child Interactive Reading Inventory (Weisleder et al., 2017).

3.4 Intervention dose

There was considerable variation in the dose of the included interventions. Some studies were minimal and consisted, for example, of a nurse spending approximately five minutes during well-child visits discussing shared reading with a mother (Goldfeld et al., 2012). Other interventions were far more intensive. For example, Cronan and colleagues (1996) administered an 18-session programme to mothers in their homes. Just over half of the interventions (10 of the 19 studies) involved multiple sessions with training time in excess of 60 minutes with caregivers.

3.5 Participant characteristics

The included studies involved 2,594 participating infant-caregiver dyads. Child age at the start of the studies ranged from 8.85 months (Goldfeld et al., 2012) to 66 months (Sim et al., 2014). All studies reported on typically developing children only, apart from Dale (1996) and Towson (2014), who included children with mild to moderate language delays and with special education needs respectively. Reporting varied widely with regard to socio-demographic variables, which precluded the construction of a socio-economic status variable (but the data indicated that socio-economic status was essentially co-extensive with parental education, which was more reliably reported). Some studies were conducted with populations that had a middle-class profile (e.g., (Sim et al., 2014; Whitehurst et al., 1988), while others included predominantly low-income households living in areas characterised by high poverty and deprivation (e.g., (Cronan et al., 1996; Vally et al., 2015). The education levels of

the caregivers in the studies also varied considerably. For the purpose of examining the impact on child outcome of carer education level, the latter was dichotomized as majority post-school educated or not. According to this categorisation, eight studies had caregivers with majority tertiary education and ten studies without this level of caregiver education. One study did not report any information on caregiver education level (Dale et al., 1996).

3.6 Intervention modality

The majority of interventions (*k*=15) were carried out in person. These were either conducted one-on-one (e.g., (Cronan et al., 1996), or in a small group (e.g., (Vally et al., 2015). Three interventions were administered in video format; for example, Blom-Hoffman and colleagues (2006) made use of the 'Read Together, Talk Together' dialogic reading instructional video developed by Whitehurst (2002). One study administered the intervention in a 20-minute instructional phone call (Wing-Yin Chow & McBride-Chang, 2003).

3.7 Bias within included studies

The Cochrane Risk of Bias Tool was used to evaluate the risk of bias within the included studies. This is summarised in Appendix 4.

Only four studies provided sufficient information on how random sequence generation was handled and qualified as low risk for this dimension. Allocation concealment was often not reported in sufficient detail: ten studies were judged as having an unclear risk of bias.

Table 1
Characteristics of included studies

Author	Year	Country	Population	N (int, control)	Child age (mo.)	Parental education	Baseline language control	Dosage intensity	Modality	Control	Time between assessments	No. of sessions (min/session)
Arnold	1994	U.S.	Middle sample	41(24,27)	29	Tertiary	Y	Low	Video	No intervention	4 weeks	2 (15 min)
Blom-Hoffman	2006	U.S.	Mixed sample	18(8,10)	41	Tertiary	N	Low	Video	Books	6/12 weeks	1 (15 min)
Chacko	2017	U.S.	Low income, Head Start	126(64,62)	55	Non-tertiary	N	Medium to high	Group	No intervention	10 weeks	8 (90 min)
Chow	2003	Hong Kong	Middle class	54(27,27)	60	Non-tertiary	Y	Low	Telephone	No intervention	8 weeks	1 (20 min)
Chow	2008	Hong Kong	Middle class	73(37,36)	63	Tertiary	Y	Medium to high	Group	Books	12 weeks	1 (60 min) + 6[a]
Cooper	2014	South Africa	Low income	25(13,12)	16	Non-tertiary	Y	Medium to high	Group	Play intervention	8 weeks	7 (60 min)
Cronan	1996	U.S.	Low income, Head Start	152(83,69)	28	Non-tertiary	Y	Medium to high	Individual	No intervention	28 weeks	18 (30 min)
Dale	1996	U.S.	Middle class	30(15,15)	61	N/A	Y	Medium to high	Group	Conversational training	8 weeks	2 (40 min)
Goldfeld	2012	Australia	Low income	410(237,173)	9	Non-tertiary	N	Low	Individual	TAU*	4 years	4 (5 min)
High	2000	U.S.	Low income	150(75,75)	19	Non-tertiary	Y	Low	Individual	TAU*	1 year	3 (5 min)
Huebner	2000	U.S.	Middle class	115(79,36)	29	Tertiary	Y	Medium to high	Group	Books	12 weeks	2 (60 min)
Kotaman	2008	Turkey	Middle class	40(20,20)	47	Tertiary	Y	Medium to high	Group	No intervention	8 weeks	1 (120 min)
Lonigan	1998	U.S.	Low income	43(16,27)	45	Non-tertiary	Y	Low	Individual	No intervention	6 weeks	2 (30 min)
Reese	2010	U.S.	Low income, Head Start	20(9,11)	49	Tertiary	Y	Low	Individual	No intervention	1 year	1 (45 min) + 5[a]
Sim	2013	Australia	Middle class	49(26,23)	66	Tertiary	Y	Medium to high	Group	Number learning	8/20 weeks	1 (15 min)
Towson	2014	U.S.	Low income, Head Start	25(13,12)	47	Non-tertiary	Y	Low	Group	Positive parenting	7 weeks	1 (30 min)
Vally	2015	South Africa	Low income	82(45,37)	15	Non-tertiary	Y	Medium to high	Group	No intervention	10 weeks	8 (90 min)
Weisleder	2018	Brazil	Low income	484(232,252)	37	Non-tertiary	Y	Medium to high	Group	Child care curriculum	36 weeks	8 (60 min)
Whitehurst	1988	U.S.	Middle class	29(14,15)	29	Tertiary	N	Medium to high	Group	No intervention	4/40 weeks	2 (35 min)

Note. * TAU stands for 'treatment as usual' and refers to routine 'well-child' visits at paediatric clinics; a = reminders

Blinding of participants was largely unproblematic for the purposes of the current review, as young children or infants were being assessed and were not aware of the intervention their parents had received. However, for studies that used parent self-report measures of child language (Cronan et al., 1996; Vally et al., 2015), blinding was a potentially important issue because knowledge of having received the intervention could have biased responses. Outcome assessment was generally well blinded, with the majority of studies (k=14) having blind assessors. Four studies were at high risk of bias with respect to outcome assessment, as the assessors were not sufficiently blinded to group allocation. Attrition and incomplete outcome data represented a source of bias in two of the included studies (Arnold et al., 1994; Lonigan & Whitehurst, 1998). One study provided insufficient information to determine whether missing data could have been problematic (Arnold et al., 1994), while another considered data only from participants who had completed post-test assessments, even though there had been substantial drop out (Lonigan & Whitehurst, 1998).

3.8 Synthesis of results

Results of all effect sizes from included studies for expressive and receptive language, and for caregiver competence outcomes, are presented in forest plots in Figures 2 and 3. For overall expressive language outcomes, 16 studies provided a total of 35 effect sizes with data from 1664 children. The forest plots show the study with which each effect size is associated, report the standardised mean difference, and 95% confidence intervals. The forest plot also provides the combined weighted effect of the outcomes. The pooled analysis suggested evidence (p<0.001) for interactive book-sharing having a small sized effect on improving expressive vocabulary when compared to

controls (*d*=0.41, CI: 0.20, 0.61; df: 13.44); tau-squared = 0.11. However, there was evidence of considerable heterogeneity between studies (I^2= 72%).

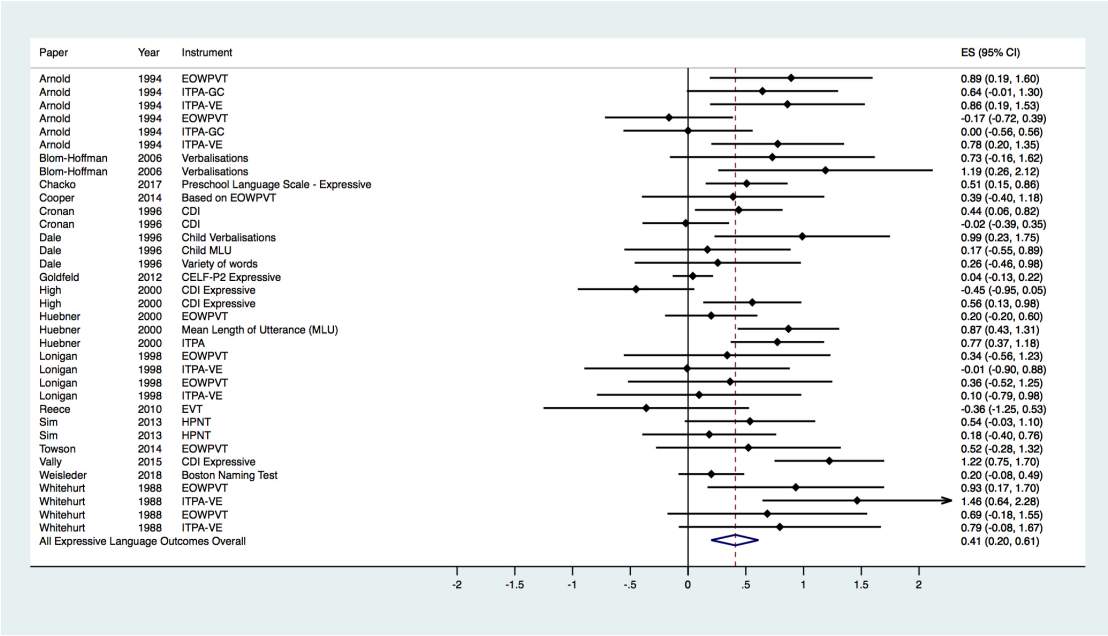


Figure 2 Meta-analysis for expressive language

For overall receptive language outcomes, 16 of the studies provided a total of 24 effect sizes on data from 1871 children. The results of the meta-analysis are provided in the forest plot in Figure 3. The pooled result of the robust variance estimation meta-analysis suggested evidence (*p*=0.001) for interactive book-sharing interventions having a small sized effect in improving receptive vocabulary when compared to controls (*d*=0.26; CI: 0.12, 0.40; df: 11.28); tau-squared = 0.03. There was evidence of some heterogeneity for this outcome (I^2= 54%).

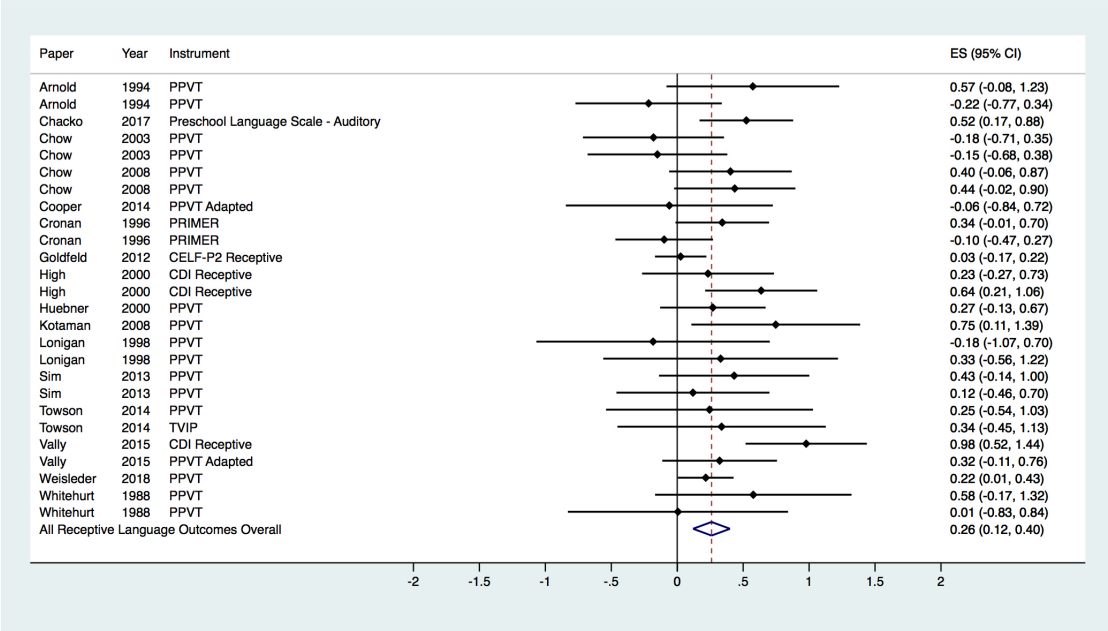


Figure 3 Meta-analysis for receptive language

For overall caregiver competence outcomes, six of the studies provided a total of 15 effect sizes on data from 481 caregivers. The results of the robust effects meta-analysis are provided in the forest plot in Figure 4. The pooled result of the robust variance estimation meta-analysis provided evidence (p=0.009) for interactive book-sharing interventions having a large sized effect in improving caregiver book-sharing competence when compared to controls (d=1.01; CI: 0.40, 1.63; df: 4.79); tau-squared = 0.29. For this outcome there was also considerable evidence of heterogeneity (I^2= 81%).

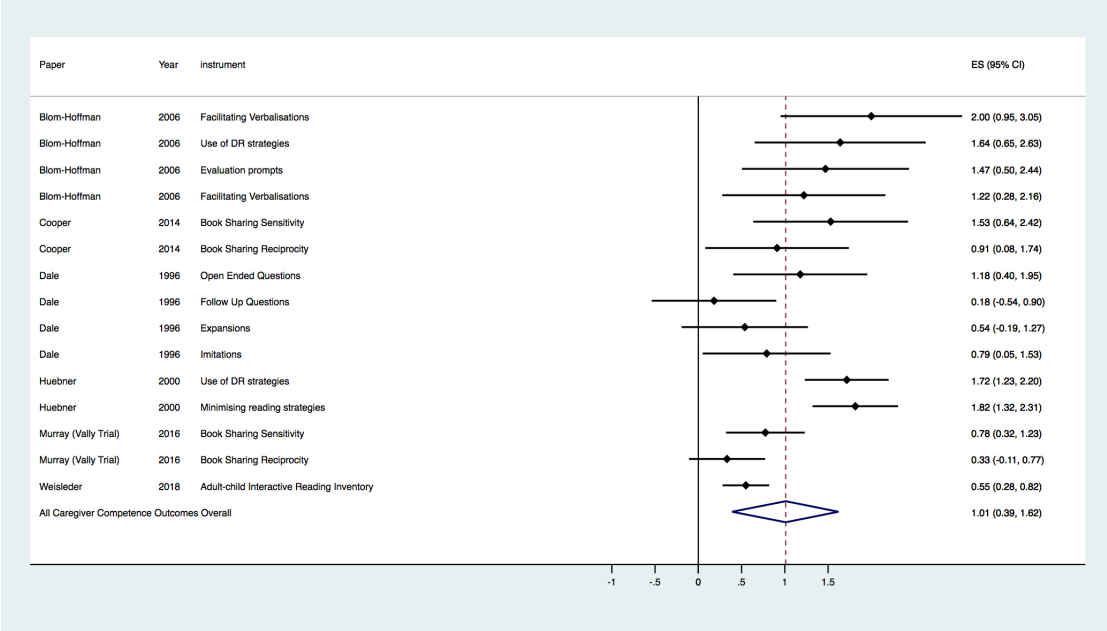


Figure 4 Meta-analysis for caregiver competence

3.9 Risk of bias across studies

The potential risk posed by publication bias was assessed by way of Egger's regression plots. These were generated by plotting the sets of standard normal deviates of effect estimates for all outcomes against their standard errors. Studies with multiple effect sizes per outcome were combined for this process by following the method proposed by Borenstein and colleagues (2009). This produced a single effect size and standard error per study per outcome that was used for the funnel plots, provided in Appendix 5. The examination of the Egger's plots revealed low asymmetry, representing low risk of bias across studies for all three outcomes. This was confirmed by non-significant results on the Egger's tests. This held across all three outcomes: expressive language (t= 1.73; p=0.11), receptive language (t=1.22; p=0.24), and caregiver competence (t=2.08; p=0.11).

3.10 Additional analyses

Five subgroup meta-regression analyses were pre-specified. Analyses according to child age, caregiver education level, modality, and intervention dose were estimated on expressive and receptive language outcomes; country income level (HIC versus LMIC) moderator analysis was estimated on receptive language only due to insufficient data on expressive language.

There was no clear evidence that child age or caregiver education moderated the effect of the intervention on either expressive or receptive language outcomes, and there was no evidence that country income level moderated the effect of the intervention on receptive language. For clarity, moderator analyses were also run with age as a continuous variable (in years). These produced very similar non-significant results.

There was weak evidence (p=0.07) that medium to high intensity interventions were associated with improved expressive language when compared with low intensity (B=0.33; CI: -0.04, 0.71). For receptive language outcomes, medium to high intensity interventions were also associated with somewhat better outcomes (B=0.21; CI: -0.07, 0.49); however, this relation was not significant (p=0.11). For those receiving medium to high intensity interventions, the effect size for expressive language was d = 0.54 (CI: 0.26, 0.82; p=0.002), whereas for those receiving the low intensity interventions it was d=0.19 (CI:-0.10, 0.50; p=0.15). Similarly, for those receiving medium to high intensity interventions, the effect size for receptive language was d=0.34 (CI: 0.17,0.50, p=0.002) and for those receiving low intensity interventions it was d=0.09 (CI: -0.25, 0.45; p=0.37).

For modality, there was evidence ($p<0.01$) that compared to individually delivered interventions, group-based interventions were associated with more improvement in both expressive language (B=0.47; CI: 0.17, 0.77; $p<0.01$) and receptive language (B=0.30; CI: 0.06, 0.54; p=0.02). These findings should, however, be interpreted with caution as the degrees of freedom for both models were below the advised level. For clarity, we ran an additional sensitivity analysis where we removed from the analysis the study of individually delivered training by Goldfeld (2012), as it was the study with the largest sample size but delivered the most minimal intervention. The results when this study was excluded did not alter the overall pattern of the findings; however the result for receptive language was no longer statistically significant (p=0.12).

Table 2
Moderator Analyses

Moderator	B	95% C.I.	Intercept	95% C.I.	Tau^2
Age					
Expressive	-0.10	-0.51, 0.31	0.46	0.07, 0.84	0.14
Receptive	0.08	-0.20, 0.36	0.23	-0.01, 0.45	0.03
Caregiver Education					
Expressive	0.16	-0.29, 0.61	0.35	0.05, 0.66	0.11
Receptive	0.13	-0.12, 0.38	0.22	0.03, 0.42	0.03
Country Income Level					
Receptive	-0.15	-0.63, 0.33	0.38	-0.24, 0.99	0.03
Intervention Dosage					
Expressive	0.33^{+}	-0.04, 0.71	0.21	-0.10, 0.51	0.09
Receptive	0.21	-0.07, 0.49	0.12	-0.18, 0.42	0.02
Modality					
Expressive	0.47**	0.17, 0.77	0.07	-0.11, 0.25	0.07
Receptive	0.30*	0.06, 0.54	0.06	-0.18, 0.30	0.02

Note. $^{+}$ $p<0.1$, * $p<0.05$, ** $p<0.01$

4. Discussion

4.1 Summary of evidence

The current systematic review aimed to assess the impact of dialogic book-sharing interventions on the language development of young children by appraising and synthesizing evidence from all identified RCTs. Overall, evidence of an acceptable quality suggested that compared to controls, shared reading interventions targeted at parents have a small positive effect on both the expressive (d=0.41) and receptive language (d= 0.26) of children. When only the ten studies with longer duration of intervention (over 90 minutes) were considered, these effect sizes were d=0.54 and d=0.34 respectively. The better outcome for expressive language compared to receptive language could be due to the fact that a central feature of book-sharing interventions is encouraging the child to take an active verbal role in the activity (Mol et al., 2008). Many of the dialogic techniques employed seek to elicit a verbal response and this promotion of child verbal participation may account for the consistent benefit in child expressive language. However, recent research using confirmatory factor analysis on multiple measures of language suggests that expressive and receptive vocabulary are best conceptualised as a single construct (Lonigan & Milburn, 2017). Thus, the differences in effects found may be a result of variability in how these skills were measured, rather than reflecting any actual differences in the children's capacities.

Measures of improvement in caregiver book-sharing competence provide a means of understanding how improvement in child language might be effected. Such measures reveal the extent to which the techniques and principles taught to parents during the interventions have been adopted and implemented. Unfortunately, few studies

reported on such outcomes, which precluded a formal subgroup analysis of implementation fidelity. However, for the six studies that did provide relevant data, a large effect size (d=1.01) was observed for the pooled effect on caregiver book-sharing competence.

While this is encouraging, only one study reported the appropriate meditational analysis to establish the impact of book-sharing competence on child language. Murray and colleagues (2016) found that improvements in caregiver sensitivity during book-sharing significantly mediated the impact of the intervention on receptive language, while improvements in caregiver-child reciprocity during book-sharing mediated the impact of the intervention on both child expressive language and receptive language (and child focal attention).

Contrary to an earlier suggestion (Mol et al., 2008), we did not find child age to be related to improvements in either expressive or receptive language: the extent to which language skills benefitted was no different for those younger or older than three years. Similarly, whether carers did or did not have post-school education did not bear on child language outcomes. This is especially important as it suggests that caregiver-directed book-sharing interventions can be successful across the full range of parental education, even when there has not previously been a routine of book-sharing as is the case in families with less educated parents (Bus et al., 1995; Mol et al., 2008).

The next subgroup analysis aimed to determine whether the effect of the intervention varied across different populations by comparing studies in countries with different income levels (LMICs and HICs). This is a particularly important question, given that

the burden of early developmental and language deficit falls in LMICs – predominantly in sub-Saharan Africa and Asia (Black et al., 2017). There was no evidence for country income level having any association with child receptive language: the interventions were just as effective in LMICs as they were in HICs. Indeed, the model somewhat favoured LMICs (B= -0.15). There was insufficient data to explore this issue in relation to expressive language. Given that relative to other more comprehensive ECD interventions, book-sharing programmes are inexpensive and can be easily delivered, it is surprising that so few evaluations of book-sharing have been carried out in LMICs. Further work of this nature is needed to establish the case for scale up of this intervention in LMICs settings. However, the current analysis provides important preliminary evidence for the global applicability of these interventions.

Intervention dosage was revealed to be an important factor in the current analysis. The categorisation into low and high dosage was necessarily crude (<60 minutes versus > 60 minutes of collective intervention time) but it was, nevertheless, instructive: children's expressive language benefitted significantly more when their caregivers had taken part in a more intensive intervention; there was a trend for the same association for child receptive language. Indeed, the brief interventions had no significant impact on child language outcomes. Brief interventions do not therefore appear to be an efficient use of resources, possibly because they fail to effect the necessary change in caregiver book-sharing behaviour.

A potentially important finding was that group-based interventions were more effective than one-on-one interventions for both expressive and receptive child

language outcomes. A possible explanation is that the group format offers more social support to participating caregivers. Many of the group-based interventions incorporated opportunities for parents to share their experiences of book-sharing with their children at home as well as discuss perceived barriers and challenges they were experiencing (e.g. Vally et al., 2015; Weisleder et al., 2018). However, these findings should be interpreted with caution, given the limited number studies that used a one-on-one format and the fact that two of these five studies had very low intensity interventions (Goldfeld et al., 2012; High et al., 2000).

4.2 Strengths and limitations

The current study is the first systematic review and meta-analysis of caregiver-directed book-sharing interventions focusing specifically on randomised trials. It involved a wide-ranging search of educational, psychological, medical, and public health databases. We used a novel statistical approach, namely robust variance estimation. This allowed for multiple effect sizes per study per outcome to be incorporated, thus providing a more precise estimation than previously achieved using the pooled effect of each outcome (Tanner‐Smith & Tipton, 2014). We also went beyond investigating the effect of these interventions on child language by also investigating their effect on caregiver book-sharing behaviours.

A key limitation of the included studies was the paucity of follow-up assessment of children. While all studies included both pre-intervention and immediate post-interventions assessments, few provide any findings on outcome beyond the immediate post-intervention assessment. This leaves unanswered the question of the durability of effects. The language and pre-literacy skills that interactive book-sharing

interventions help to build are only fully realised when a child enters the schooling system and begins to engage with formal literacy instruction. As such, it is of critical importance that a longitudinal study design is employed to establish whether the impressive short-term benefits for child language are evident at the point of school entry. The only study to follow up with children more than a year following the intervention was Goldfeld and colleagues (2012) who found no long-term impact of the intervention; however, this study involved the briefest intervention of all studies included in this review and it produced one of the smallest post-intervention effects on child language, so an absence of a long-term impact cannot be regarded as a valid reflection of the long-term impact of dialogic book-sharing.

A second limitation is the reporting on implementation fidelity. Such reporting was a rarity in the studies reviewed. Our understanding of the mechanisms responsible for intervention effects would benefit considerably if studies consistently collected data on parents' application of learned techniques. This would enable mediator analyses, of the sort reported by Murray and colleagues (2016), which could elucidate core components that drive intervention effects. Such analysis could serve the cause of distilling a parsimonious intervention package that could potentially improve efficiency and increase reach.

A third limitation was that many of the included studies lacked information about the random sequence generation used (k=12) and about allocation concealment (k=10). These two aspects of study execution are central to the RCT design, and hence uncertainty regarding how they were carried out means that further caution in interpreting the findings is warranted.

A fourth limitation is that a wide variety of language measures were used in the included studies. Although almost all were standardised and well-validated instruments, this variability in assessment introduced heterogeneity into the results. Finally, clinical and statistical heterogeneity were present within the set of included studies. The interventions, while all sharing certain common messages to help parents optimise shared reading practice, came in a variety of forms, which meant that there was a degree of clinical heterogeneity present, reflecting this variability. Further, despite exploration (by means of subgroup analyses), the observed statistical heterogeneity for all three outcomes remain somewhat unexplained.

4.3 Implications and conclusions

Implications for policy and practice. The current meta-analysis of RCTs on book-sharing interventions demonstrates the promise of such interventions for enhancing child language development, at least in the short term. These interventions show efficacy across a variety of settings and modalities, which is encouraging for taking them to scale. Indeed, a strong argument could be made that book-sharing should be considered for any programme that seeks to support early literacy and language development in infants and young children. It is especially significant that the current analysis indicates that book-sharing interventions can be equally effective when targeted at caregivers with low and high levels of education. It is also notable that contrary to previous suggestions, the current analysis indicates that young and older preschool children benefit equally from these interventions. Finally, this analysis suggests that there is a dose effect, with brief interventions being unlikely to result in improvements in children's language abilities. Interventions involving multiple

sessions, on the other hand, with extended contact time between the instructor and caregiver, are highly likely to result in improvements to child language.

Implications for research. A total of 19 RCTs were identified that met the inclusion criteria. This is a relatively small number of studies. More than half were conducted in the United States, which further limits generalizability. Certain shortcomings in the evidence base emerged through this review and future research should look to address these. First, studies need to include measures of implementation fidelity measuring parents' application of the interactive techniques when book-sharing with their children. This is important for both theory development and intervention refinement. Second, there is a need for longitudinal research into the durability of intervention effects – ideally following children from early childhood to the point of school entry. Third, given the tentative evidence that group-based interventions are more effective than one-on-one interventions, a direct comparison of these two delivery formats in an RCT format could be a valuable addition to this body of literature. Fourth, the studies in this review primarily included only typically developing children. Interventions targeting children with language deficits or children 'at risk', such as those from LMICs, could be an important direction for future research. Finally, and arguably most critically, there is a need for more research in LMIC settings where it is estimated that in excess of 250 million children are at risk of failing to meet their developmental potential (Black et al., 2017). In these settings, interactive book-sharing interventions have the potential to bring about marked, positive effects on children's early language development and, possibly, their wider developmental progress.

IV. Systematic Review Implications for DPhil Thesis

The preceding systematic review and meta-analysis synthesised all the experimental evidence on the impact of existing book-sharing programmes on child language and caregiver practices globally (up to 22/03/2018). This section summarises the implications of the review findings for the empirical work – particularly the randomised controlled trial (DPhil Paper 3).

The meta-analysis included 19 randomised controlled trials of caregiver-directed book-sharing intervention. The quality of the study designs and reporting was mixed: there was some high and unknown risk of bias due to poor reporting, and only five of the 19 trials were pre-registered. Overall, a significant benefit to child expressive and receptive language was demonstrated, as well as a substantial effect on caregiver book-sharing competence outcomes.

Importantly, the paper identified a number of factors relevant to effective programming and policy. First, the analysis indicated that there is an important dose effect, with brief interventions unlikely to result in improvements in children's language abilities. For the purposes of the review, brief interventions were classified as those with fewer than 60 minutes of 'contact' time. On the other hand, interventions involving multiple sessions with greater contact time between instructor and caregivers were highly likely to result in substantial child language improvements. The BEBS book-sharing intervention was aligned to this more intensive format, consisting of multiple sessions of more than an hour each. Second, the meta-analysis suggested that a group-based format was more effective than a one-on-one format. This suggests the possible benefits of social support networks created

by small groups of caregivers, which was indicated in a number of the studies (e.g. (Vally et al., 2015; Weisleder et al., 2017)). This finding was accommodated within the BEBS intervention, where caregivers participated in the programme in small groups, and social support networks were encouraged through caregivers sharing their experiences, challenges and successes throughout the programme. The concept of creating communities of learning and support through the programme was emphasised. A further point arising from the meta-analysis accommodated within the BEBS trial was that a number of the included studies required children to be present during intervention sessions, to enable caregivers to practise learned techniques and get real-time feedback from facilitators (e.g., (Cronan et al., 1996; High et al., 2000; Vally et al., 2015; Weisleder et al., 2017)). Although the data did not allow for this moderator to be formally tested, the results suggested that this element was linked to intervention success, as has been shown in parenting interventions more broadly (Rao et al., 2014).

Similarly, some important policy lessons emerged from the meta-analysis with particular relevance to this DPhil. First, the analysis demonstrated that caregiver education level did not affect the degree to which children benefitted from the intervention. This finding was important because previous reviews had indicated that children of less educated caregivers were less likely to benefit (Mol et al., 2008), and also because in the low-income South African context where the empirical work for this DPhil was taking place, the education level of caregivers was generally low. As such, this finding provided reassurance that the caregivers and children in the study context were just as likely to derive benefit from the programme as those of more educated caregivers. A second related finding was that programme effects were just as

strong in the few studies conducted in LMICs as they were in those conducted in HICs, and in fact, outcomes appeared to be somewhat better in LMICs. This suggested a strong degree of universality to these interventions although as noted, the sample from LMICs was considerably smaller than that in HICs.

Finally, what was very clear from the review was that experimental evaluations of book-sharing studies have focused almost exclusively on child language outcomes. Indeed, only two of the included studies (Murray et al., 2016; Weisleder et al., 2017) looked at any child outcomes other than language. Similarly, investigation into caregiver outcomes, or child-caregiver interaction outcomes was rare (Vally et al., 2015). Only six of the included studies measured caregiver book-sharing competence, and for these studies a large positive effect was demonstrated. However, in terms of parenting outcomes more broadly, and caregiver-child interactions beyond the book-sharing context, there was an almost complete paucity of inquiry. Only one study looked at interactions during play and caregiver disciplining behaviour, both using caregiver-reported measures (Weisleder et al., 2017). Despite a considerable body of empirical research demonstrating the role of caregiver talk (in particular, mental state talk) on child social understanding (Devine & Hughes, 2018), none of the included book-sharing interventions investigated a possible impact on the quality of caregiver talk. Similarly, none of the included interventions described specific programme content that was related to child socio-emotional development.

Thus, the systematic review highlights certain programming and evaluation gaps in the literature, but also provides valuable insights that can be taken forward by the empirical work in this thesis. The intervention evaluated in this thesis aims to add to

the evidence base by testing a book-sharing programme that contains specific content targeting social and emotional development, and aims to move beyond child language as the primary outcome of interest.

V. Methodology

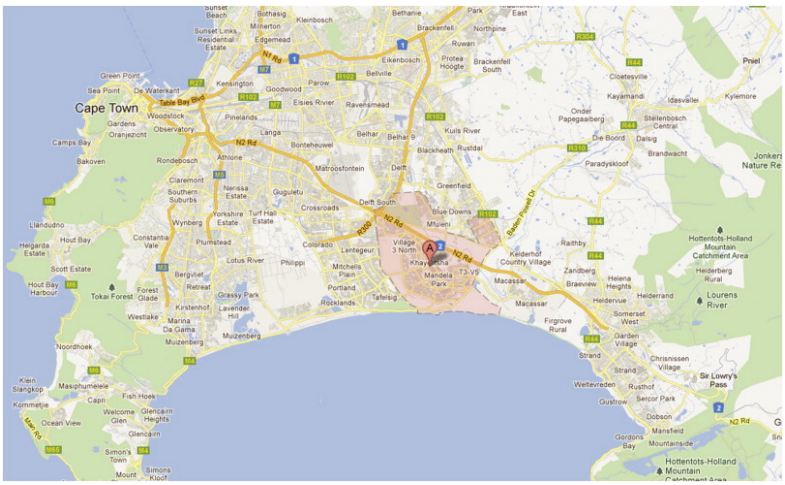
The empirical section of this thesis aims to 1) explore the individual and family-level predictors of child social understanding using baseline data and 2) experimentally evaluate the efficacy of a book-sharing intervention on parenting behaviours and child outcomes in a low-income South African sample. These empirical papers are at the centre of the Benefits of Early Book-Sharing (BEBS) Study (Dowdall et al., 2017), a randomised controlled trial and qualitative assessment, designed to develop and evaluate an evidence-based parenting and child stimulation programme for vulnerable families in the Western Cape province of South Africa. This methodology chapter will provide context for the empirical papers by providing a detailed description of the overall research study, including issues of sampling, recruitment, selection of measures, trial design, ethical procedures and fieldwork challenges experienced. Research methods and statistical analysis methods are also described in the individual papers; however, where sufficient detail was not included in the individual papers due to word-limit constraints, the author attempted the capture them in this chapter.

1. Contextualising the Empirical Papers

1.1 Study setting

The study took place in four neighbourhoods within the greater Khayelitsha – a large, partially informal, peri-urban township on the outskirts of Cape Town, South Africa. It is an area that is predominantly isiXhosa speaking and translates to ‘new home’ in English. The settlement was created in the 1980s during the racially segregated apartheid years, to provide a space for the many black South Africans, many whom had moved to the area from the more rural Eastern Cape province in the hope of finding work in Cape Town. It is approximately 30 kilometres from the Cape Town

city centre and now home to more than 500,000 people. It is an area characterised by high levels of poverty, unemployment and violence (Smit et al., 2016). The majority of households are shacks in informal settlements. Educational resources in the area are also lacking, with very limited access to library facilities and school infrastructure is often inadequate (Smit et al., 2016).





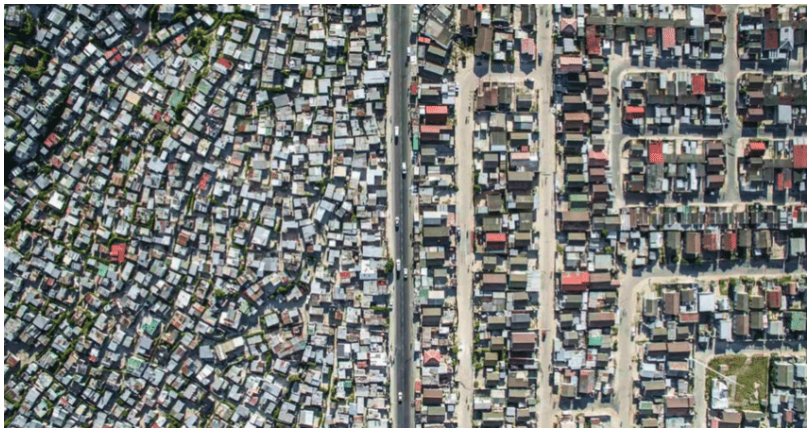


Figure 5 Map and pictures of Khayelitsha

1.2 Sampling and recruitment

The sample for the present study was drawn from four neighbourhoods in the greater Khayelitsha region. The Endlovini and Mfuleni areas are characterised by predominantly informal housing structures, while Makhaza and Harare have a mix of formal brick housing and informal structures.

Participants for the study were recruited by staff systematically going from door to door in the demarcated areas and enquiring about potentially eligible participants. The fieldworkers who conducted the recruitment were trained by the candidate and interactions were scripted and planned. Recruitment was conducted in two phases – in January and May 2016, corresponding to the two study waves. In general, families in the communities were receptive to the study and the recruitment went to schedule. The candidate would monitor the recruitment data submitted by the fieldworkers to the online server and would meet with the recruiting staff twice a week. For both waves, recruitment took approximately a month.

Participants who met inclusion criteria were asked for various contact details that were recorded on a cell phone via the Mobenzi data collection app. These participants were then called from the research centre and the details were checked to confirm that they matched the inclusion criteria. From each eligible household, the study enrolled one adult, namely the primary caregiver, and one child. Inclusion criteria for children and caregivers were defined as follows:

1) **Children:**
    a) Aged between 21 and 28 months
    b) Spend at least four nights per week in the respective household with the caregiver
    c) Have no chronic illness or disability that would prevent them from fully participating in the intervention
2) **Caregivers:**
    a) Aged 18 years or older
    b) Spend at least four nights per week in the respective household with the child
    c) Have no chronic illness or disability that would prevent them from fully participating in the intervention
    d) Able to attend weekly sessions (groups during the weekdays or on Saturday mornings)

1.3 Trial design

An RCT design was employed for the study, with participants assigned at the individual level to either book-sharing intervention or wait-list control groups. Data were collected at baseline, post-intervention, and at a six-month follow-up. For

pragmatic reasons, data collection was carried out over two waves. The timing for the trial is depicted in Figure 6.

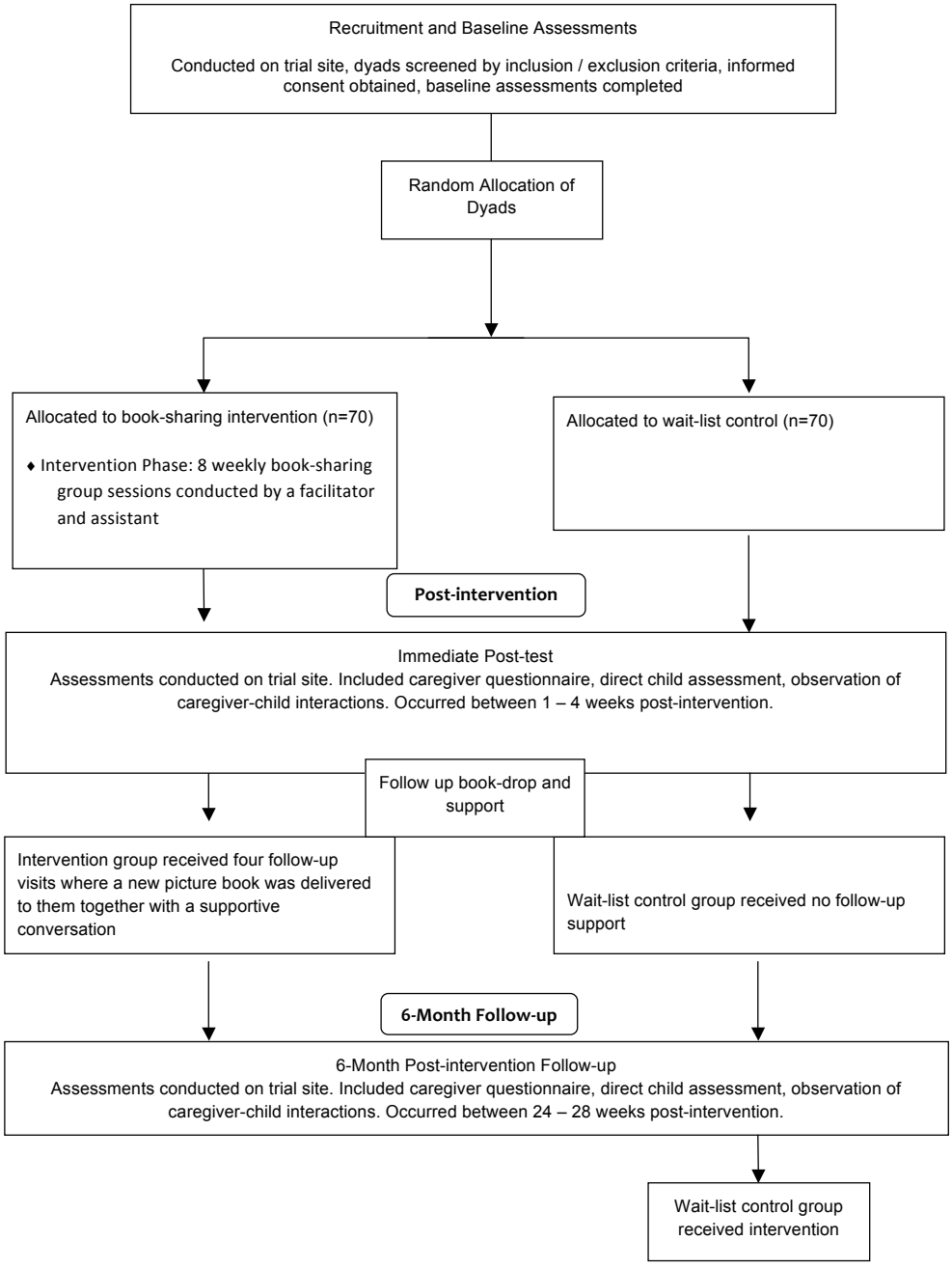


Figure 6 Trial timeline

The sample consisted of 140 caregiver-child dyads (70 in each arm). This sample has sufficient power to detect projected differences in the primary child cognitive outcomes. All power calculations were run for 80% power and alpha = 0.05. The power calculations for language and attention outcomes were based on previous research that aimed to improve child language and focal attention through a book-sharing intervention in South Africa, with two groups of 44 calculated as sufficient based on an effect size of 0.5 (Vally et al., 2015). For the behavioural outcomes of aggression and pro-social behaviour, the power estimates were based on normative data from a study in Khayelitsha on a sample of 302 children. For both the pro-social and the aggression variables, two groups of 64 were calculated as sufficient to detect the difference (two-tailed), based on an effect size of 0.50. Two groups of 70 were therefore recruited, which allowed for 10% sample attrition.

For baseline assessments, caregivers were contacted by the data collection team, and the study was briefly explained to them, including that participation is entirely voluntary. A suitable time for the caregivers to come in for assessments was then arranged. On the day, a driver picked up the participants from their home and brought them to the research centre located in central Khayelitsha. On arrival, participants were offered refreshments. Consent was again explained and caregivers then provided consent for themselves and their children.

Eligible participants who consented to taking part in the study were randomised on a 1:1 schedule to the index group and a wait-list control condition (the latter received the intervention once the three waves of assessment had been completed). A

minimisation process was used, using the MINIM software (Evans, Royston, & Day, 2004), to ensure a similar distribution of participant characteristics between two study groups in terms of child age (younger: 21-25 months, or older: 25-28 months) and sex. Randomisation took place when participants consented to being part of the study, before completion of baseline assessments. The candidate performed the minimisation process on site, and then notified an isiXhosa-speaking research assistant, who was not involved in any other aspect of the study, of the allocation. The assistant then privately explained the allocation to the participant, drawing on a script developed in conjunction with local research staff.

Blinding of participants and programme facilitators was not possible because participants knew whether or not they were receiving the eight-week book-sharing programme. However, observed child outcomes were unlikely to be influenced by this, as the children were not at a level of maturity where issues of blinding would be relevant to them. All assessment staff were blind to group allocation for the duration of the study.

To ensure transparency and reporting integrity, the trial was pre-registered with the ISRCTN registry on 27 February 2016 (ISRCTN71109104). The trial protocol was also published under the title ‘The Benefits of Early Book-Sharing (BEBS) for child cognitive and socio-emotional development in South Africa: study protocol for a randomised controlled trial’ in the journal *Trials* in January 2017.

2. Data Collection

2.1 Training and piloting and adapting

During the preparatory phase before baseline assessments began, between November 2015 and January 2016, the candidate worked closely with a team of three data collectors who carried out the assessments. This period involved training the data collectors to administer the language assessments, theory of mind tasks, mother-child interaction tasks, and questionnaires. This was done through a process of teaching and demonstrating, practising, and finally piloting with real children and caregivers from the community. The candidate also worked with the team to translate all the materials from English into isiXhosa, as well as culturally adapt certain assessment materials – such as items from the Communication Development Inventory (CDI), or items in the theory of mind battery of tasks. All adaptation was done in collaboration with local isiXhosa-speaking research assistants from Khayelitsha.

Training and piloting were on-going processes, as additional measures were included at later assessment points. For certain measures and instruments, such as the Language Environment Analysis (LENA) digital devices and software, the candidate went through an initial training process and then trained staff in the use of the instruments and piloted the processes. Similarly, the candidate was trained in the administration of the Bayley Scales of Infant Development and then conducted training and piloting with staff, before it was administered it at the six-month follow-up stage.

A team of three data collectors were trained in the requisite child assessments and caregiver interview questionnaires. All three data collectors had previous experience

administering questionnaires and child assessments, including administration of some of the measures used in the present study. All data collectors were familiar with consent and referral procedures, as well as how to discuss potentially sensitive topics during interviews with caregivers.

2.2 Procedure

All caregiver/child dyads were assessed on three occasions: at baseline, immediately following the eight-week intervention, and six months after the intervention. Assessments lasted for up to two-and-a-half hours. This included specific assessments of the child (e.g. Early Childhood Vigilance Task), questionnaires answered by the caregiver (e.g. Communication Development Inventory), filming the caregiver and child in interactive tasks (e.g. during guided play), and home-based observational measures (LENA). There were frequent breaks for drinks and snacks and if the child showed any signs of tiredness or distress, the session would be paused or if necessary terminated and rescheduled.

3. Measurement

3.1 Questionnaires

Various outcomes were assessed through standardised questionnaires that were administered on tablets. Due to a number of factors, including varying levels of literacy and caregivers' computer literacy, it was decided that questionnaires would be administered in the form of interviews: the research assistant would ask the caregiver for responses and fill them in on the tablet. Questionnaires were designed on Mobenzi, a South African software and online server that specialises in technology for research purposes. With the Mobenzi app, the questionnaires were easy for

research assistants to navigate, and were embedded with various skips and prompts for ease of administration.

3.2 Child assessments

Various direct assessments of the child were conducted, such as the theory of mind tasks. All direct observation tasks were video recorded for both coding and quality control purposes. The caregiver would always be present in the room when direct assessments were being conducted, but clear instructions were given to caregivers to not help or guide their child to the correct answer. Fidelity of assessment procedures would be checked by the candidate every day during the first week of assessment, and then weekly after that. The candidate was on site at the research centre every day during data collection to assist staff with a variety of issues that would arise during assessments (expanded upon in the Challenges section). The candidate extracted, labelled and saved all video data at the end of each day of assessments. A sub-sample of videos was then systematically checked for fidelity of administration, and regular feedback would be provided to research assistants.

3.2.1 Child language

There is no clear consensus on the best way to assess language abilities in young children, especially those two years and younger. On the one hand, standardised lab-based measures such as the Peabody Picture Vocabulary test have a number of strengths, such as being well structured and directly observed measures of receptive language. However, especially in young children, these kinds of assessments also come with an inherent set of limitations. The main risk is that these direct assessments may not reflect a child's true ability, because of a set of limiting contextual factors.

For example, young children often become uncooperative, and lose attention and interest in the task. Another risk is that they become intimidated and overly inhibited when asked to perform certain tasks like pointing to a picture that corresponds to the question posed by the an unfamiliar adult in a an unfamiliar 'lab' setting (Feldman et al., 2005). Caregiver-reported checklist measures of child language address many of the limitations described above, but come with their own set of limitations. Namely, that caregiver report is not always reliable as it is dependent on memory and draws on the adult's general assessment of the difficulty of the word in question (Tomasello & Mervis, 1994). Further, it can be prone, especially in the context of an intervention programme, to overestimating child language abilities due to natural pride or perceived demand effects. The MacArthur-Bates Communicative Development Inventory (CDI) is one of the most widely used caregiver-report instruments globally for assessing child language. When used appropriately, it can provide reliable and valid measures of total vocabulary size. A variety of studies of the CDI have demonstrated concurrent and predictive validity with observed and naturalistic measures of language (Dale & Fenson, 1996; Marchman & Martínez-Sussmann, 2002). It has also been adapted and successfully used in various African contexts (Alcock et al., 2015; Law & Roy, 2008) including South Africa (Vally et al., 2015). A thorough adaptation and back-translation process was undertaken by the candidate as a version of the Toddler Form II was not available in isiXhosa. This process, and the resulting checklist are presented in Appendix 6.

However, given the preceding discussion, a complete reliance on caregiver-report language measures would have posed a risk to the validity of the outcome reporting. Another commonly used method of assessment is to code naturalistic and spontaneous

speech (Pan, Rowe, Spier, & Tamis-Lemonda, 2004). Thus, child utterances were coded (as an event count) during a five-minute toy play activity with their caregiver.

Finally, at the six-month follow-up assessment, when the participant children were closer to three years old, the language sub-scales of the Bayleys Scale of Infant Development was used as a direct assessment of their language abilities. This is a widely used, comprehensive measure of child language (Bayley, 1993) that has demonstrated concurrent and predictive validity with other measures such as the Ages and Stages Questionnaires (Gollenberg, Lynch, Jackson, McGuinness, & Msall, 2010). It goes beyond merely naming or pointing to pictures, and assesses children's ability to understand morphological markers such as plurals, pronouns and prepositions. It also evaluates syntactic development such as use of tenses, plurals, and multi-word sentences. It has been used in South Africa in an isiXhosa population and this work was drawn on in the translating, training and piloting (Ballot et al., 2017). These three approaches to language assessment provided a robust evaluation of child language through the use of a diverse set of methods.

3.2.2. Child attention

The relationship between attention and intelligence is well established (Schweizer, 2010; Schweizer & Moosbrugger, 2004). Indeed, a child's ability to sustain their attention has been shown to be a particularly important factor in their learning and development (Choudhury & Gorman, 2000; Slater, 1995). Caregiver-child interactions that are contingent and responsive have been shown to be an important factor in in promoting children's abilities to sustain their attention (Graziano, Calkins, & Keane, 2011), specifically when caregivers and children engage in episodes of joint

attention, such as during shared reading (Scott et al., 2013). Thus, it is surprising that child sustained attention has rarely been included as an outcome in book-sharing studies.

There is no clear consensus on the most appropriate way to measure sustained attention in young children. Common approaches include 'looking time' or visual fixation, where it is argued that looking behaviour is an important proxy for attention (Colombo & Cheatham, 2006). Naturalistic toy play is another popular approach to measuring attention, where children are presented with multiple toys and then coded for bouts of sustained attention (Choudhury & Gorman, 2000). Certain direct assessments have been developed to assess attention in young children. One such assessment is the Early Childhood Vigilance Task (ECVT) (Goldman, Shapiro, & Nelson, 2004). This task is based on a direct measure developed by Ruff et al. (1990) where infants were shown a puppet that made a noise and then disappeared after a few seconds. They would then measure how long the infants continued to attend to the location where the puppet had disappeared. The ECVT uses this paradigm through a screen-based measure of vigilance. It involves a moving cartoon that attempts to hold the attention of the child by calling out to them, while music plays in the background. The character then consistently disappears and reappears over the course of seven minutes. The task measures how long the child attends to the screen throughout the sequence, including in the absence of the stimuli. Through this approach, the ECVT is able to combine the vigilance through anticipation paradigm with the 'looking time' attention style of task. Though a relatively new measure, it has shown strong correlations with a number of other measures of attention, such as sustained attention in toy play (Romero et al., 2012).

The ‘vigilance’ approach to assessing attention was used in the present study through the use of the ECVT. However, to reduce reliance on a single approach to measuring attention, a naturalistic measure of attention was obtained though a multiple object toy play task. For this task, a global rating scale was used, based on a similar system used in a South African study with 14-month-old infants (Cooper, Vally, Cooper, Radford, et al., 2014).

3.2.3. Child pro-social behaviour

There is evidence from observational studies that caregiver behaviour during book-sharing is associated with child socio-cognitive understanding (e.g. (Adrian et al., 2007; Adrian et al., 2005) and also with pro-social behaviour (Brownell, Svetlova, Anderson, Nichols, & Drummond, 2013). Pro-social behaviour can be measured in young children through caregiver-reported questionnaires such as the Strengths and Difficulties Questionnaire (SDQ), or through direct observation. The strength of caregiver report is that it does not have the risks associated with children having to complete a task in an unfamiliar environment, with an unfamiliar adult, which can be compromised by factors such as inhibition, mood, and fatigue. However, caregiver-reported pro-social outcomes are can be compromised by social desirability biases and caregivers rating their own children overly favourably (or unfavourably).

Thus, two measures of pro-social behaviour were chosen for the present study. First, the SDQ pro-social sub-scale, which asks caregivers to judge five statements about different aspects of their child’s behaviour, such as ‘my child is kind to younger children’. In addition, a direct measure of pro-social behaviour was included with a ‘helping’ task modelled on Buttlemann et al. (2009) which creates a scenario where

the child sees an adult in a predicament and is given the opportunity to help them locate a lost pen. This task is explained in detail in Paper 2.

3.2.4 Child aggression

There was an emphasis on promoting positive parenting strategies in the book-sharing intervention in the present study. Given the known relationship between positive parenting and lower levels of child aggression (Knerr, Gardner, & Cluver, 2013), an important and novel question was to test if the programme had any impact on child aggressive or defiant behaviour. It is common in the literature to group child defiance/non-compliance together with aggression as part of the same externalising behaviour construct (Crockenberg & Litman, 1990; Rothbaum & Weisz, 1994).

As with pro-social behaviour, child aggression can be measured by direct assessment or by caregiver report. Each of these approaches has strengths and limitations. The aggression sub-scale of the Child Behaviour Checklist (CBCL) is among the most widely used caregiver-report measures of child behaviour problems in clinical and research settings (Ebesutani et al., 2010). However, it is prone to the same limitations as other caregiver-report child behaviour measures described previously. This can lead to either underestimates *or* overestimates of behaviour problems. Direct observation of child behaviour and parent-child interactions can yield more reliable data on child externalising behaviour, but these methods also have certain limitations. For example, Gardner (2000) described some of the methodological issues involved in direct observation of child behaviours. First, these measures often entail recording behaviour in unnatural and unfamiliar settings (e.g. a research lab). Second, the presence of an unfamiliar researcher (observer) can affect both child and caregiver

behaviour, and the imposition of a task (e.g. requesting them to play) rather than observing a natural or spontaneous set of behaviours can affect the behaviours.

As with previous measures, a mix of caregiver report (CBCL), and direct observation of child behaviour and caregiver-child interactions were used in this study to assess child externalising behaviour.

3.2.5 Child social understanding

Certain kinds of caregiver behaviours during book-sharing have been shown to benefit child social understanding, or theory of mind in a number of observational studies (Adrian et al., 2007; Fine, Aram, & Ziv, 2014). Traditional theory of mind assessments such as the well-known 'unexpected contents' false belief tasks are suitable for children three and a half years old and upwards (Wellman, 2002). For younger children, a number of simpler assessments, which rely less on language capabilities, have been developed (Wellman, 2002). These tasks aim to measure early markers of theory of mind and often involve simple perspective taking activities, or the interpretation of diverse desires and diverse beliefs (Repacholi & Gopnik, 1997). These three dimensions were judged to be appropriate for the children in the current study, after a thorough review of the literature and consultations with global experts on theory of mind such as Henry Wellman and Alison Gopnik, in addition to some early piloting work with children in Khayelitsha.

The tasks used are described in detail in papers II and III, as well as in Appendix 7.

3.3 Caregiver-child observations

As part of the assessments, caregivers and children were observed in different situations; for example, during toy play. During these observations, a camera was set up in the corner of the room so that all observations were video recorded. The research assistant would then provide clear, scripted instructions to the caregiver about the required activity: for example, 'Okay (child's name) can play with the toys now and you should help him play with them'.

3.3.1 Caregiver sensitivity and reciprocity

A central objective of the present study was to assess whether caregivers that received the book-sharing intervention demonstrated improvements across a range of behaviours, both in book-sharing contexts, and in non-book-sharing contexts. Based on previous book-sharing research in South Africa, the two critical variables in this regard were measures of sensitivity and reciprocity (Murray et al., 2016). Both of these variables encompass a number of dimensions such as emotional tone, pacing, and facilitations (described in detail in Appendix 8) and were coded using adapted versions of the Global Rating Scales of mother-child interactions (Murray, Fiori‐Cowley, et al., 1996). The variables were coded for a book-sharing episode and a joint-play activity (where an adjusted coding scheme was used). While these observational methods do come with similar limitations as described by Gardner (2000), namely the artificial 'lab' setting and presence of an adult stranger, they still represent more reliable assessments than equivalent caregiver-reported measures.

3.3.2 Caregiver discipline

Although not traditionally evaluated in book-sharing intervention studies, there was interest in the present study to assess the possible impact of the programme on caregiver disciplining strategies. While the intervention did not contain traditional child behaviour management components, many elements of positive, sensitive and reciprocal parenting were emphasised throughout the programme. Thus, both positive and harsh dimensions of discipline were of interest. Disciplining is a complex dimension of parenting to assess, and both direct observation and self-report measures have several limitations. Self-report measures such as the Discipline and Violence Questionnaire (DVQ) (Lansford & Deater‐Deckard, 2012) have been widely used to assess a range of disciplining practices. The key limitation with self-reported assessments of discipline is that caregivers are not always willing to admit to using harsh disciplining strategies, particularly when they might feel it is not socially acceptable to admit to do so (such as admitting to beating your child) (Locke & Prinz, 2002). Indeed, the wording of questions in self-report presents a challenge, as general wording such as 'firm disciplining' can obscure variations in effective or ineffective practices, however, specific wording such as 'spank' or 'beat' can prompt social-desirability biases (Locke & Prinz, 2002).

Similarly, observed measures of disciplining have a number of limitations. If the context is lab-based, then the setting and awareness of being observed can affect caregiver behaviour. Further, lab based assessments are usually quite short in duration, so there is an issue of having naturally low-frequency behaviours combined with a short period of observation which can lead to data not always being an accurate reflection of actual behaviour.

Thus, in order to compensate for the limitations of both approaches, a combination of caregiver-report (DVQ) and observed measures were used in the present study. A prohibition task was set up where a caregiver was instructed to not let their child touch a set of toys for a defined period of time. This was designed in order to 'elicit' parenting behaviours, including disciplining strategies. A compliance task was also used where caregivers were asked to direct their child to pack away a set of toys following period of free play. The coding schemes are presented in Appendix 9 and the tasks described in the trial outcomes paper (Paper 3).

3.3.3 Caregiver mental state talk

A well-established relationship exists between certain types of caregiver-child discourse and child social understanding (Devine & Hughes, 2018). In particular, caregiver references to mental states (e.g. cognitions, emotions, perspectives) have shown consistent associations with measures of child social understanding. In general, obtaining measures of mental state talk is an onerous process that entails recording, transcribing and coding segments of speech. For the present study, an interaction where a caregiver was requested to explain a set of pictures to their child was used as the source for the mental state talk variables. This task and coding process is described in detail in Paper 2.

3.4 Home-based observations

A balanced combination of caregiver-reported and direct observation measures was used in the present study. However, naturalistic assessments in the home environment represent a very strong source of data. The quantity of adult speech that young children are exposed to in their home environments is well acknowledged to be of

benefit to their cognitive and language development (Gilkerson et al., 2018). One of the intended outcomes of the book-sharing intervention was to engage caregivers and children in rich and frequent verbal interactions through the medium of picture books. In this regard, the gold standard of assessment was to obtain measures of child language exposure in the home. The LENA recording devices and software were used to collect naturalistic measures of the child's home-language environment (Xu, Yapanel, Gray, & Baer, 2008). These devices generate counts of child vocalisations, adult words, and adult-child conversational turns for the hours that the child is wearing the device. As such, they are able to automatically generate accurate measures of child language exposure over long periods of time.

Research assistants scheduled a time when the caregiver would be at home with the child, and dropped off an appropriately-sized vest, fitted with a recording device. The research assistant provided the caregiver with clear instructions about what to do with it when the child went to bed. The device and vest were collected the following day, and a fresh device was dropped off. Two LENA recordings were obtained from each child. There was a separate process of consent and explanation for these assessments.

This section discussed some of the overarching methodological decisions and trade-off's required in the present study, however, all measures and variables used for the analyses are described in detail in each empirical paper.

3.5 Coding and scoring

A key strength of the BEBS study was the large volumes of observational data that were collected. Much of this data was, however, in video format and needed to be scored or coded at a later stage.

As some of these observational assessments were fully novel to the South African context, behavioural coding schemes were developed by the candidate in collaboration with the Principal Investigators. For other tasks, coding schemes were already in place and the process required training local research assistants to code the videos. The coding and scoring processes are briefly summarised in Table 3 below.

Table 3
Coding and scoring processes

Task	Coding scheme	Coder(s)	Picture
Caregiver-child toy play *Five-minute play interaction*	Developed by LM and used in multiple studies in HICs. Adapted to the South African context. Used event counts and rating scales. Based on five-minute play interaction. Final variables coded included: vocalisations, attention, facilitations, sensitivity, and reciprocity. Full interaction translated and transcribed for coding by non-isiXhosa-speaking research assistants. Detailed coding scheme presented in Appendix 10	Graduate students from the University of Reading Psychology Department trained by LM.	

Don't touch / pack away <u>Don't Touch</u> *Two-minute prohibition task* <u>Pack Away</u> *1-3 minutes depending on how long it took for child and caregiver to pack toys away*	Developed by UCT graduate student in collaboration with LM, drawing heavily on systems developed by Kochanska (Kochanska & Aksan, 1995)and Crockenberg (Crockenberg & Litman, 1990). Made up of rating scales and event counts. Final coded variables included: child defiance, verbal and physical guidance, harsh verbal and physical discipline. Full interaction translated and transcribed for coding by non-isiXhosa-speaking research assistants. Detailed coding scheme presented in Appendix 9.	Graduate student from UCT supervised by LM.	
Book-sharing activity *Five-minute book-sharing activity.*	Developed by LM and used in previous research in HICs and adapted for the South African context. Manualised by ND for BEBS study. Used rating scales. Final variables coded included: sensitivity and reciprocity. Coding scheme and manual presented in Appendix 8.	Local isiXhosa research assistants trained by ND.	

Barrier frustration task *60-second 'frustration' activity where a toy is put out of reach behind a Perspex barrier.*	Developed by LM in line with the coding system proposed by Goldsmith (Goldsmith & Rothbart, 1993). Made up of rating scales and count variables. Final variables included negative intensity (aggression), mature regulation strategies and dysregulative strategies. The coding scheme is presented in Appendix 11.	Graduate students from the University of Reading Psychology Department trained by LM.	
Narrative task *Approximately five-minute interaction where caregiver explains two sets of pictures to child*	Developed by ND, drawing on coding systems proposed by Ruffman (Ruffman et al., 2002) and Dunn (Dunn, Brown, & Beardsall, 1991) , with assistance from LM. Used count data from transcribed utterances. Final variables included: emotions, perspectives, desires, cognitions, causal talk, and complex cognitive talk. Full interaction translated and transcribed for coding by non-isiXhosa-speaking research assistants. The coding scheme is presented in Appendix 12.	Research assistants from Stellenbosch University, with assistance from ND.	

Early childhood vigilance task *Tablet-based attention assessment that child watches. Video lasts for seven minutes.*	Scoring based on guidelines provided by Goldman (Goldman et al., 2004), but adapted and operationalised as necessary by ND for the context. Final variable was child focal attention as a ratio of the total time. Scoring system is presented in Appendix 13.	Local isiXhosa research assistants trained by ND.	
Theory of mind *Six tasks assessing different aspects of theory of mind – battery takes approximately ten minutes to complete.*	Scoring based on guidelines provided by Wellman (Wellman & Liu, 2004), Gopnik (Repacholi & Gopnik, 1997) and others, but adapted and operationalised as necessary by ND for the context. Final variables were two composite variables – ToM classic and ToM advanced. Scoring system is presented in Appendix 7.	Local isiXhosa research assistants trained by ND.	

3.6 Data management and cleaning

Data were collected on tablets and once complete, automatically submitted to a secure server platform hosted by Mobenzi. Data transmitted from the tablets were stored on a secure central network server, with passwords only known to senior project staff. The questionnaire data coming in were monitored online daily by the candidate. The candidate was responsible for developing a system of regular data backup for increasing data safety and from possible server failure. Questionnaire data were downloaded and backed up on an external drive once a week. Video data were downloaded and labelled from cameras every day and loaded onto external hard drives. Once a week, all video data was backed up onto a second hard drive. All other study documentation such as consent forms, participant information and other notes were stored in locked cupboards in the secure office. Participants were allocated personal identification numbers that were used in all study records to protect their identity and maintain confidentiality.

Data cleaning was performed by the candidate. The initial database was developed in MS excel. A detailed codebook was created, specifying each variable label and response codes, corresponding questions and composite variables or scales. Data from all three time points were merged based on participant IDs. Descriptive statistics were computed for all variables to check for impossible values and data capture errors. In the small number of cases where unusual values were observed, the candidate followed up with field workers and then resolved the problem by replacing the value as missing data or the correct data, if it was identified.

The data analysis strategies are described in detail in the respective empirical papers.

4. Ethical Considerations

Ethical approval for the study was obtained from the Health Research Ethics Committee at Stellenbosch University (N15/09/084) and the Departmental Research Ethics Committee at Oxford University (SPI/C1A/16/006). Ethics approval letters are presented in Appendix 14.

4.1 Informed consent

Participation in the BEBS study was entirely voluntary. Initial information about the study was provided by isiXhosa-speaking study recruitment staff who went from door to door, looking for participants who met inclusion criteria. At each assessment point, consent forms were available in both isiXhosa and English. Due to varying levels of literacy, research staff were trained to read and thoroughly explain consent forms to participants to ensure they were fully understood. Consent forms contained information about the purpose of the research study, the right to withdraw at any point, confidentiality procedures, and contact details of study staff. A full template of the study consent form is presented in Appendix 15.

4.2 Referrals

In cases where research assistants identified an urgent need for a participant to access support services, such as counselling, meeting with a social worker or health care worker, referrals and necessary arrangements were made with the consent of the participant. Examples included where caregivers reported severe depression, including suicidal ideations, or if caregivers reported intimate partner violence. Stellenbosch University protocols were followed in such cases, and resources, such as arranging for transport to referral services, were made available.

4.3 Compensation

In order to compensate participants for their time, vouchers of R150 ($10) were given to caregivers after each assessment point. This was in line with other studies carried out by the Stellenbosch Research Group in those communities. Further, as part of the intervention, caregivers were given a meal voucher after each session and at the end of the intervention, caregivers and children were given a pack of six books, a certificate of completion, and a laminated 'reminder' card with key messages on one side and a picture of them sharing a book with their child on the other side. Refreshments and snacks were provided at each assessment point and during each intervention session. Wait-list control group participants were offered the same intervention package after the final assessments were completed.

5. Fieldwork Challenges

5.1 Child assessments

While the team endeavoured to keep the assessments as short as possible and phased with regular breaks for the participants, working with very young children can present challenges. Active participation of the child was necessary for a number of assessments (e.g. social understanding tasks), and at times children were not prepared to take part in the activities. The staff, together with the candidate, would have a protocol for how to deal with children in 'challenging' moods. First, as soon as it was clear that the child was not prepared to participate in an activity, the caregiver and child were given a break and encouraged to have a refreshment and (sometimes) go for a short walk outside the offices. After this short break, the research assistant would again attempt to engage the child in the activity. If the child was still not willing to participate, the research assistant would complete any remaining caregiver

questionnaires, thus giving the child more time to rest. If, after two attempts to re-engage the child in the task or activity clearly were not working, the research assistant would consult the candidate and a joint decision would be made about the way to proceed. In most cases, the mother would be requested to come back to complete the remaining assessments the following day, or as soon as she was available. As many precautions were put in place as possible to facilitate child participation: for example, the team always kept a supply of diapers and wipes on hand for caregivers; there was a small mattress available for children to have a nap if necessary; there were various snacks and refreshments for caregivers and children; and there was a full-time driver to collect participants and take them home.

5.2 Tracking participants

Many of the neighbourhoods in Khayelitsha where participants lived were informal settlements. In most of these areas, there are no formal street addresses, presenting a challenge for locating participants. The strategy for keeping in touch and locating participants was to hold a comprehensive database with multiple phone numbers – of the participant, a partner or spouse or other family member. If the participant did not have a formal address, a description of the location of the house was provided and kept on record. Participants were phoned well in advance to schedule assessments and were given a reminder call the day before when they were provided with all the necessary details for the upcoming assessment. Nevertheless, there were regular instances of participants not arriving to be collected by the driver, and not being contactable by the research team. When the team was not able to contact a participant (or any of the other contact related to the participant for whom the team had details), research assistants would go out into the community to track down the house and try

to get information from neighbours or other community members. In most cases the team was able to track down participants. However, a common problem with conducting research studies with families in Khayelitsha is that many participants come from the Eastern Cape province and have family (parents or grandparents) living there. As such, it is common for them to move back to the Eastern Cape for periods of time or, if their living conditions change (such as finding employment), to send their young children to live with the grandparents. Unfortunately, there was not sufficient budget to send research assistants to the Eastern Cape to track down participants and carry out assessments. Accordingly, a small number of participants were lost to follow-up.

VI. Paper 2: The role of Caregiver Causal Talk in Promoting Child Social Cognition: A Cross-Sectional Observational Study in an Impoverished South African Community

This is the second paper of this DPhil thesis and is based on empirical baseline data collected as part of the trial. This paper is under review by *Cognition*.

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Statement of Authorship

I confirm that I completed the majority of the work in this study. I conceptualised the study and research questions, and led the process of instrument selection, data collection, coding, analysis and I wrote the paper. Other authors contributed to the developing of coding schemes, coding of data, supervision and support of data collection, and offered suggestions on the write up and interpretation of findings.

Abstract

Background

Despite much research into individual and family predictors of socio-cognitive understanding in preschoolers, little is known about corresponding predictors in younger children. Similarly, these relationships are yet to be explored in low-income countries, where context and parenting norms may be different from those obtaining in higher income contexts. Of particular interest is whether caregiver-child talk plays a similar role in the development of child socio-cognitive understanding to that shown in high-income countries.

Methods

Seventy families with two-year-old children from Khayelitsha, a low-income peri-urban township in South Africa, participated in a cross-sectional study. Two tasks assessing socio-cognitive understanding were administered to the children and video-based transcripts of caregiver-child interactions were coded for mental state talk, causal utterances, and speech quantity. The relationship between maternal talk and child socio-cognitive development was investigated. Key child and family demographic variables were taken into account.

Results

Child language, caregiver education, family socio-economic deprivation, and caregiver references to emotions and causal talk were all associated with child performance on socio-cognitive tasks. After controlling for relevant variables, caregiver causal talk emerged as the most salient predictor of child socio-cognitive performance.

Conclusions

This study demonstrated that caregiver talk is associated with child socio-cognitive understanding in a low-income context. Moreover, it addresses the paucity of research into the nature of this relationship with very young children using measures of fledgling socio-cognitive understanding. Our findings suggest that the quality, rather than the quantity, of maternal speech plays an important role in helping children develop socio-cognitive capacities. In particular, speech that involves discussion of causality appears to play a central role.

1. Background

As children develop, they are increasingly able to give psychological explanations for human behaviour, and become able to predict such behaviour in accordance with their own and others' desires, intentions, and perspectives (Rosnay & Hughes, 2006). This ability to interpret human behaviour on the basis of the mental states that underpin it is a crucial capacity that represents a cornerstone of human social interaction (Ruffman, Slade, Devitt, & Crowe, 2006). Indeed, it is at the centre of socio-cognitive development and is commonly referred to as having a 'theory of mind' (Wellman, 2002), or 'mental state understanding' (Rosnay & Hughes, 2006). The developmental acquisition of these capacities has a profound influence on how young children see the world and interact with others, manifested in their capacity to apprehend other people's perspectives and their ability to respond to others' actions. In short, these advances in socio-cognitive development help children make sense of everyday human interactions and more smoothly navigate their social world. Indeed, socio-cognitive understanding underpins cooperation and pro-social behaviour (Ruffman et al., 2002) which, in turn, have been shown to predict lower rates of aggression, externalising behaviour and conduct problems in adolescence and beyond (Diener & Kim, 2004; Eron & Huesmann, 1984; Spinrad & Stifter, 2006).

The question of what drives and promotes early socio-cognitive understanding has attracted considerable research interest in recent years (Ruffman et al., 2006). There is evidence for a number of key *drivers* including the presence of older siblings (Perner, Ruffman, & Leekam, 1994; Peterson, 2000), higher socio-economic status and more advanced parental education (Cutting & Dunn, 1999; Holmes, Black, & Miller, 1996), secure attachment (Fonagy, Redfern, & Charman, 1997), and certain kinds of positive

maternal disciplining strategies (especially those that invoke emotional perspective taking) (Ruffman, Perner, & Parkin, 1999). This body of research suggests a range of potential causal mechanisms for the development of socio-cognitive understanding.

The key family correlates of early child socio-emotional understanding were recently synthesised in a meta-analysis (Devine & Hughes, 2018). This demonstrated robust evidence for the influence of family socio-economic status, number of siblings, and certain aspects of caregiver talk to the child. Importantly, these associations were found to endure after controlling for differences in child verbal ability. Further, using longitudinal data, Devine and Hughes (2018) demonstrated the causal role of these family factors in supporting the development of false belief understanding.

One driver of child social understanding that has received particular attention in the literature is the influence of children's conversational environments and interactions (Rosnay & Hughes, 2006). A number of studies have sought to identify which specific elements within these conversational environments and interactions are associated with child social understanding. Within this research, caregiver mental state talk has emerged as a particularly salient predictor (Rosnay & Hughes, 2006). Mental state talk, sometimes referred to as 'mentalising', is a term used to describe the language that caregivers use with their children that involves references to emotions, desires, cognitive states, and intentions, amongst others (Ruffman et al., 2002).

In one of the first studies of its kind, Dunn and colleagues (1991) examined the relationship between caregiver talk about 'feeling states' in children at three years of

age and child emotion understanding at six years of age. They found that later child emotion understanding was predicted by frequency of maternal talk about feelings, the diversity of themes discussed, and the frequency of causal feeling state utterances.

Several studies have attempted to elaborate on Dunn et al's (1991) specification of the dimensions of caregiver talk that are associated with child socio-cognitive development. Although never formally addressed using meta-analytic techniques, certain patterns emerge from the literature. The dimension most frequently positively and significantly associated with child socio-cognitive performance is caregiver talk about cognitions or cognitive states (Adrian et al., 2007; Adrian et al., 2005; Ensor et al., 2014; Ensor & Hughes, 2008; Howard, Mayeux, & Naigles, 2008; Ruffman et al., 2002). This involves caregivers using words like 'think', 'know', 'believe', and 'understand' in conversations with their children. A number of studies (Laranjo et al., 2010; Symons, Fossum, & Collins, 2006; Taumoepeau & Ruffman, 2006, 2008) have also identified caregiver use of desire talk – terms like 'want', 'wish', 'hope' – as being significantly associated with measures of child socio-cognitive understanding. Further, references to emotions or affective states – such as 'happy', 'scared', and 'sad'– have also shown significant associations with various measures of child socio-cognitive understanding (Adrian et al., 2005; Dunn, Brown, & Beardsall, 1991; Racine, Carpendale, & Turnbull, 2007). Finally, a dimension of caregiver talk that has also been investigated in numerous studies is 'causal talk' (Ruffman et al., 2002). This dimension refers to caregivers' propensity to give causal explanations for their statements or perspectives. For example, a caregiver might say, 'They have no clothes *because* they're in the water'. This kind of causal referencing has been shown to be significantly associated with later child socio-cognitive performance, independently

of mental state utterances (Dunn, Brown, & Beardsall, 1991; Ruffman et al., 2002; Ziv, Smadja, & Aram, 2013).

The question of whether a causal relationship exists between caregiver mental state talk and child social understanding has been addressed by a number of researchers. Longitudinal evidence, using composite measures of caregiver mental state talk and child socio-cognitive performance has yielded a number of key insights. First, caregiver mental state language seems to be stable, remaining largely consistent across multiple time points (Ruffman et al., 2002; Taumoepeau & Ruffman, 2008). Second, compared with the children whose caregivers use less mental state speech at earlier time points, children of caregivers who use more of such speech perform better on measures of social cognition at later time points (Devine & Hughes, 2018; Ruffman et al., 2002; Taumoepeau & Ruffman, 2006, 2008). Crucially, this association endures even after controlling for earlier child theory of mind, language ability, and caregiver verbosity (Meins et al., 2002; Ruffman et al., 2002; Ruffman et al., 2006), lending weight to the case for a causal relationship. Recent meta-analytic evidence further supports this argument. Mental state talk was the strongest predictor to emerge from the meta-analysis by Devine and Hughes (2018) of family factors associated with child false belief understanding (combined association from 28 studies of r=0.21). Notably, for the subset of longitudinal studies included in the meta-analysis where false belief was measured at multiple time points, the estimated longitudinal correlation (after controlling for earlier false belief) was even stronger (r=0.29).

Much of the research on the relationship between mental state talk and social understanding examines children's performance on theory of mind tasks (typically false belief) between the ages of four and six years. Fewer studies have examined this relationship with younger children, looking at early articulations of socio-cognitive development. Nevertheless, one such study found that mothers' appropriate mind related comments ('mind mindedness') with their one-year-old children was positively associated with performance on a perspective taking and discrepant desires task at two years of age (Laranjo et al., 2010).

In summary, research demonstrates consistent associations between the nature of caregiver mental state and causal talk and the development of child social cognition. Notably, however, this body of knowledge has been derived almost exclusively from the English-speaking United States and UK, and primarily with children aged between four and six years. Our knowledge about child socio-cognitive understanding in LMICs is limited. While there is some evidence from China and Iran (Wellman, Fang, Liu, Zhu, & Liu, 2006; Wellman & Liu, 2004) that similar patterns in theory of mind development occur, the role of caregiver mental state talk in these contexts is unknown. Similarly, there is a paucity of evidence on the drivers of child socio-cognitive development in African contexts, and in particular, on whether the same relationship as holds in HICs obtains between maternal mental state talk and child socio-cognitive understanding in these settings.

The fact that a positive relationship between caregiver mental state talk and child socio-cognitive understanding is evident in samples from a number of countries suggests a degree of universality to this association. However, even if such

universality were accepted, it remains important to elucidate how risk factors that vary across international contexts, such as poverty and caregiver education, relate to the quantity of maternal mental state talk used, and bear on the association between this mental state talk and child socio-cognitive development.

A key finding concerning the potential importance of children being exposed to conversations about mental states in a non-western context comes from a recent study carried out in Samoa (Mayer & Träuble, 2013). This setting provided a particularly interesting environment for the study of the onset of false belief understanding because of the well-documented anthropological finding: in Samoan culture it is commonly believed that it is impossible to know what others think or feel. Accordingly, it is frowned upon to talk about mental states in this culture. This study found that only from the age of eight years did children regularly pass a change of location false belief task, which represents a three-to-four-year delay relative to western norms. However, data were not collected on caregiver mental state talk and assumptions regarding its role relied solely on existing ethnographic and anthropological evidence.

Research from a number of rural societies in low-income countries has suggested that verbal engagement with young children is substantially less frequent than in higher income contexts (Richman, Miller, & LeVine, 1992). Indeed, it has been noted that caregivers in some of these contexts believe that talking to infants may even have negative consequences (LeVine et al., 1996). Recent research by Weber and colleagues (2017) from rural Senegal, for example, showed that mothers speak very little to their infants and that the quality of talk is intentionally rudimentary –

comprising single words or short imperatives, such as ‘suck’ or ‘don’t cry’. This study found that such rudimentary talk was often a function of parents’ beliefs that learning begins only well beyond infancy. Similarly, qualitative research with isiZulu caregivers in South Africa suggested that mothers tended to use physical body contact to regulate infant distress, rather than face-to-face communication or verbal consolation (Bozicevic et al., 2016; Holdstock, 2000). This research suggests that one might see lower levels of caregiver mental state talk with young children in a deprived sub-Saharan African setting compared to HICs and this, in turn, might be linked to relatively delayed socio-cognitive development.

To the extent that the association between parental talk and child social cognition found in HICs does also obtain in the southern African context, the question then arises of the appropriateness of interventions for enhancing maternal mental state talk. Indeed, if child social cognition were found to be relatively delayed in this context, and if such delay were associated with adverse child outcome, as it is in HICs, then evaluating the impact of changes in these critical maternal behaviours on child social cognition would be of particular interest and importance.

Rationale and objectives

The current study addresses gaps in the literature on the relationship between caregiver talk and young children’s child socio-cognitive understanding in an LMIC, where beliefs and practices concerning caregiver talk may differ from those in HICs. In a low SES South African sample, first we examined the quality and quantity of maternal narratives to young children (aged 22 to 28 months). Second, we investigated the children’s performance on various tasks that assess early social

cognition. Third, we examined the relationship between socio-demographic variables and child social cognition. Finally, we addressed the question of whether caregiver mental state and causal talk was associated with socio-cognitive understanding in the children in this LMIC context.

2. Methods

2.1 Design and setting

The study was conducted in Khayelitsha, a large peri-urban township on the outskirts of Cape Town, South Africa, an area characterised by high levels of poverty, unemployment and violence (Norman, Matzopoulos, Groenewald, & Bradshaw, 2007; Smit et al., 2016). The study capitalised on a randomised controlled trial of a book-sharing intervention for caregivers and their two year old children in Khayelisha. All assessments took place at the offices at the Masiphulisane Research Centre in Khayelitsha. Ethical approval for the study was obtained from the Health Research Ethics Committee at Stellenbosch University (N15/09/084) and the Departmental Research Ethics Committee at Oxford University (SPI/C1A/16/006).

2.2 Participants and eligibility criteria

The sample comprised 70 isiXhosa-speaking caregivers and their children. The sample represented a mix of both intervention and control group children and caregivers. Only dyads with complete data on all the variables relevant to this paper were able to be included in the analysis, hence the smaller sample size than in the main outcomes paper. Comparative analysis with the dyads that were not included in

this paper revealed that they did not differ from the included dyads in any systematic way on a number of demographic variables.

Families were recruited from two underprivileged communities within the greater Khayelitsha area. Research assistants went systematically from door to door within the areas and invited those caregivers with age-eligible children to participate in the study. Families who were eligible for inclusion in the study were those with children aged 22-28 months at the time of baseline assessment. They also required an adult primary caregiver who was at least 18 years old, lived in the household with the child for at least four nights per week, and who consented to participate in the study. A chronic illness or disability in the child or the adult that would prevent them from fully participating in the study was an exclusion criterion.

2.3 Procedure

Two trained native isiXhosa-speaking assessors from Khayelitsha conducted all assessments at the research centre. After completing the informed consent procedure, caregivers and children completed tasks that were filmed and later transcribed and scored by trained native isiXhosa-speaking research assistants. Caregivers also completed a demographic questionnaire.

2.4 Measures

2.4.1 Socio-demographic variables

Demographic characteristics were assessed using a questionnaire administered verbally by the assessor. Caregivers were asked to provide information on their education, housing situation, number of household members (including siblings of the

target child), and child age and gender. Three items asked about their housing situation, which serve as a proxy for SES. First, they were asked whether they lived in a shack or brick house; second, they were asked whether they had access to water on site; and finally, whether they had a flush toilet in their house. A binary SES variable was then created: if a household had at least one of running water, flush toilet, and/or a brick house they were classified as non-deprived, and if they had none of the three resources they were classified as deprived.

2.4.2 Child socio-cognitive understanding

Child socio-cognitive understanding was assessed using a set of tasks adapted from previous research, including one used in our previous work in South Africa (Murray et al., 2016). In particular, the assessments drew on the work of Gopnik (1997) and Buttleman (2009).

The first task was primarily a perspective taking task but also directly assessed pro-social 'helping' behaviour and inference of desires. A scenario was created that gave the child the opportunity to help the assessor locate her lost pen, based on a task reported by Buttelman and colleagues (2009). The assessor initially showed great enthusiasm for her new pen, while describing it to the child and using it. The assessor then placed the pen on the corner of a table in front of the child and turned away to search for something in her bag. While this was happening, another researcher silently picked up the pen, ticked off something on a piece of paper, placed the pen into a small box on the floor and then returned to her position behind the video camera. The assessor then turned back to the table to see that the pen was no longer where she had left it. She looked clearly confused and concerned and offered a rehearsed a set of

escalating prompts (such as, ‘That’s strange, I wonder where my pen is?’) without directly addressing the child. Helping behaviour was scored if the child picked up the lost pen and returned it to the assessor, or pointed to the pen, or verbally indicated to the assessor where the pen could be found (score 0 or 1).

The second task assessed fledgling theory of mind, in the form of a ‘diverse desires’ task using an adapted version of the Repacholi and Gopnik ‘broccoli and crackers’ task: this assesses children’s ability to use emotional cues to infer the experimenter’s desires, which are different from their own desires (Repacholi & Gopnik, 1997). After consultation with a group of local mothers, ‘Flings’ (a variety of crisp) and cucumber were chosen as the most appropriate ‘desirable’ and ‘undesirable’ food options for this context. For clarity, when they came in for assessments, mothers were asked whether their children preferred Flings or cucumber. All mothers said that their children preferred Flings. The task administration followed Repacholi and Gopnik’s procedure. Two plates with a small pile of each food were placed on a table between the assessor and the child. The assessor then tried the Flings and followed this by vocalisations and facial expressions of disgust. Then the assessor tried the cucumber and expressed clear enjoyment. After this, the assessor pushed the two plates across to the child’s side of the table and asked the child to give her something to eat, being careful not to express any preference. After this verbal request, the assessor placed her open hands together directly in between the two plates. A correct response was scored if the child passed the food that corresponded with the assessor’s expressed preference (cucumber). The assessor thanked the child regardless of the food they passed her or of the child’s not responding.

Scoring of socio-cognitive understanding

The assessments were administered in a predefined sequence and were video recorded. A blinded isiXhosa-speaking research assistant then scored the tasks directly from the video recordings, using a standardised score sheet. The research assistant was supervised (by ND), and in cases of uncertainty, a collective rating was made (by ND and the research assistant).

2.4.3 Child language

Child language was assessed by interviewing the primary caregiver with an isiXhosa version of the short form of the MacArthur Communication Development Inventory (CDI) (Fenson et al., 2000). This 100-item checklist provides information on child expressive language and has previously been used successfully by our group in South Africa (Vally et al., 2015), as well as by others in other African contexts (Law & Roy, 2008). Specifically, caregivers are asked whether their child can understand and say the word. The CDI exhibits robust reliability indices (Fenson et al., 2000). An aggregate score was calculated and used as an interval scale variable.

2.4.4 Caregiver mental state talk

A narrative cartoon-explanation task was used to assess caregiver mental state talk. A similar task has previously been used to assess maternal mental state talk by Taumoepau and Ruffman (2006). The caregiver was shown two strips that each contained sets of six cartoon pictures depicting a sequence in which one character is unaware of another character attempting to perform a malevolent act (e.g., a dog being unaware of a cat attempting to raid a bird's nest), with various emotional

expressions present (e.g. scared, angry, happy). The carer was then asked to explain to their child what was happening in each cartoon strip. Caregivers were not limited in the amount of time they could take to explain the cartoons to their children, but most interactions lasted between four and five minutes. A video camera was set up unobtrusively to record the interaction. Maternal speech was transcribed verbatim from the video recordings and translated into English for coding.

Coding of mental state talk

Mental state talk was coded by ND based on the coding systems of Bretherton and Beeghly (1982), Ruffman and colleagues (Ruffman et al., 2006; Taumoepeau & Ruffman, 2006, 2008), and Dunn and colleagues (1991). Some adaptations were necessary to accommodate certain cultural features of the sample population (see below).

The coding system applied to the transcribed utterances is summarised in Table 4. The main categories included are references to emotions (e.g. happy, scared, angry), to desires (e.g. want, like), to cognitive states (e.g. know, think), and to perspectives (e.g. look, see, watch). To be coded as an instance of the category, phrases or words needed to refer to genuine mental states. Thus, utterances were not coded as instantiations of a category that were not clear examples. For example, caregivers would often begin or end phrases to their children with the words ‘look’, or ‘can you see’. It was judged that since these were attempts to orientate the child’s attention they could not be coded under the ‘perspectives’ category. Similarly, caregivers would often ask the child ‘Do you know this?’, referring to an animal or item in the cartoon; despite the use of a cognitive term ‘know’, this was not coded as a reference

to a cognitive state. The referent of the mental state reference was also recorded in order to determine whose perspective the caregiver was referencing. This was done in light of previous demonstrations of the importance for child social understanding of using the third person statements in mental state talk (Ruffman et al., 2002). For this rating, there were three categories: the characters in the cartoon, the caregiver, and the child. The majority of mental state utterances (>90%) were in the third person and accordingly, only these were used in the creation of the final variables.

The extent to which caregivers provided causal explanations was also coded, including both explicit causal reference terms (e.g., 'because', 'why') and implied causal terms (e.g., 'he's running – the cat is chasing him').

In order to provide a richer account of the caregiver narrative, attention-orientating statements, questions and simple descriptions were also coded, as in some previous studies (Ruffman et al., 2002). When an utterance did not fit within any of the stated categories, it was not coded, but it was accounted for in the total caregiver utterances, in order to control for the total number of caregiver utterances made. Following Ruffman and colleagues (Ruffman et al., 2002), since each utterance used by caregivers may have a direct influence on the child's socio-cognitive development, frequency counts of mental state and causal utterances were used, as opposed to proportions of total caregiver utterances.

2.5 Reliability

For mental state talk variables, reliability was established from a randomly selected 20% of transcripts (scored by MM and ND). Intraclass correlation coefficients ranged

between 0.76 and 0.99. Full details of reliability statistics can be found in Appendix 16.

Table 4

Caregiver talk variables

Variable	Description	Example
Mental State Talk Categories		
Emotion	Terms that describe an emotional or affective experience	Happy, scared, afraid, crying, shame
Desire	Terms that describe an experience of craving or wanting something (e.g., object, action)	Want, wish, crave
Cognition	Terms that convey a thought or belief or cognitive process	Think, know, believe
Perspective	Terms that describe a visual perspective, or contrasting perspectives	Look, see, watch
Referent Categories		
Character	When mental state refers to a character in the cartoon	"The jackal wants to eat the goat"
Child	When mental state refers to child	"What do you want, my child?"
Caregiver	When caregiver refers to their own mental state	"I don't know what this animal is called"
Other Categories		
Causal talk	When caregivers give causal explanations for their statements or observations	"The goat is taking her child out of the water *because* it was drowning"
Simple descriptions	Describes an activity or physical state. May convey a basic intention but does not convey any causality	"The goat is running" "The dog is barking" "This is a bird"
Questions	The caregiver questions the child about something in the cartoon	"Where is the dog?" "What is this animal?"
Attention orientation	The caregiver uses a brief statement to orientate the child's attention back to the cartoon	"Look" "Can you see"

2.6 Data analysis

All data were analysed using Stata version 15. Descriptive statistics are summarised below and presented for all dependent and independent variables. To determine the

relationship between caregiver narrative content and child socio-cognitive understanding, first, correlation matrices were examined between all caregiver narrative variables, and the child socio-cognitive understanding variables. Regression analyses were then run in order to assess the independent association of caregiver narrative variables in predicting child socio-cognitive understanding, while controlling for the potentially important factors of child language, presence of siblings, level of maternal education, and socio-economic status.

3. Results

3.1 Descriptive statistics

Basic descriptive statistics of demographic variables are presented in Table 5. The mean child age was 24 months, and the child male:female ratio was almost equivalent. Child expressive language was normally distributed with a mean of approximately 60 words. Just over two-thirds of the sample had one sibling or more, with the maximum number of siblings under the age of 12 years being three. Over half the sample were classified as socio-economically deprived. The majority of the caregivers had not completed high school education; just under a quarter had completed high school or had some tertiary education.

Table 5

Descriptive statistics: child and caregiver variables		
Variable	Range	Mean (Std Dev.)
Continuous variables (N=70)		
Child age (months)	21-28	24.41 (1.58)
CDI Expressive language	29-99	59.76 (13.16)
Siblings (under 12 yrs)	0-3	1.14 (0.99)
ToM	0-2	0.67(0.76)
Categorical variables (N=70)		
Gender		N (%)
Male		36 (48.6%)
Female		34 (51.4%)
SES		
Deprived		40 (57%)
Non-deprived		30 (43%)
Caregiver education		
Less than grade 10		16 (22.9%)
Grade 10 or grade 11		37 (52.9%)
Matric		15 (21.4%)
Post matric		2 (2.9%)

For the CDI expressive language measure, the mean score was approximately 60/100, with a standard deviation of 13. In the child socio-cognitive assessments, approximately one-third of the children passed each task. However, in line with developmental theory (Wellman, 2002), somewhat fewer children passed the diverse desires task (31.4%) than the perspective-taking task (35.7%).

The theory of mind tasks were significantly correlated, $r=0.27$, $p<0.05$. Accordingly, a single composite measure (i.e., 0,1,2) was created and used as the primary outcome variable.

Table 6 shows the descriptive statistics of the caregiver mental state talk variables. Desires and causal descriptions were the two categories referred to the most frequently. Cognitions were not referred to at all by the great majority of the sample (90%) and, given this, this category was not considered in further analyses. The range

for all other mental state talk categories was similar, with a maximum frequency of occurrence of any category of 11. The total number of caregiver utterances, as expected, displayed substantial variance.

Table 6

Descriptive statistics: Caregiver utterances (N=70)		
Variable	Range	Mean (Std Dev.)
Caregiver utterance	8-179	66.39(35.34)
Desires	0-11	3.08(2.86)
Emotions	0-8	1.24(1.82)
Perspectives	0-11	2.13(2.67)
Cognitions	0-5	0.24(0.86)
Causal talk	0-10	3.07(2.95)
Simple descriptions	0-70	28.12(14.10)
Questions	0-83	12.75(15.01)
Attention-orienting statements	0-30	5.26(5.31)
Total mental state talk	0-18	6.01(4.69)
Total complex cognitive talk	0-22	9.09(6.53)

3.2 Preliminary analyses

First, correlations were run between variables of established relevance in previous research and the ToM outcome variable. These are presented in Table 7. Both child language and caregiver education displayed a weak positive association with ToM ($p<0.10$), while SES was strongly associated with it ($p<0.01$). This suggests that children with stronger language skills, better-educated caregivers, and better living circumstances are somewhat more likely to perform better on theory of mind tasks, although the strength of the associations were modest.

Table 7

Bivariate correlations between demographic covariates and ToM (N=70)	
Variable	*r (ToM)*
Child age	0.01
Child gender (female)	-0.07
Child expressive language	0.22^{+}
Siblings	-0.11
SES	0.34**
Caregiver education	0.21^{+}

$^{+}$ p<0.1 ** p<0.01

We then examined the caregiver mental state talk variables. All four variables were significantly correlated with one another, apart from the 'desires' category, which was unrelated to the other three categories. The full correlation matrix for the mental state talk variables can be found in the supplementary material.

The correlations between the caregiver mental state talk variables and child ToM are presented in Table 8. Caregiver reference to emotions displayed a partially significant correlation, while caregiver reference to causality was strongly and significantly correlated with the child ToM. The total caregiver utterances variable was not significantly associated with the ToM outcome, indicating that the quantity of caregiver talk during the narrative task had no bearing on the child outcome.

Table 8

Bivariate correlations between mental state talk and ToM (N=70)	
Variable	*r (ToM)*
Desires	-0.06
Emotions	0.20^{+}
Perspectives	0.11
Causal talk	0.41*
Caregiver total utterances	-0.10

$^{+}$ p<0.1 * p<0.05

3.3 Association between ToM and mental state talk

In order to determine the association and explanatory power of the mental state talk variables in relation to ToM, a two-step regression model was run.

In step one, the six relevant covariates (age, gender, SES, language, number of siblings and caregiver education) were included. These variables explained 21% of the variance in the outcome, and the model was significant, F (6,60) = 2.65, p = 0.02. Two of the variables, child language and SES, were the strongest predictors and the only significant variables in the model. In step two, the mental state and causal talk variables were added. Their inclusion in the model explained an additional 14% of the variance in outcome, which was a significant change in the explanation of variance, bringing $R^2 = 0.35$ overall. From the new variables added, the one that emerged as the strongest predictor of the outcome was causal talk, $B = 0.39$, $p < 0.01$. This indicates that a standard deviation increase of approximately three utterances in causal talk is associated with almost half a standard deviation increase in ToM score, which is equal to half of the sample mean (0.33). This suggests a considerable effect. SES was also significant in the final model, though not as strongly as causal talk. Overall the full model was highly significant in predicting the outcome, F (11,55) = 2.63, p <0.01.

Table 9

Multivariate hierarchical regression model for ToM

Variables entered	B (SE)	*B*	B (SE)	*B*
	Step 1: $R^2 = 0.21$*		Step 2: $R^2 = 0.35$**	
Child age	0.03 (0.06)	0.06	0.04 (0.06)	0.08
Female	-0.20 (0.18)	-0.13	-0.13 (0.18)	-0.08
SES	0.50 (0.19)*	0.33*	0.43 (0.18)*	0.28*
Child language	0.01 (0.006)*	0.25*	0.009(0.005)	0.19
Siblings	-0.05(0.09)	-0.06	-0.02(0.09)	-0.02
Caregiver education	0.12(0.12)	0.12	0.03(0.12)	0.02
Causal talk			0.10 (0.04)**	0.39**
Emotions			0.07 (0.05)	0.17
Desires			-0.01(0.03)	-0.05
Perspectives			-0.05(0.04)	-0.17
Caregiver utterances			0.002(0.002)	-0.11

**p<0.01 * p<0.05 $^{+}$ p<0.1

4. Discussion

This study examined factors associated with two-year-old children's socio-cognitive understanding in a peri-urban South African township, focusing on the role of caregiver complex cognitive talk. Child performance on theory of mind tasks – involving perspective taking and desire reasoning – was positively associated with a number of child and family variables and, in particular, caregiver causal talk. This provides novel evidence of a link between caregiver talk and child social cognition in an LMIC setting. Further, it addresses the paucity of research into this link with such a young sample of children.

Given the novelty of using parent cognitive talk variables in LMIC settings, a brief comparison of our findings with those from other settings is warranted. A suitable comparison can be made with Ruffman and colleagues (2002) who used a set of ten pictures to assess the narratives of 82 mothers and their three-four-year-old children in the UK. While these cannot be viewed as direct comparisons, they are sufficiently

similar to provide insight into the cultural variability of maternal narratives. The UK mothers used substantially more simple descriptions (m=53.93 vs m=28.12) and more orientating utterances (m=9.14 vs m=5.26). While the use of desire terms was very similar (m=3.08 vs m=3.10), the South African caregivers used fewer emotion terms (m=1.24 vs m=3.79). A stark difference is apparent for cognitive terms (e.g. 'think', 'know'). While they were almost never used in the present study (m=0.24), they were the most frequently used mental state term in the UK study (m=13.66). Finally, causal talk was more prevalent in the present study (m=3.04 vs m=1.26). This evidence shows that the narratives used by isiXhosa-speaking caregivers in an impoverished setting are in some respects, comparable to those used in a middle-class UK setting, albeit that across all dimensions except causal talk, the UK sample evidenced higher utterance counts.

We found that certain variables associated with theory of mind in children in HICs, such as socio-economic status (Devine & Hughes, 2018), caregiver education level (Hughes et al., 2005), and child language (Rosnay & Hughes, 2006), were also associated with ToM tasks in our South African sample, while others, such as child age and number of siblings, were not related to ToM. The lack of association with child age is unsurprising given the narrow age range in the current study. The finding concerning siblings is not in line with much of the literature on the effect of this variable on ToM development (Devine & Hughes, 2018; Peterson, 2000), although it is consistent with some other studies (Racine et al., 2007).

The key finding of the current study regarding the likely causal role of various kinds of maternal language, and particularly mental state talk, with respect to child theory of

mind is well-demonstrated in previous research and is supported by recent meta-analytic evidence (Devine & Hughes, 2018; Tompkins, Benigno, Kiger Lee, & Wright, 2018). However, the current findings are novel in two respects. First, the majority of studies have examined maternal mental state talk in relation to fully fledged child theory of mind in children between the ages of four- and six-years-old (Devine & Hughes, 2018), as assessed with traditional false belief tasks. Studies have observed associations between caregiver mental state talk at a young age (e.g. 12 months), and child theory of mind at age four or five (Ruffman et al., 2002; Taumoepeau & Ruffman, 2006); but none, to our knowledge, has looked at the association between maternal mental state talk and early manifestations of theory of mind, in two-year-old children. Only Larajno and colleagues (2010) have studied caregiver 'mind mindedness' (at age one) in relation to child social cognition at age two and demonstrated a positive association. Second, no study to our knowledge has examined the association between caregiver mental state talk and child social understanding in an LMIC setting, where little is known about how these variables operate.

In the present study two dimensions of caregiver narratives were associated with child performance on the ToM tasks – references to emotions, and causal talk. These were associated with better child performance on both diverse desires and perspective-taking tasks. Both these tasks required the children to appropriately interpret contrasting emotions. In the pen perspectives task, the assessor initially displayed happiness with her new pen and later, concern and confusion when it disappeared. The diverse desires task involved facial exhibitions of disgust and pleasure from tasting both snacks. Thus, the link to caregiver emotion language is clear. Likewise, it

is clear why understanding causality would benefit performance on both tasks. For the pen perspectives task, the child needs to infer that the reason behind the assessor's distress was the disappearance of the pen, and that helping the assessor find it (permitted by the child's different perspective) would alleviate this distress. For the diverse desires task, the child needs to infer the desire of the assessor and that passing them the snack that corresponded with that desire, would cause them satisfaction. In sum, there is clear cause and effect at play in both tasks.

Caregiver causal talk emerged as the strongest predictor of ToM, after controlling for a number of relevant covariates including child language and caregiver education. There is an evidential precedent for this, with several studies having demonstrated a strong effect of causal talk in predicting false belief (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Ruffman et al., 2002) and emotion understanding (Dunn, Brown, & Beardsall, 1991). What the current study adds to this literature is that this was demonstrated in an LMIC context with a younger sample of children than has previously been examined.

The results of the present study also add to the 'continuity versus discontinuity' debate with respect to the manifestations of ToM. Certain scholars have argued that explicit false belief understanding, emerging typically around five to six years, involves a slow process of development that depends on specific forms of instruction and is culturally inherited (Thoermer, Sodian, Vuori, Perst, & Kristen, 2012). In contrast, others argue that earlier, implicit, false belief is a separate skill from ToM and depends on domain-general neurocognitive mechanisms that are specialised for apprehending mental states and, as such, is largely automatic and genetically inherited

by typically developing infants (Heyes & Frith, 2014). Our findings are not consistent with this latter position. In our sample, fledgling ToM skills show the same predictors and developmental mechanisms as those used in fully fledged false belief tasks: that is, SES, caregiver education, child language, and caregiver mental state talk and causal talk. Thus, our data appear to support the continuity interpretation of ToM, which posits that ToM is a continuous construct whereby early implicit abilities are built on in interaction with the social environment to create explicit understanding and performance (Thoermer et al., 2012).

4.1 Limitations

The cross-sectional nature of this research limits conclusions about the causal influence of caregiver narrative input, as the direction of effects can only be tentatively inferred. However, there is good evidence from longitudinal studies (Devine & Hughes, 2018; Ruffman et al., 2002; Taumoepeau & Ruffman, 2006) that early caregiver mental state talk predicts child theory of mind at later time points, and not the other way around.

Second, due to the young age of the children in the study, we were unable to assess the impact of caregiver talk on more traditional theory of mind tasks such as false belief. This limits our ability to compare our results with much of the literature on this topic. However, we do help to fill a gap in the literature by looking at this question with younger children and examining precursors to fully fledged theory of mind.

Third, utterances were coded in such a way that they could fall into multiple categories. For example, an utterance could be both a mental state (emotion) and involve causal talk. As such, we were unable to separate in the analysis causal talk with and without mental states.

4.2 Implications

This study has demonstrated, in an LMIC, that caregiver talk is associated with child socio-cognitive understanding. This has some important implications. It demonstrates the possible universality of this relationship, and helps to put into perspective other cross-cultural evidence, such as a study by Mayer (2013) that found delayed onset of false belief understanding in a cultural context where talking about mental states is uncommon. A key limitation of Mayer's study was that it did not evaluate caregiver narrative input: the evidence from the present study highlights the importance of such input in supporting children to develop socio-cognitive capabilities in LMICs. This evidence, although preliminary, may contain some potential lessons for parenting interventions. Although we require further data on whether ToM is associated with wider social adjustment in young children in these settings (as it is in HIC settings) if similar patterns do hold, then targeting improvement of caregiver drivers of this may be fruitful. Many early parenting interventions emphasise the importance of talking to infants and young children as a way of improving their language and general cognitive development (Weber et al., 2017). Our findings suggest that the quality, rather than the quantity, of speech plays an important role in helping children develop socio-cognitive capacities. In particular, speech that involves discussion of causality seems to play a central role. One simple application of this might be to encourage caregivers to ask their young children more 'why' questions.

4.3 Future research

Notwithstanding the limitations highlighted above, the findings of the current study provide notable, novel evidence of the association of caregiver talk and child social cognition in an LMIC context. Future research could explore a number of avenues. First, a longitudinal design would help to confirm directionality of effects and add weight to claims of causality. In particular, it would be valuable to assess the role of caregiver talk on both fledgling theory of mind outcomes and on more explicit false belief outcomes when children are at an age when they might be expected to pass such tasks. This would help to delineate the role of maternal narrative input on a wide range of outcomes across the socio-cognitive domain. Two further questions could be addressed through intervention research. First, can a programme directed at caregivers improve the quality of the language they use with their children? Second, are such improvements associated with enhancement of the children's understanding of mental states and theory of mind? Finally, since the current study adds to a growing body of evidence suggesting that causal talk could be as important as mental state talk in promoting child social understanding, future studies concerned with the relationship between caregiver talk and child outcomes should also incorporate measures of such causal talk.

VII. Implications of Paper 2 for the DPhil

The preceding empirical cross-sectional paper sought to identify factors associated with child social understanding, with a particular focus on the parenting behaviours relevant to this area of development. It looked at the mechanisms that promote social understanding in young South African children in an impoverished context. It demonstrated, for the first time in an LMIC, that it is the quality rather than merely the quantity of caregiver speech that appears to play an important role in children's development of social understanding.

This question was of particular relevance to the current thesis because all the research on the contribution of caregiver talk to the child's social understanding comes from very different contexts to that of the current DPhil. Indeed, there is a complete paucity of research on the relation between parental mental state talk and child socio-emotional understanding in LMICs; there is also no consideration of the impact of dialogic book-sharing on this relationship. Therefore, the demonstration in this paper that the content of caregiver speech is related to their child's social understanding filled two important links for the trial that followed. Specifically, the paper showed that the use of mental state language, such as references to emotions and causality, is of particular benefit to child social understanding in the LMIC in which this body of work was taking place. It indicated that targeting maternal mental state talk in the BEBS trail was both appropriate and timely.

As such, this research filled an important gap in the evidence base required to inform how a book-sharing intervention might bring about improvements in child social understanding. By demonstrating the same kinds of associations between parental talk

and child social understanding in an LMIC that has been found in HICs (Devine & Hughes, 2018), the question then became how to enhance caregiver mental state talk through a book-sharing intervention. Indeed, evaluating the impact of potential changes in these critical maternal behaviours on child social understanding became a question of particular interest and importance.

VIII. The BEBS Book-Sharing Programme

The BEBS book-sharing programme was based on a programme initially developed by Lynne Murray and Peter Cooper for infants (14-month-olds) in South Africa based on an extensive review of the literature and pilot work in the South African context (Cooper, Vally, Cooper, Radford, et al., 2014; Vally et al., 2015). The candidate led the process of revising and redeveloping the materials and content for the BEBS study.

This involved designing new sessions on emotions, intentions and perspectives. An important new part of the BEBS programme was the focus on supporting child socio-emotional development, in addition to language and cognitive development. Paper 2 of this DPhil provided a review of the literature on caregiving practices associated with child social and emotional understanding: in particular, the kinds of talk that appear to play a causal role in this domain of development. Paper 2 also provided empirical evidence of the association between certain types of caregiver talk, such as referencing emotions and causality, and measures of child social understanding.

Developing the three new sessions drew on this literature in order to present programme content that encouraged caregivers to discuss these themes during book-sharing, and, importantly, to practise asking their children questions related to these themes. The choice of picture books for these sessions was important: books needed to have theme-relevant content and were carefully selected.

Further, supervised by PC and LM, the candidate wrote content for the slides, arranged and directed short illustrative film clips, and trained the facilitators to deliver

the sessions. The candidate also developed a protocol for the one-on-one feedback sessions that took place between each caregiver and the programme facilitator at the end of each session. Further, the candidate developed a protocol for follow-up discussions between the facilitator and caregivers when new books were being delivered to caregivers after the official programme had ended.

1. Delivery Format

The intervention consisted of 60 to 90-minute sessions run weekly for eight consecutive weeks. Sessions were held in a church hall during the morning (Saturday morning sessions were held for caregivers who were unable to attend during the week). The programme was delivered to groups of three to six caregivers and their children. Each session focused on different and incremental techniques for caregivers to apply during book-sharing. For the first six sessions there was a 'book of the week' that the carers took home to share with their child, and brought back the following week. In session seven, all the key principles were reviewed, and the child chose which of the six books they wanted to take home for that week. During the final session, there was a group discussion where caregivers were guided in reflecting on the programme and discussed plans for continuing with their book-sharing – such as registering at a nearby children's library or continuing to meet as a group. Session eight ended with a graduation where caregivers were presented with a certificate of completion, a laminated card with a summary of the key lessons from the programme, on the back of which there is a picture of themselves and their child sharing a book (See Appendix 17) and a copy of each of the six books used in the programme.

For the intervention sessions, caregivers sat in a semi-circle facing the facilitator who sat at the front of the room with a laptop on which a PowerPoint was displayed. An area at the back of the room was laid out for the children with a set of soft toys. An assistant watched the children during the didactic part of the session. The first part of the session was a group-based, instructive presentation of the week's key book-sharing principles. PowerPoint slides were used to deliver particular learning points, accompanied by brief illustrative video clips. Towards the end of the presentation, the facilitator discussed the book of the week with the caregivers, highlighting how the book could be used at home and providing examples of how to apply the techniques covered in that session.



Figure 7 Group-based session and individual mentoring

The second part of the session involved one-on-one mentoring with the facilitator. This took place in a separate room, where the caregiver was asked to share the book of the week with their child, under the guidance of the facilitator. These sessions lasted for approximately five to ten minutes, with the final few minutes dedicated to positive feedback and modelling of book-sharing techniques. This session also included a discussion between caregiver and facilitator about the book-sharing home routine, where the facilitator encouraged the carer to spend at least ten to fifteen minutes a day sharing the book of the week with their child, practising the techniques learned that week.

2. Programme Content

The following components are central to dialogic book-sharing (Murray, 2014; Whitehurst et al., 1988; Whitehurst & Lonigan, 1998) and could be considered the core principles that underpin this method of interacting over a picture book. These principles or components were reinforced throughout the programme, rather than only appearing in a single session.

1. *Active child participation*: Rather than being a passive listener and observer, the child should be encouraged to participate actively in the book-sharing interaction. All aspects of the interaction should support the active engagement of the child, including things like making sure the child is in control of handling the book, turning pages and directing the pace.

2. *Pointing and Naming*: Caregivers were encouraged to point to and name objects on the page in view of the child. In particular, caregivers should name and label things that the child shows interest in – indicated by them looking, touching, patting, scratching etc.

3. *Follow the interest of the child*: Caregivers were encouraged to always pay close attention to the things their children were showing an interest in, and to follow up on those things by naming, emphasising and animating them.

4. *Active questioning using 'what / where / who / why'*: For words that the caregiver think the child understands, they are encouraged to point to the object and ask the child 'where is the …' or 'can you show me the…'. If they think the child knows how to say the word, then use of 'what' or 'who' questions are encouraged. In order to elicit simple explanations from their children, the use of 'why' questions is encouraged.

5. *Linking to the child's own experience*: Caregivers were encouraged to try and find links to the child's own in the content of the books, and to point out these links to the child. For example, if there was a dog in the book, the caregiver could mention that the dog was similar to their dog at home or in their neighbourhood.

Session 1: Introduction to book-sharing

The first session provided caregivers with an introduction to what book-sharing was, and why it was a beneficial activity for their child. It covered a number of practical issues such as when and where to share books, and how to sit comfortably and position themselves and their child while book-sharing. Some initial principles were also covered such as following the child's lead, using a lively voice to keep the child's attention, and setting up effective book-sharing routines. Content was introduced in a slow and purposeful manner to allow caregivers to become familiar with the core basic concepts, and to ensure buy-in from early on. The pace of the sessions and amount of content per session was also developed in line with the local context, where research has suggested that book-sharing is not a common practice among caregivers (Le Roux, 2012). It was therefore conservatively assumed that many of the caregivers would not be particularly familiar with the practice of book-sharing, and the session flow and content should be aligned with that. An example of slides used is presented in Appendix 18.

Session 2: Pointing and naming

Each subsequent session began with a review of the previous week, with caregivers being encouraged to share their experiences of having shared the books at home with their children. The group would often then discuss challenges or positive experiences that the rest of the group could learn from. The second session built on the basic dialogic book-sharing skills introduced in the first session but introduced a number of additional 'core skills' such as pointing and naming, repeating, extending and elaborating on things that interest the child, and finding opportunities for praise.

Session 3: Naming and linking

Session three introduced various forms of questioning during book-sharing. Initially, closed-ended questions such as 'Where is the cat?' or 'Who is that?' were encouraged. This was followed by slightly more open-ended forms of questioning such as 'Why is he doing that?'. This session also introduced the concept of linking book content to the child's own experience. For example, linking places or characters in the books to familiar counterparts in their child's life. Finally, this session encouraged caregivers to find opportunities in books to use actions and to act these out with their children – such as hugging or eating.

Session 4: Talking about feelings

The fourth session focused on the theme of emotions. It began with helping caregivers introduce their child to the meaning of basic emotion terms – happy, sad, angry, scared – by using the book content. Later, caregivers were encouraged to discuss with their children why book characters feel the way they do, using facial expressions and tone of voice to convey characters' feelings. Finally, they were shown how to link feelings and emotions to the child's own experience.

Session 5: Talking about intentions

Session five introduced the notion of discussing intentions – why characters in the book felt the way they did, or why they did certain things. Caregivers were encouraged to ask their children about what characters were thinking, or why they were doing certain things. This also brought in the concepts of causality – what caused a character to do something or feel something. The session also encouraged caregivers to promote curiosity in their children through book-sharing – prompting children to think about what might happen next in the story, when the page was turned.

Session 6: Talking about perspectives

The sixth session was the last session to introduce new content. The focus of this session was on perspectives; caregivers were encouraged to help their children understand that different characters can see things differently, know different things, and feel differently about things. The book of the week was chosen due to its rich content on perspectives, and caregivers were taken through various examples of where perspectives could be discussed with their children in a fun and engaging way.

Session 7: Summary

Session seven was a broad review of all the main principles covered in the first six sessions. It provided caregivers with the opportunity to review content that they may have struggled with and gave the intervention facilitator an opportunity to focus on specific areas that she felt the group may have needed more time on.

Session 8: Graduation

The final session involved an initial group discussion on how to remain motivated about book-sharing, how to continue supporting each other and how to continue

accessing children's books (e.g., registering at a local library). Caregivers were then presented with certificates of completion, and summary 'take-home' cards, as well as a full set of the six books used in the first six sessions of the programme. This was followed by a celebratory party for the caregivers and children to close out the programme.



Figure 8 BEBS programme graduation session

Table 10
Intervention Session Themes And Books

Session	Session Content	Book of the Week
1	Introduction to book-sharing	*Clap Hands – Helen Oxenbury*
2	Pointing and naming	*Abongi's Journey – Kerry Saadien-Raad*
3	Naming and linking	*Yawning is Catching – Lyn Stonestreet*
4	Talking about feelings	*Hug – Jez Alborough*
5	Talking about intentions	*Little Helpers – Lynne Gilbert*
6	Talking about perspectives	*Handa's Surprise – Eileen Browne*
7	Summary	
8	Graduation event	

3. Intervention Facilitators, Training and Supervision

The intervention was delivered by two isiXhosa-speaking women from Khayelitsha. Both facilitators had experience delivering book-sharing to mothers and children from the community, having been facilitators in a previous trial (Vally et al., 2015), as well as an earlier pilot study (Cooper, Vally, Cooper, Sharples, et al., 2014). In addition to the two facilitators, an assistant supported each main facilitator during intervention sessions. Their primary role was to look after the children, who also attend the sessions. The assistants were selected from the community, based on their previous experience of working with young children.

Facilitator training for the current book-sharing intervention was held over a two-day workshop, run by the candidate with support from PC, the original programme developer. This included a refresher session, when the content of the earlier programme was reviewed (including a review of the accompanying PowerPoint presentation materials and videos), followed by instruction on the new programme content and materials. First, the key principles of the new sessions (i.e., those concerning emotions, intentions and perspectives) were explained, and the accompanying illustrative videos viewed and discussed. This was followed by

discussion between the trainers and facilitators, and any questions or uncertainties were resolved. During these discussions, the facilitators also deliberated on ways in which the key principles of the new material could be explained and demonstrated in a culturally appropriate manner.

The second part of the facilitator training covered the one-on-one sessions where parents practise book-sharing with their children and receive feedback from the facilitator. This training specified the role that the facilitator needed to play during these sessions, covering principles of sensitive instruction, modelling, and providing positive support. In addition, facilitators were instructed on how to incorporate into the one-on-one sessions the central take-home messages from the group session.

Finally, facilitators were briefed on monitoring and evaluation procedures, including tracking attendance, scheduling participants for sessions, and following up with participants who missed sessions. They were also given a refresher session on using the PowerPoint presentation materials on laptops. The assistants attended a one-day training workshop run by the candidate that covered basic video camera skills, activities to do with the children, and roles and responsibilities during sessions – such as preparing refreshments, filming, and watching over the children.

Regular supervision was provided throughout the intervention. The candidate met with the facilitators for two-to-three hours at the end of each week to review how the sessions had gone that week. During the first half of the meeting, the two facilitators discussed aspects that went well, challenges, and logistical issues. They also identified participants who seemed to be experiencing difficulties in applying the

programme with their child and discussed the support they may need in their next one-on-one session. The second half of the meeting involved preparation for the next week's session. The group went through the PowerPoint slides, discussed specific examples or strategies to use, and made sure the facilitators had no unanswered questions or queries about the forthcoming session. Finally, the group reviewed the attendance records from the past week and discussed plans for catch-up sessions for any participant who may have missed sessions. Every intervention session was video recorded, and one session each week per facilitator was checked by the candidate for delivery fidelity.

IX. Paper 3: Book-sharing for Parenting and Child Development in South Africa: A Randomised Controlled Trial

This is the third paper of this DPhil thesis. It presents the results from the randomised controlled trial of the BEBS book-sharing programme. This paper is under review by *The Journal of Clinical Child and Adolescent Psychology*.

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Statement of Authorship

I confirm that I completed the majority of the work in this study. I led the development of the new intervention content and designed the assessment protocol. I led all fieldwork-related aspects of the study and oversaw the coding of observational data. I conducted all analyses reported in this paper and drafted the first version of this article. Other authors contributed to aspects of the study design, development of some coding schemes, coding and scoring of some data, supervision and support of some data collection, and offered suggestions on the write up and interpretation of findings.

Abstract

Objective: Children in LMICs are at risk for problems in their cognitive and socio-emotional development. This study sought to address key risk factors such as poor cognitive stimulation and harsh parenting practices through a book-sharing intervention.

Method: We conducted a randomised controlled trial in a low-income peri-urban South African township to evaluate the impact of a parenting intervention on 21-28-month-old children's cognitive and socio-emotional development. Families were randomly allocated to training in dialogic book-sharing or a wait-list control. The intervention was carried out weekly in small groups over eight weeks. Data were collected at baseline, post-intervention, and six months post-intervention. Trial registration SRCTN71109104.

Results: One hundred and forty caregivers and their 21-28-month-old children (70:70) were assessed at enrolment, with 130 (93%) contributing data at post-intervention and 123 (88%) at six-month follow-up. Children in the intervention group performed significantly better than controls on a number of observed and caregiver-reported measures of language (d=0.37 – 0.50) and attention (d=0.39 – 0.44). Few between-group differences were found for observational and caregiver-reported measures of child behaviour problems, pro-social behaviour, and theory of mind. Caregivers in the intervention group showed more sensitivity and reciprocity in both book-sharing and free play (d=0.21-1.01), and more complex cognitive talk in a narrative task (d=0.65). Intervention caregivers were less verbally and psychologically harsh (d=0.19- 0.43).

Conclusions: This programme benefitted a number of domains of parenting and child development and holds considerable promise as an early parenting intervention in LMIC contexts.

1. Background

1.1 Child development problems in low- and middle-income countries (LMICs)

Children in LMICs are at risk for problems in their cognitive and social development (Grantham-McGregor et al., 2007). These problems commonly occur in the context of widespread poverty; conservative estimates suggest that in excess of 250 million children, primarily in sub-Saharan Africa and Asia, are failing to reach their developmental potential as a result of poverty (Black et al., 2017; Walker et al., 2011). These developmental problems predominantly occur within a context of severe community stress, often characterised by high levels of violence (Aisenberg & Herrenkohl, 2008). In these circumstances, caregivers, who themselves have been educationally and socially disadvantaged, are likely to replicate harsh childrearing and relationship practices that contribute to compromised child development and behaviour problems (Walker et al., 2011). These risks not only constrain the life chances of the children, but carry a considerable social burden and have a major adverse financial impact on affected societies (Heckman & Masterov, 2007).

1.2 Cognitive development

A large body of research from high-income countries (HICs) has shown that early cognitive and language development is a critical determinant of subsequent school progress and literacy (Bornstein & Putnick, 2012; Catts, Fey, Zhang, & Tomblin, 2001; Murray et al., 2010). Evidence suggests that a similar relationship obtains in LMIC settings (Dendir, 2014; Engle et al., 2007; Liddell & Rae, 2001). Hence, the early developmental deficits so prevalent in LMIC contexts are likely to play a critical role in how cycles of poverty and deprivation become entrenched in societies through their adverse impact on educational progress, and thereby on future employment

opportunities and earning potential (Heckman, 2008; Heckman & Masterov, 2007). This is particularly relevant for South Africa, where recent evidence on educational outcomes has shown that children are performing poorly, especially relative to the country's level of wealth and development (Mullis, Martin, Foy, & Hooper, 2017). Importantly, both cross-sectional and longitudinal research show that particular early parenting practices are associated with child cognitive performance: where parental interactions are responsively contingent to the child, and support the child's active engagement in their environment, children perform better on measures of cognitive functioning (Murray, 2014).

1.3 Social and emotional development

Research has shown a number of early positive child and parenting characteristics to be associated with optimal child social and emotional development and reduced levels of behaviour problems (Murray, 2014). One key child characteristic is socio-cognitive understanding. This includes the ability to understand one's own feelings, emotions, desires and intentions, as well as those of other people (Ruffman et al., 2002). A key development in early social understanding is 'theory of mind' – the ability to accurately attribute mental states (desires, motives, emotions) to other people and understand that these can be different from one's own (Wellman, 2002). This is important because it underpins cooperation and pro-social behaviour (Diener & Kim, 2004). The relationship between early pro-social behaviour and lower rates of aggression and conduct problems in adolescence and beyond has been demonstrated in a number of longitudinal studies (e.g. (Chen, Li, Li, Li, & Liu, 2000; Eron & Huesmann, 1984).

Specific aspects of early parenting are important in the development of children's social understanding. In particular, research has highlighted the contribution of certain kinds of parental discourse with the child, as these are internalized and shape child socio-cognitive development (Fivush & Nelson, 2006; Murray et al., 2014). It has been shown that parental speech which includes frequent reference to mental states, desires, emotions (e.g., 'think', 'feel', 'want') and causality promotes children's social understanding, including theory of mind capacity (LaBounty, Wellman, Olson, Lagattuta, & Liu, 2008; Rosnay, Pons, Harris, & Morrell, 2004).

When young children do not acquire adaptive ways of dealing with challenges and frustrations, they can fall into persistent patterns of aggression that are associated with violent behaviour later in life (Broidy et al., 2003; Nagin & Tremblay, 1999; Tremblay et al., 2004). Studies in HICs show that aggression in childhood is predicted by a range of early child, family, and wider social factors (Engle et al., 2007; Moffitt & Caspi, 2001; Odgers et al., 2012). Key predictors include child concentration problems and hyperactivity, as well as insecure attachment (Tremblay et al., 2004). Importantly, meta-analyses have revealed the importance of particular parenting practices, namely, harsh and coercive parenting (including corporal punishment), the lack of parental positive reinforcement and responsiveness, as well as general insensitivity (Gershoff, 2002; Rothbaum & Weisz, 1994). Although less is known about parenting and family risk factors for child aggression and violence in LMICs, the most recent meta-analytic evidence suggests that the same predictive relationships obtain as in HICs (Murray, Anselmi, Gallo, Fleitlich-Bilyk, & Bordin, 2013; Murray et al., 2018; Wessels et al., 2013).

1.4 Book-sharing

The sharing of books with young children is well-established as being of benefit to their language development and pre-literacy skills (Lonigan & Shanahan, 2010; Mol et al., 2008; Whitehurst & Lonigan, 1998). Two early meta-analyses, looking at the effect of frequency of parent-child book-sharing (Bus et al., 1995), and the value of dialogic reading interventions on child language outcomes (Mol et al., 2008), both demonstrated substantial benefit to child language. The most recent meta-analysis (Dowdall, et al., 2019) of RCTs of the efficacy of shared picture book reading interventions on child language outcomes revealed a clear benefit to expressive vocabulary (*d*=0.41, CI: 0.20, 0.61) and a positive, although a more modest, effect on receptive language (*d*=0.26, CI: 0.12, 0.40); for the subgroup of interventions that were not brief, outcomes were much improved (i.e., *d*=0.54 and *d*=0.34 respectively). This meta-analysis also found a substantial benefit to caregiver book-sharing competence as a result of the intervention (*d*=1.01; CI: 0.40, 1.63). Notably, there was a paucity of RCTs conducted outside of HICs.

Aside from their benefit to child language development, picture books can be effective tools for prompting rich mental state discussion between parents and young children (Fine et al., 2014; Ruffman et al., 2006; Ziv et al., 2013). Indeed, recent observational research has also shown associations between book-sharing and child social understanding (Adrian et al., 2007; Adrian et al., 2005). Thus, there is preliminary evidence that book-sharing can be a good context in which carers through talking about mental states, can promote child social understanding (Adrian et al., 2005).

To date, there is little evidence concerning the benefits of training parents in book-sharing in LMICs. However, in a randomised trial of a book-sharing intervention conducted by our research team in South Africa, with carers of 14-16-month-old infants, considerable gains were demonstrated on measures of infant language and attention (Vally et al., 2015), and there was preliminary evidence of improvements in social understanding (Murray et al., 2016). Notably, mediation analyses showed that it was by virtue of improvements in parental sensitivity and in reciprocity that the cognitive gains were brought about. This confirmed promise shown in a small-scale pilot RCT in South Africa (Cooper, Vally, Cooper, Radford, et al., 2014). Similar gains from book-sharing interventions have been reported for studies in Mexico, Bangladesh and Brazil (Opel et al., 2009; Valdez-Menchaca & Whitehurst, 1992; Weisleder et al., 2017). However, an important gap in this evidence base is whether such an intervention could have an impact on child socio-emotional development and behaviour, and the parenting behaviours relevant to these child variables, such as mental state talk, disciplining strategies, and positive parenting.

1.5 Current trial

The current trial targeted two-year-old children, an age which, compared to trials in infancy, affords the opportunity of assessing the impact of the intervention on a number of dimensions of social understanding and child behaviour, as well as on language and attention. The intervention therefore included specific focus on promoting parenting skills relevant to child social understanding and preventing the development of aggressive behaviour. Specifically, the training was extended to include book content with themes concerning book characters' emotions, intentions, perspectives, and pro-social behaviour, in order to promote parental mental state and

emotion talk around these topics. Although we did not directly address the topic of negative parenting in the intervention, we hypothesized that such practices would reduce as a secondary consequence of promoting positive parenting.

1.6 Aims and hypotheses

The objective was to determine the impact of a book-sharing intervention on a broad range of child and caregiver variables located on the early pathways to later aggression and violence. We hypothesized that the intervention would improve child language, attention, socio-cognitive understanding, and behaviour. We also hypothesized that caregivers would evidence more behavioural sensitivity, both in book-sharing and non-book-sharing contexts, and that interactions would be more reciprocal: that caregivers would engage in more mental state talk with their children, and would be more supportive and less harsh in situations that challenged parenting.

2. Methods

2.1 Study design

We conducted an RCT – the benefits of early book-sharing (BEBS) – to evaluate a dialogic book-sharing intervention for caregivers of children aged 21-28 months. Participants were randomised at the individual level to intervention or wait-list control groups. Data were collected at baseline, post-intervention, and at a six-month follow-up. The Consolidated Standards of Reporting Trials (CONSORT) were followed in preparing this paper. The BEBS trial was pre-registered (ISRCTN71109104). Ethical approval for the study was obtained from the Health Research Ethics Committee at Stellenbosch University (N15/09/084) and the Departmental Research Ethics Committee at Oxford University (SPI/C1A/16/006).

2.2 Eligibility criteria

Eligible families were those with children aged 21-28 months at the time of baseline assessment, with an adult primary caregiver who was at least 18-years-old, who lived in the household with the child for at least four nights per week, and who consented to participate in the study. A chronic illness or disability in the child or the adult that would prevent them from fully participating in the intervention was an exclusion criterion.

2.3 Study setting

The study was conducted in Khayelitsha, a large peri-urban township on the outskirts of Cape Town, South Africa, characterised by high levels of poverty, HIV, unemployment and violence (Smit et al., 2016). All assessments took place at offices at the Masipulisane Research Centre. Intervention group sessions were held in an adjacent church hall.

2.4 Intervention

The intervention was a group-based dialogic book-sharing programme based on the team's previous programme (Cooper, Vally, Cooper, Sharples, et al., 2014; Vally et al., 2015). It consisted of eight 60–90-minute weekly sessions run over consecutive weeks. The programme was delivered by a trained facilitator to groups of between four and six caregivers. Each session focused on different and incremental principles and techniques for caregivers to apply during book-sharing. For the first six sessions there was a 'book of the week' that the carers took home to share with their child, and brought back the following week. In session seven, all the key techniques and

principles were reviewed, and the child chose which of the six books they wanted to take home for that week. During the final session, there was a group discussion where caregivers were guided in reflecting on the programme and discussing plans for continuing with their book-sharing – such as registering at a nearby children's library or continuing to meet as a group. Session eight ended with a graduation where caregivers were presented with a certificate of completion, a laminated card with a summary of the key lessons from the programme (on the back of which there was a picture of themselves and their child sharing a book), and a copy of each of the six books used in the programme. Table 11 details the content of each session. For the six-month period following session eight, the facilitator visited each participant on three occasions to deliver a new picture book and have a short encouraging conversation with the caregiver about their book-sharing.

The first part of each session was a group-based, instructive presentation of the week's key book-sharing principles. PowerPoint slides were used to deliver particular learning points, accompanied by brief illustrative video clips created within the community in the local language. Towards the end of the presentation, the facilitator discussed the book of the week with the carers, highlighting how this book could be used at home, and providing examples of how to apply the techniques covered in that session.

The second part of each session involved one-on-one mentoring with the facilitator. This took place in a separate room, where the caregiver was asked to share the book of the week with their child, under the guidance of the facilitator. These sessions

lasted for between five and ten minutes, with the final few minutes dedicated to positive feedback and modelling of book-sharing techniques. This session also included a discussion between caregiver and facilitator about the book-sharing home routine, with the facilitator encouraging the caregiver to spend at least 10-15 minutes a day sharing the book of the week with their child, and practising the techniques learned that week.

Table 11
Intervention session content

Session	Content
1	***Introduction to book-sharing*** Introduction and basic dialogic books-sharing skills part 1 – following the child's lead, using a lively voice, setting up book-sharing routines
2	***Pointing and naming*** Basic dialogic book-sharing skills – pointing and naming, repeating, extending and elaborating on things that interest the child; finding opportunities for praise
3	***Naming and linking*** Asking 'where/who/what/why' questions; linking book content to the child's own experience; finding opportunities to use actions (e.g. hugging, eating)
4	***Talking about feelings*** Helping the child understand the meaning of basic emotion terms (happy, sad, angry, scared); discussing why book characters feel the way they do; using facial expression and tone of voice to convey characters' feelings; linking feelings to the child's own experience.
5	***Talking about intentions*** Discussing what characters are thinking and intending; encouraging the child to be curious about what will come next in the story
6	***Talking about Perspectives*** Helping the child understand that different people can see things differently; know different things, and feel differently about things.
7	***Summary*** Reviews of key principles from sessions 1–6
8	***Graduation Event*** Certificates of completion presented to participants along with summary take-home cards and a full set of the six books (from sessions 1–6). A group discussion about how to remain motivated about book-sharing and how to access children's books (e.g. registering for local library).

2.5 Outcomes

Outcome data were collected through the use of 1) direct child assessments, 2) video-recorded caregiver-child interactions, and 3) caregiver interviews. The caregiver interviews and child assessments were all conducted in isiXhosa. The assessment of each caregiver-child pair was completed by one of two native isiXhosa-speaking

assessors, trained and supervised by ND. The assessors remained blind to intervention group allocation. The assessments comprised assessments of the child (e.g. attention assessment), interviewing the caregiver (e.g. assessing caregiver depression), and filming the caregiver and child in interactive tasks (e.g. while sharing a book). Videos were scored by blind coders trained by LM, MM and ND. Detailed information about the training and supervision of assessors and programme facilitators, as well as informed consent procedures, can be found in the published protocol (Dowdall et al., 2017).

2.5.1 Primary outcome measures

a) Child cognition

Child language

Child language was assessed by interviewing the primary caregiver using the short form of the MacArthur Communication Development Inventory (CDI) (Fenson et al., 2000). This 100-item checklist, which has been widely used (e.g. (Cronan et al., 1996; High et al., 2000), including in other African contexts (Law & Roy, 2008), provides information on child expressive and receptive language. It was used at baseline and immediately following the intervention. A measure (i.e. a count) of child utterances during free play with the mother was also recorded at all three time points. At the follow-up assessment, the language subscales of the Bayley Scale of Infant Development (Bayley, 1993) were administered. This measure has been widely used, including in a number of African peri-urban contexts (Ballot et al., 2017).

Child attention

Child attention was measured using the Early Childhood Vigilance Task (ECVT) at all three time points (Goldman et al., 2004). This is a screen-based assessment of sustained focal attention during 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. Sustained attention is indexed by the number of seconds the child attends to the screen, expressed as a proportion of the seven minutes of the video. The ECVT has been used successfully in a previous South African RCT (Vally et al., 2015), as well as in other African contexts (Musielak-Hanold, 2016). We also used an observational measure rating the average quality of child attention during free play at all three time points (Cooper, Vally, Cooper, Radford, et al., 2014).

b) Child behaviour

Child pro-social behaviour

This was assessed directly in a pro-social 'helping' task where a scenario was created that gave the child the opportunity to help the assessor locate her lost pen. 'Helping behaviour' was scored as a binary variable if the child picked up the lost pen and returned it to the assessor, or pointed to the lost pen, or verbally indicated the pen's whereabouts to the assessor. This assessment, based on a task reported by Buttelman and colleagues (2009), was used in a previous trial of book-sharing and found to show effects of the intervention (Murray et al., 2016). In addition, the child's main caretaker completed the pro-social scale of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001), a measure that has previously been used successfully in South Africa (Cluver, Gardner, & Operario, 2007).

Child aggression

The child's main caregiver completed the aggression sub-scale of the Child Behaviour Checklist (CBCL) for ages 18 months to five years (Achenbach, 1992). This 19-item questionnaire provides an assessment of various types of aggressive and deviant child behaviour. This measure, which has been used successfully in several South African studies (Cluver & Gardner, 2007; Nöthling, Martin, Laughton, Cotton, & Seedat, 2013; Rochat et al., 2016), was administered at all three assessments.

Direct measures of child defiance/non-compliance were also obtained from coded video data of three caregiver-child interaction tasks: a prohibition task ('Don't touch'), a compliance task (Crockenberg & Litman, 1990; Kochanska & Aksan, 1995; Pereira, Negrão, Soares, & Mesman, 2014), and a frustration task ('barrier' task). The first two tasks have been used to assess child defiance in several studies in HICs (Kochanska & Aksan, 1995; Pereira et al., 2014). Since they have, to our knowledge, not been used in LMIC contexts, baseline videos were examined and culturally sensitive modifications were made to existing coding schemes (Cooper, 2016). As the distributions were skewed towards zero, binary variables were created for 'defiant' and 'non-defiant' behaviour based on any instance of a rating of '4' or '5' on the five-point scale (i.e., frequent and constant whining, temper tantrums). The barrier task has also been widely used in studies conducted in HICs (Goldsmith & Rothbart, 1993), as well as in previous work in South Africa (Bozicevic et al., 2016), to provide a measure of negative intensity (5-point scale of negative emotion), and constructive (attempts to obtain toy and self-distraction) versus dysregulative (tantrums and venting) emotion regulation strategy (count variables). These assessments were made at all three assessments points.

2.5.2 Secondary outcome measures

Caregiver sensitivity and reciprocity

Caregiver sensitivity, reciprocity and facilitation were assessed by direct observation of the caregiver and child during book-sharing and non-book-sharing contexts. Caregiver-child interactions were videotaped and independently coded using a reliable system of global rating scales ranging from 1-5 (Murray, Stanley, Hooper, King, & Fiori‐Cowley, 1996). These variables were shown in a previous trial to improve with book-sharing training and to mediate the effects of the intervention on child cognitive development (Vally et al., 2015). All these assessments were made at all three assessment points.

Caregiver discipline

Caregiver discipline was assessed using the discipline and violence self-report questionnaire (Lansford & Deater-Deckard, 2012). This questionnaire comprises three subscales of discipline practice: non-violent, physically violent, and psychologically violent discipline. This questionnaire was administered at all three assessment points. Caregiver disciplining strategies were also assessed by direct observation of videos of interactions during the prohibition and compliance tasks. Caregiver behaviour was coded using measures of harsh/coercive discipline (physical and verbal), and supportive guidance (physical and verbal) during the 'Don't touch' prohibition task and the 'Clean up' compliance tasks. These assessments of caregiver discipline have been widely used in the assessment of parenting in several studies in HICs (Crockenberg & Litman, 1990; Kochanska & Aksan, 1995). Since, to our knowledge, they have not been used in an LMIC context, baseline videos were examined and culturally sensitive modifications made to existing coding schemes (Cooper, 2016;

Kochanska & Aksan, 1995). Many of the variables coded for the 'Don't touch' prohibition and 'Clean up' compliance tasks, were skewed towards zero; in such cases, binary variables were created.

Child social understanding

Child theory of mind was assessed using a set of six tasks adapted from the scale developed by Wellman and Liu (Wellman & Liu, 2004) and tasks developed by Buttleman et al. (2009) and Repacholi and Gopnik (1997). The tasks gradually become more complex, beginning with tasks assessing perspective taking moving to understanding of diverse desires and finally to tasks that require understanding of diverse beliefs. The three tasks that assessed diverse beliefs were only administered at follow-up. Two theoretically informed dimensions were created for theory of mind: the first was the 'ToM Classic', comprising a perspective-taking task and two diverse desires tasks; the second was the 'ToM Advanced', comprising three diverse beliefs tasks (only administered at follow-up.). Both dimensions ranged from 0–3.

2.5.3 Exploratory Outcomes

Mental state talk

Caregiver mental state talk was assessed by making transcripts from video recordings of interactions during a narrative cartoon-explanation task (Taumoepeau & Ruffman, 2006). We showed the caregiver two sets of six cartoon pictures, depicting a sequence in which a cartoon character is unaware of another character who is attempting to perform a malevolent act (e.g. a cat attempting to raid a bird's nest). The caregiver was then asked to explain to their child what was happening in the cartoon. Mental state talk was coded based on a system derived from Ruffman and colleagues

(Ruffman et al., 2006; Taumoepeau & Ruffman, 2006, 2008). The main categories included references to emotions (e.g. happy, scared, angry), to desires (e.g. want, like), to cognitive states (e.g. know, think), and to perspective taking (e.g. look, see, watch). The extent to which caregivers provided causal explanations was also coded, including both explicit causal reference terms (e.g. 'because') and implied causal terms (e.g. 'he's running – the cat is chasing him'). In order to provide a richer account of the caregiver narrative, attention-orientating statements, questions, and simple descriptions were also coded, as has been done in some previous studies (Dunn, Brown, & Beardsall, 1991; Ruffman et al., 2002). All the dimensions of mental state talk were highly correlated with one another and a composite measure, 'complex cognitive talk', was therefore created (including causal talk). This assessment was made at baseline and immediately post-intervention.

Home-language environment

The LENA system measures the language environment of children by recording adult speech directed at the child and the child's own speech while the child is at home (Xu, Richards, & Gilkerson, 2014). LENA consists of a compact digital recorder, software that turns the recording into data and a system for managing the data. The system can be used for research, clinical or intervention purposes. The main components of the LENA system are the digital language processor (DLP), LENA Collector, LENA flash drive and LENA Pro.

A child vocalisation (CV) is counted when child speech of any length is surrounded by greater than 300 milliseconds of silence or other sound that is not child speech. CVs do not include cries or vegetative sounds. The LENA system provides

breakdowns of CVs in five-minute, hourly, daily, and monthly reports. The adult word count (AWC) is the number of words a child hears from an adult within a specific period. The LENA system provides breakdowns of AWC in five-minute, hourly, daily, and monthly reports. Conversational turns (CT) occur when a child vocalises (initiates) and an adult responds or an adult speaks (initiates) and a child responds. Each time that happens, one turn is counted. CTs are one of the only ways to measure engaged interaction with a child. The LENA system offers breakdowns of CTs in five-minute, hourly, daily, and monthly reports.

The child's home-language environment was assessed using a LENA digital recorder, a system that captures language heard and spoken by the child over the course of a whole day (Gilkerson et al., 2017). The LENA analysis software produces automated measures of AWCs, CVs, and counts of CTs. Average hourly counts were used as a common metric, given that the number of hours of recorded data varied slightly between participants over the two recording sessions. Though predominantly used in HIC contexts, LENA has been used successfully in a low-income country context in Senegal (Weber, Marchman, Yatma, & Fernald, 2018). In the current study, the LENA assessments were made only at the six-month follow-up.

2.6 Coding and reliability

Videos of caregiver-child interactions and child attention and frustration tasks were scored by blind and independent trained coders. For caregiver-child interaction variables, reliability was established from a randomly selected 20% of baseline videos. Intraclass correlation coefficients ranged between 0.87 and 0.96 for

interaction variables (e.g. sensitivity), and 0.93 to 0.99 for child variables (e.g. attention). A summary of reliability statistics is presented in Appendix 19.

2.7 Sample size and power calculation

The sample consisted of 140 caregiver-child dyads (70 in each arm). This sample has sufficient power to detect projected differences in the primary cognitive outcomes. All power calculations were run for 80% power and alpha = 0.05. The power calculations for language and attention outcomes were based on previous research that aimed to improve child language and focal attention through a book-sharing intervention in South Africa, with two groups of 44 calculated as sufficient based on an effect size of 0.5 (Vally et al., 2015). For the behavioural outcomes of aggression and pro-social behaviour, the power estimates were based on normative data from a study in Khayelitsha on a sample of 302 children. For both the pro-social and the aggression variables, two groups of 64 were calculated as sufficient to detect the difference (two-tailed), based on an effect size of 0.50. Two groups of 70 were therefore recruited, which allowed for 10% sample attrition.

2.8 Randomisation

Eligible participants who consented to taking part in the study were randomised on a 1:1 schedule to the index group and a wait-list control condition (the latter received the intervention once the three waves of assessment had been completed). A minimisation process was used, using the MINIM software (Evans et al., 2004), ensured a similar distribution of participant characteristics between two study groups in terms of child age (younger: 21–25 months, or older: 25–28 months) and sex.

Randomisation took place when participants consented to being part of the study, before completion of baseline assessments, and was performed by ND.

2.9 Data analysis

Statistical analyses were performed on the basis of intention to treat. Group baseline differences were assessed using independent t tests for continuous variables and chi-squared tests for categorical variables. Analysis of baseline group differences included socio-demographic data, such as gender and age, and caregiver variables, such as income, employment, and depression.

Comparisons of groups at post-intervention and follow-up were first conducted by using t tests and chi-squared tests for unadjusted analyses. Cohen's d, reflecting mean differences between groups in standard deviation units, was used as a measure of effect size. Unadjusted effect sizes and p-values are presented in outcomes tables. Adjusted analyses were conducted by using analysis of covariance (ANCOVA) to assess intervention effects at post-intervention and follow-up, after controlling for baseline scores as covariates. ANCOVA adjusted partial eta squared values and p-values are presented in outcomes tables. In cases where binary outcome variables were used, logistic regressions were run to control for baseline scores.

3. Results

The CONSORT diagram (Figure 9) shows the participant flow. Of the 191 dyads assessed for eligibility, consent was obtained from 140 who met all inclusion criteria and were then randomised to intervention or wait-list control. Of these, 130 (93%) completed post-intervention assessments, and 123 (88%) completed six-month post-

intervention follow up assessments. Socio-demographic characteristics of the sample are summarised in Table 12. The table demonstrates baseline equivalence across a range of characteristics.

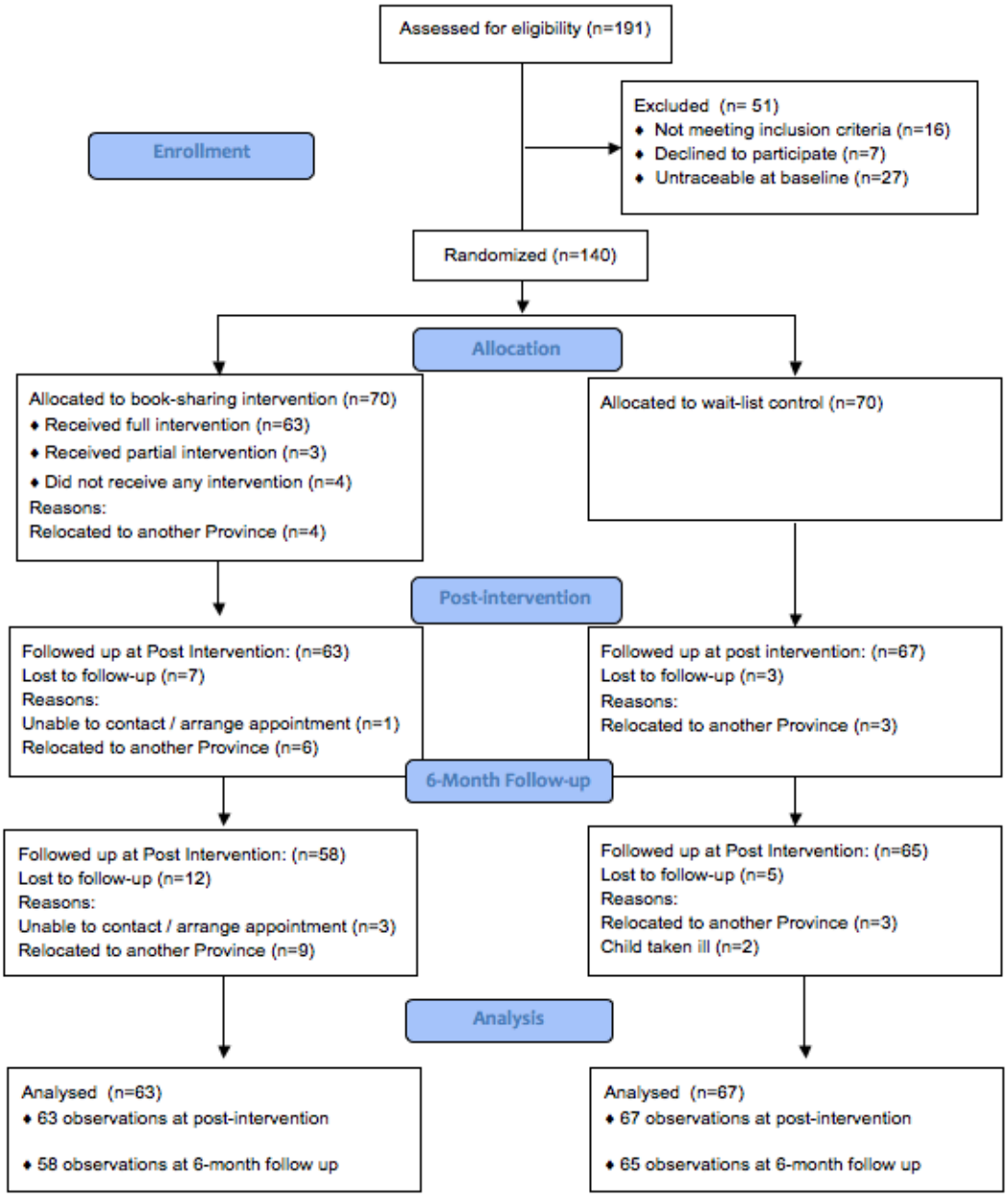


Figure 9 CONSORT diagram

Table 12
Sample characteristics and baseline checks

Variable	Range	Full Sample, n=140	Control, n=70	Index, n=70	p-value
Caregiver age (years)	18-63	31.82(8.08)	32.87(9.09)	30.79(6.83)	0.27
Child age (months)	21-28	24.3(1.54)	24.3(1.54)	24.3(1.56)	0.79
Household food insecurity scale	0-25	9.96(5.07)	10.07(4.88)	9.86(5.29)	0.81
Caregiver depression (PHQ-9)	0-24	6.21(4.73)	6.00(4.64)	6.43(4.84)	0.40
Child gender					0.87
Female		65(46%)	33(47%)	32(46%)	
Male		75(54%)	37(53%)	38(54%)	
Caregiver marital status					0.72
Single		47(34%)	23(33%)	25(36%)	
Married/living with partner		92(66%)	47(67%)	45(64%)	
Caregiver education					0.33
Less than grade 10		26(19%)	17(24%)	9(13%)	
Grade 10 or 11		77(55%)	37(53%)	40(57%)	
Matric		33(23%)	14(20%)	19(27%)	
Post matric		4(3%)	2(3%)	2(3%)	
Monthly household income					0.49
0-49		1(1%)	0(0%)	1(1%)	
50-100		6(5%)	4(6%)	2(3%)	
101-200		19(15%)	6(10%)	13(20%)	
201-500		74(57%)	38(60%)	36(55%)	
500-800		20(15%)	11(17%)	9(14%)	
800→		9(7%)	4(7%)	5(7%)	
Housing					0.69
Shack		106(76%)	52(74%)	54(77%)	
Brick house		34(24%)	18(26%)	16(23%)	
Employment					0.06
Unemployed		82(59%)	45(64%)	37(53%)	
Part-time / self employed		33(23%)	18(26%)	15(21%)	
Full-time		25(18%)	7(10%)	18(26%)	

Note. Data are mean (SD), or *n* (%). Household Income figures in U.S. Dollar.

3.1 Primary outcomes

Table 13 shows results for child language outcomes, with intervention effects evident at post-intervention for CDI expressive (d=0.37, C.I. 0.02,0.71) and receptive (d=0.50, C.I. 0.15,0.84) language. However, when baseline scores were adjusted for, the effect for CDI expressive language was no longer significant at the 5% level (p=0.10). At six-month follow-up, a difference was found between groups on the

Bayley expressive sub-scale (d=0.49, C.I. 0.13, 0.86), but not the receptive sub-scale (p=0.21); a pattern that remained when baseline language scores were adjusted for. Children in the intervention group evidenced more utterances in free play compared to controls post-intervention (d=0.35, C.I. 0.01,0.70), but not at six-month follow-up.

Table 13
Child language outcomes at post-intervention and six-month follow-up

Variable	N	Time point	Intervention, Mean (SD)	Control, Mean (SD)	P-value[a]	Cohen's D (95 % C.I)[a]	Partial Eta Square[b]	P-value (adjusted)[b]
CDI (Exp)	140	Baseline	51.23(15.07)	47.70(15.15)				
	128	Post	62.69(12.75)	58.06(13.04)	0.04*	0.37 (0.02,0.71)	0.021	0.10
CDI (Rec)	140	Baseline	60.37(13.49)	59.76(13.89)				
	128	Post	71.70(9.18)	66.78(10.60)	<0.01**	0.50(0.15,0.84)	0.075	<0.01**
Bayley (Exp)[c]	121	Follow up	38.36(3.53)	36.46(4.09)	<0.01**	0.49(0.13,0.86)	0.059	<0.01**
Bayley (Rec)[d]	121	Follow up	31.82(3.13)	31.09(3.28)	0.21	0.23(-0.13,0.59)	0.011	0.28
Utterances (Exp)	137	Baseline	15.59(15.91)	16.55(14.82)				
	124	Post	22.66(17.12)	17.12(13.27)	0.05*	0.35(0.01, 0.70)	0.041	0.02*
	121	Follow up	14.03(13.71)	12.67(15.07)	0.67	0.08(-0.28,0.43)	0.002	0.59

Note. a= based on t tests with no adjustments; b=ANCOVA adjusted for baseline score; c= controlling for baseline utterances.; d= controlling for CDI receptive.

In Table 14, we present the child attention outcomes. There was no difference between groups on the ECVT at post-intervention (p=0.51); however, a significant benefit of the intervention was observed at six-month follow-up (d=0.39, C.I. 0.02,0.76; p<0.05). In contrast, for the observed attention measure (average quality) during free play, there was a difference between groups at post-intervention (d=0.44,C.I. 0.09,0.79; p<0.01), but not at follow-up (p=0.61).

Table 14
Child attention outcomes at post-intervention and six-month follow-up

Variable	N	Time point	Intervention, Mean (SD)	Control, Mean (SD)	P-value[a]	Cohen's D (95% C.I)[a]	Partial Eta Square[b]	P-value (adjusted)[b]
ECVT[c]	134	Baseline	0.64(0.18)	0.63(0.18)				
	126	Post	0.70(0.14)	0.68(0.19)	0.51	0.12(-0.23,0.47)	0.003	0.53
	116	Follow-up	0.64(0.18)	0.57(0.18)	0.04*	0.39(0.02,0.76)	0.040	0.05*
Free play	139	Baseline	4.38(0.94)	4.52(0.64)				
	127	Post	4.92(0.28)	4.76(0.43)	0.01*	0.44(0.09,0.79)	0.054	<0.01*
	123	Follow-up	4.72(0.70)	4.78(0.60)	0.61	-0.09(-0.44, 0.26)	0.002	0.64

Note. a= based on t tests with no adjustments; b= ANCOVA adjusted for baseline score; c= Early Childhood Vigilance Task.

In Table 15 we present observed and caregiver-reported child behaviour outcomes. No between-group differences were found for observed child defiance in the 'Don't touch' or 'Clean Up,' or for intensity in the barrier frustration task at either time point. No group differences were found for observed mature strategies in the barrier frustration task at post-intervention or six-month follow-up. For dysregulatory strategies in the barrier task, no group differences were present at post-intervention; however, at six-month follow-up, there was a significant effect (d=-0.42, C.I. -0.78, -0.07), with fewer dysregulative strategies used by children in the intervention group. No group differences were seen for the caregiver-reported CBCL aggression sub-scale, the SDQ pro-social sub-scale, or the pen 'help' task at either assessment point.

Table 15
Child behaviour outcomes

Variable	Time point	Intervention, Mean (SD) or N (%)	Control, Mean (SD) or N (%)	P-value[a]	Cohen's D (95% C.I)[a]	Partial Eta Square[b]	P-value (adjusted)[b]
Don't touch	Baseline	17(25%)	20(29%)				
(Defiance)	Post	22(36%)	17 (26%)	0.23	0.21(-0.14,0.57)		0.15
% Defiant	Follow-up	7(12%)	7 (11%)	0.82	0.04(-0.31,0.39)		0.71
Clean Up	Baseline	16 (23%)	19 (27%)				
(Defiance)	Post	7(12%)	6(9%)	0.66	0.08(-0.26,0.45)		0.64
% Defiant	Follow-up	5(9%)	6(9%)	0.90	0.02(-0.33,0.37)		0.98
Barrier	Baseline	12(18%)	9(14%)				
(Intensity)	Post	7(11%)	3(5%)	0.17	0.24(-0.11,0.59)		0.22
% High intensity	Follow-up	3(5%)	1(2%)	0.26	0.20(-0.15,0.56)		0.32
Barrier	Baseline	52.48(16.18)	53.76(18.15)				
(Mature strat)[c]	Post	59.47(19.61)	54.63(18.15)	0.14	0.26(-0.09,0.60)	0.012	0.24
	Follow-up	53.79(17.77)	50.10(15.45)	0.22	0.22(-0.13,0.58)	0.021	0.14
Barrier	Baseline	3.52(5.56)	4.48(7.10)				
(Dysreg strat)[d]	Post	3.51(7.95)	2.70(5.22)	0.50	0.12(-0.23,0.47)	0.004	0.50
	Follow-up	1.39(4.18)	4.84(10.43)	0.02*	-0.42(-0.78,-0.07)	0.035	0.04*
CBCL[e]	Baseline	17.44(7.65)	16.00(7.30)				
(Aggression)	Post	15.01(7.78)	14.74(8.21)	0.84	0.03(-0.31,0.37)	0.001	0.73
	Follow-up	12.27(7.57)	12.30(7.56)	0.98	0.004(-0.34,0.36)	0.002	0.63
SDQ[f]	Baseline	7.24(2.50)	6.97(2.56)				
(Pro-social)	Post	7.73(2.45)	7.13(2.55)	0.17	0.24(-0.11,0.58)	0.012	0.21
	Follow-up	8.09(2.35)	8.18(1.84)	0.80	-0.04(-0.40,0.31)	0.001	0.70
Pen task	Baseline	19(27%)	23(33%)				
(Pro-social)	Post	20(36)%	17(28%)	0.39	0.20(-0.23,0.64)		0.41
% Pass	Follow-up	27(49%)	25(42%)	0.42	0.16(-0.25,0.56)		0.44

Note. a= based on t tests with no adjustments; b= ANCOVA adjusted for baseline score; c=Mature strategies; d=Dysregulatory Strategies; e= Child Behaviour Checklist (aggression sub-scale); f= Strengths and Difficulties Questionnaire (pro-social sub-scale).

3.2 Secondary outcomes

In Table 16 we present the child theory of mind outcomes. It is apparent that while all comparisons favoured the intervention group, in no case was the difference statistically significant.

Table 16
Child theory of mind outcomes

Variable	Time point	Intervention, Mean (SD)	Control, Mean (SD)	P-value[a]	Cohen's D (95% C.I)[a]	Partial Eta Square[b]	P-value (adjusted)[b]
ToM Classic[c]	Baseline	0.58(0.83)	0.91(0.95)				
	Post	1.43(1.01)	1.22(0.88)	0.42	0.21(-0.30,0.71)	0.022	0.33
	Follow up	1.35(0.93)	1.13(0.85)	0.23	0.25(-0.16,0.66)	0.012	0.43
ToM Advanced[d]	Follow up	1.24(0.93)	1.07(0.88)	0.42	0.19(-0.27,0.64)	-	-

Note. a= based on t tests with no adjustments; b= ANCOVA adjusted for baseline score; c= perspectives and diverse desires tasks; d= three diverse belief tasks.

We present the observed parenting outcomes in Table 17. Significant group differences were found for observed book-sharing sensitivity (d=1.01, C.I. 0.67,1.40) and reciprocity (d=0.57, C.I. 0.22,0.92) at post-intervention. Significant group differences were also found for observed sensitivity in free play at post-intervention (d=0.21, C.I. -0.14,0.56, adj p<0.01) and six-month follow-up (d=0.39,C.I. 0.03,0.75). For observed reciprocity in free play, while there was no group difference at post-intervention (adj p=0.15), there was a difference at six-month follow-up (d=0.37, C.I. 0.02,0.73). A modest but significant group difference was found for facilitation in free play at post-intervention (d=0.22, C.I. -0.13,0.57, adj p =0.048), but this was only partially evident at six-month follow-up (d=0.27, C.I. -0.08,0.63, adj p =0.06). A substantial group difference was found at post-intervention for observed complex cognitive talk during the narrative task (d=0.65, C.I. 0.29, 1.01). For verbal guidance, there was a significant effect in the Clean Up task (d=0.41, C.I. 0.05,0.77, p=0.02), but not in the Don't Touch task (adj p=0.11). The reverse was true for physical guidance: at post-intervention there was a significant positive effect in the Don't

Touch task (d=0.36, C.I. 0.01,0.71, p=0.04) but not in the Clean Up task (adj p=0.48). An effect was found for harsh verbal parenting in the Don't Touch context (d=-0.43, C.I. -0.79, -0.08, p=0.02), favouring the intervention group. Due to the low frequency (<5%) of caregivers being rated as 'physically harsh' in the Don't Touch and Clean Up tasks, and verbally harsh in the Clean Up task, we were unable to analyse these variables.

Table 17
Observed parenting outcomes

Variable	Time point	Intervention, Mean (SD) or N (%)	Control, Mean (SD) or N (%)	P-value[a]	Cohen's D (95% C.I)[a]	Partial Eta Square[b]	P-value (adjusted)[b]
Sensitivity (BS)	Baseline	2.53(0.63)	2.62(0.55)				
	Post	3.48(0.81)	2.74(0.61)	<0.001**	1.03(0.67,1.40)	0.262	<0.001**
Reciprocity (BS)	Baseline	2.64(0.80)	2.75(0.70)				
	Post	3.46(0.80)	3.01(0.81)	0.002**	0.57(0.22,0.92)	0.098	<0.001**
Sensitivity (play)	Baseline	2.48(1.08)	2.89(1.14)				
	Post	2.62(1.06)	2.41(0.94)	0.23	0.21(-0.14,0.56)	0.06	0.006**
	Follow up	2.97(0.90)	2.60(0.97)	0.03*	0.39(0.03,0.75)	0.078	0.002**
Reciprocity (play)	Baseline	2.83(1.24)	3.11(1.14)				
	Post	3.07(1.12)	2.86(1.19)	0.33	0.17(-0.17,0.52)	0.017	0.15
	Follow up	3.50(1.14)	3.06(1.20)	0.04*	0.37(0.02,0.73)	0.053	0.01**
Facilitations (play)	Baseline	3.70(2.40)	4.50(2.54)				
	Post	3.31(1.76)	2.92(1.70)	0.20	0.22(-0.13,0.57)	0.032	0.048*
	Follow up	3.12(1.73)	2.67(1.55)	0.13	0.27(-0.08,0.63)	0.028	0.06[+]
Complex Cognitive	Baseline	11.18(8.77)	10.30(8.04)				
Talk[c]	Post	18.22(11.84)	11.45(9.46)	<0.001**	0.63(0.28, 0.99)	0.110	<0.001*
Verbal guidance	Baseline	13(19%)	24(35%)				
(DT)	Post	18(30%)	14(22%)	0.30	0.18(-0.17,0.53)		0.11
Verbal guidance	Baseline	32 (46%)	28(41%)				
(CU)	Post	44(73%)	35(53%)	0.02*	0.41(0.05,0.77)		0.03*
Physical guidance	Baseline	10(15%)	14(20%)				
(DT)	Post	20(32%)	11(17%)	0.04*	0.36(0.01,0.71)		0.02*
Physical guidance	Baseline	33(47%)	41(58%)				
(CU)	Post	20(33%)	26(40%)	0.40	-0.15(-0.49,0.20)		0.48
Harsh verbal (DT)	Baseline	8(12%)	20(29%)				
	Post	6(10%)	17(26%)	0.02*	-0.43(-0.79, -0.08)		0.07[+]

Note. a=based on t tests with no adjustments; b= ANCOVA adjusted for baseline score; Questionnaire. c=Based on cognitions, desires, emotions, perspectives, and causal talk.

In Table 18 we present caregiver self-report disciplining outcomes from the Discipline and Violence self-report questionnaire. Notably, all effects, although non-significant, favoured the intervention group. For the non-violent sub-scale, which

represents only those caregivers who use non-violent strategies *and* report not using any harsh/violent strategies, there was a trend for an intervention effect at post-intervention (d=0.31, C.I. -0.03, 0.66, p=0.07), but not at six-month follow-up (adj p=0.78). No between-group differences were found for the physical violence sub-scale. For the 'psychologically violent' sub-scale, there was a trend towards a benefit of the intervention, both at post-intervention (d=-019, C.I. -0.16,0.53, adj p=0.07), and at six-month follow-up (d=-0.19, C.I. -0.16,0.55, adj p=0.09).

Table 18
Self-report caregiver discipline outcomes

Variable	Time point	Intervention, N (%)	Control, N (%)	P-value[a]	Cohen's D (95% C.I)[a]	P-value (adjusted)[b]
DVQ[c] (non-violent)[d]	Baseline	17 (24%)	13(19%)			
	Post	23(37%)	15(22%)	0.07[+]	0.31(-0.03,0.66)	0.08[+]
	Follow up	11(19%)	11(17%)	0.76	0.05(-0.30,0.41)	0.78
DVQ (physical)[e]	Baseline	43(61%)	46(66%)			
	Post	32(50%)	41(61%)	0.23	-0.21(-0.13,0.56)	0.32
	Follow up	35(60%)	40(62%)	0.89	-0.08(-0.27,0.43)	0.87
DVQ (psychological)[F]	Baseline	32(46%)	20(29%)			
	Post	18(28%)	25(37%)	0.29	-0.19(-0.16,0.53)	0.07[+]
	Follow up	23(39%)	32(49%)	0.28	-0.19(-0.16,0.55)	0.09[+]

Note. a= based on chi-squared tests with no adjustments; b= adjusted for baseline score (logistic regression); c= Discipline and Violence Questionnaire; d= carers used at least one non-violent strategy and no violent strategies; e= carers used at least one harsh physical strategy; f= carers used at least one harsh psychological strategy.

Table 19 presents the LENA outcomes. For child vocalisations (CVC), scores were higher in the intervention group (d=0.32, C.I. -0.05,0.70), but this did not reach conventional statistical significance (p=0.09). A significant group difference was observed for the LENA conversational turns count (CTC) favouring the intervention group (d=0.38, C.I. 0.01,0.75; p<0.05). For both these outcomes, the baseline-adjusted results reflected the unadjusted results almost exactly. The AWC were also higher in the intervention group, but this difference was not significant in either adjusted or unadjusted models.

Table 19
LENA outcomes

Variable	Time point	Intervention, Mean (SD)	Control, Mean (SD)	P-value[a]	Cohen's D (95% C.I)[a]	Partial Eta Square[b]	P-value (adjusted)[b]
LENA (AWC)[e]	Follow up	1158 (490.7)	1116 (560)	0.68	0.08(-0.29; 0.45)	0.006	0.81
LENA (CVC)[c]	Follow up	239(97.8)	209(88.1)	0.09[+]	0.32(-0.05,0.70)	0.028	0.08[+]
LENA (CTC)[d]	Follow up	45.68(21.0)	38.18(18.8)	0.05*	0.38(0.01; 0.75)	0.035	0.05*

Note. Note. a= based on t tests with no adjustments; b=ANCOVA adjusted for relevant baseline measures; c= child vocalisation count; d= conversational turns count; e= adult word count.

4. Discussion

The current study showed that a caregiver-directed group-based dialogic book-sharing intervention delivered by non-professionals had meaningful impacts both on positive caregiver-child interactions, such as caregiver sensitivity, caregiver-child reciprocity, and complex cognitive talk, as well as on child language and cognitive outcomes. There was also some reduction in certain aspects of harsh parenting. However, no benefit was apparent for child behaviour problems, pro-social behaviour, or theory of mind.

For child language, at post-intervention, intervention effects were found on the caregiver-reported CDI expressive outcome and observed child utterances during free play. At follow-up, an effect was found for the expressive sub-scale of the Bayley. The particular benefit to expressive language is in line with the findings of a recent meta-analysis (Dowdall et al., 2019).

For child attention, an intervention effect on child performance on the ECVT was observed at follow-up, but not immediately post-intervention. This may suggest that with this child age group, several months of book-sharing with the shared focal

attention that accompanies it, are needed for benefits to child attention to be realised. While the benefit we showed to child attention at follow-up replicates a previous book-sharing trial in South Africa (Vally et al., 2015), these remain the only two book-sharing studies to date to have measured child attention as an outcome. It is important to note that baseline and post-intervention ECVT assessments were completed with children sitting on the caregiver's lap, while for six-month follow-up assessments children were of the age where they were keen to sit alone with their mother behind them in the corner of the room. This difference in administration is possibly the reason for scores decreasing in both groups from post-intervention to six-month follow-up (with children sometimes turning away from the screen to check/reference their mother sitting behind them), rather than the attention of the children deteriorating. Given the importance of attention for later development and school achievement (Choudhury & Gorman, 2000), the finding of a benefit of book-sharing at the follow-up assessment should provide impetus for researchers to include measures of attention in future book-sharing intervention research.

There were few group differences for observed and caregiver-reported child behaviour outcomes and none for child theory of mind. While it is possible that targeting risk factors such as child attention and sensitive parenting may not be sufficient to improve child behaviour outcomes and that more direct support for caregiver management of difficult child behaviour may be required (as suggested by Chacko et al. (2017)), a longer-term follow-up is required for a definitive rejection of the null hypothesis. Similarly, in relation to the theory of mind outcome, given that the intervention did lead to improvement in caregiver complex cognitive talk (e.g., mental state talk), itself known to be associated with child theory of mind (Devine &

Hughes, 2018), a sleeper effect of the current intervention on child theory of mind remains a possibility.

In terms of caregiver behaviours, substantial group differences favouring the intervention group were found for observed caregiver sensitivity and reciprocity during book-sharing and, importantly, also during free play. Intervention group caregivers also demonstrated more facilitatory behaviour with their children during free play. Further, intervention group caregivers displayed more verbal guidance and physical guidance in the compliance and prohibition tasks respectively. In the prohibition task, intervention group caregivers were significantly less harsh in their verbal interactions with their children. Finally, in terms of self-reported caregiver disciplining behaviour, there was a suggestion of a possible benefit in terms of the non-violent sub-scale and the psychological sub-scale, but group differences did not reach conventional statistical significance.

Effects on caregiver book-sharing competence were broadly in line with the findings of a recent meta-analysis (Dowdall et al., 2019) which estimated the pooled effect of book-sharing interventions on measures of caregiver book-sharing competence, and, consistent with Cooper and colleagues (2014), extend the conclusions to non-book-sharing contexts such as sensitivity and reciprocity in play.

Findings were mixed with respect to harsh parenting. Significant reductions were found for observed harsh verbal interactions, and there was a suggestion of an impact on non-violent parenting. No effects were found for observed harsh physical

disciplining practices but, as noted above, these were rarely observed in either group at any of the assessments and the null hypothesis was therefore, essentially, untestable. Although it is possible that intervention content which focuses only on promoting sensitive and positive parenting through book-sharing is not sufficient to effect change in negative or harsh parenting, it is notable that there were encouraging positive trends across all measurable dimensions of harsh parenting. This suggests that the intervention focus on positive parenting may have had a knock-on effect with respect to harsh parenting. Having said this, it may well be the case that in order to achieve substantial reductions in harsh parenting, it may be necessary to target harsh physical discipline through direct promotion of positive discipline, as was done by Chacko et al. (2017). Further, given the pervasiveness of harsh parenting and violence in South Africa (Breen, Daniels, & Tomlinson, 2015), it remains possible that a broader structural shift around physical punishment may be required.

A notable finding of the current study was that the intervention had a positive impact on caregiver-child conversational turns. On average, intervention children and caregivers engaged in 84 more such turns in a 12-hour day. This is an important finding as it arises from a naturalistic non-intrusive assessment of the home-language environment; there is strong evidence that conversation turns with an adult is the foundation of language development (Goldin-Meadow et al., 2014; Golinkoff et al., 2015; Tamis-LeMonda et al., 2014). Indeed, a recent study demonstrated that conversational turns with a parent, rather than the total quantity of language to which children were exposed, predicted greater activation of the Broca's area, even after controlling for a number of key parental and social variables (Romeo et al., 2018). In addition, the conversational turns combined with Broca's area activation mediated the

relationship between caregiver education level and child language scores. Further, a recent longitudinal study found that conversational turns when children were two-years of age significantly predicted IQ, verbal comprehension and expressive language ten years later, after controlling for socio-economic status (Gilkerson et al., 2018). These findings underscore the importance of the intervention effect on conversational turns found in the current study.

The current study has a number of strengths, including high rates of retention, a follow-up, evaluation of a number of domains of parenting and child functioning using multiple and independent methods of evaluation, and an emphasis on observational data rather than caregiver-reported outcome data. Further, the intervention was delivered by non-professionals; a necessary condition given the local resource limitations for these kinds of programmes to be delivered at scale in LMICs.

The study also had certain limitations. First, although systematic assessment measures were used, norms (i.e., standard scores) were not available for any of them. As such, we were limited in our ability to interpret the clinical significance of the findings. Second, while in the present study we did conduct a six-month post-intervention follow-up assessment, which is longer than the follow-up time for the great majority of book-sharing RCTs (Dowdall et al., 2019), we still remain ignorant of the long-term impact of book-sharing interventions. Further, the caregiver sample was almost exclusively comprised of mothers or other female caregivers. Only one book-sharing trial has focused on the impact on fathers (Chacko et al., 2017). This is clearly a major gap in the research literature.

4.1 Future directions for research

While the findings of the current study are encouraging, a number of questions remain to be addressed. One issue concerns the question of whether it would be possible to bring about changes in child behaviour (aggression, pro-social) and in physically harsh parenting, by more directly embedding traditional parenting programmes into the book-sharing intervention, as was successfully done by Chacko and colleagues (2017) in the United States with a population of low-income fathers. Second, this field of work could benefit from a follow-up at school entry of children and caregivers who had participated in a book-sharing intervention in early childhood. This would reveal to researchers and policy makers the potential long-term benefits of these interventions and answer important questions regarding durability of effects on parenting and child outcomes. Third, evaluation of this kind of programme through an effectiveness trial would help to answer important policy-related questions regarding the sustainability and scalability of book-sharing interventions. Finally, the book-sharing literature could benefit from parallel qualitative studies with caregivers to help understand issues of relevance to implementation, such as barriers and facilitators to uptake and adherence.

4.2 Conclusions

The Benefits of Early Book-Sharing (BEBS) trial evaluated the impact of an early book-sharing intervention on a range of parenting and child outcomes. This simple intervention was shown to benefit child language and attention and to improve sensitive parenting in both book-sharing and free play, to improve caregiver complex cognitive talk, and to enhance caregiver-child reciprocity. While the intervention did reduce harsh verbal parenting, its impact on observed harsh physical parenting could

not be ascertained. Certain aspects of child problem behaviour, which were not improved by the intervention, may require more direct targeting of aspects of parenting, such as positive discipline.

X. Discussion

1. Overview of DPhil Findings

This DPhil aimed to analyse the efficacy of a book-sharing programme that sought to improve parenting routines and behaviours that promote child cognitive, language and socio-emotional development. Three specific aims were addressed, resulting in three stand-alone papers:

1) Synthesising experimental evidence on the impact of existing book-sharing programmes on child language and caregiver practices globally (DPhil Paper 1, published in *Child Development*).
2) Identifying the factors associated with child social understanding, particularly as they pertained to parenting behaviours (in particular, their 'mental state talk'), in a low-income South African community (DPhil Paper 2, under review by *Cognition*).
3) Assessing the impact of a book-sharing programme on child language, cognition, and socio-emotional development and parenting outcomes relevant to these child variables in a low-income South African community (DPhil Paper 3, under review by *The Journal of Clinical Child and Adolescent Psychology*).

The empirical findings from this thesis suggest that book-sharing programmes can have an impact on a broad range of child and parenting outcomes in an LMIC context, well beyond the scope of that which has been traditionally investigated and believed to be the primary area of impact, namely child language (Mol et al., 2008).

In this DPhil thesis, I initially demonstrated in a meta-analysis of 19 existing RCTs that caregiver-directed book-sharing interventions are an effective way of boosting child language outcomes, and identified a number of factors that either moderate or have no bearing on the effect of these programmes (DPhil Paper 1). However, this review also revealed a paucity of research into outcomes other than child language. Next, I turned my focus to understanding the mechanisms that promote social understanding in young South African children, and demonstrated that it is the quality, rather than the quantity of caregiver speech that plays an important role in helping children to develop their social understanding (DPhil Paper 2). Lastly, taking into account the lessons from the preceding investigations, I showed in a field experiment (DPhil Paper 3) how a dialogic book-sharing programme delivered in a low-income South African community brought about positive changes across a wide range of parenting and child outcomes, and also that bringing about changes in parenting behaviours does not always translate into changing associated child outcomes.

In the next section, I discuss the overarching findings from this thesis, which are categorised into two themes: 1) Book-sharing: efficacy and moderating factors; and 2) Book-sharing: A 'silver bullet'? I go on to reflect on the strengths and limitations of the work detailed in this thesis, and look at implications for policy and future research. Finally, I provide a summary of dissemination and impact achieved through this doctoral research.

1.1 Book-sharing: Efficacy and moderating factors

While in ECD, education and paediatric circles it is well acknowledged that sharing books with young children benefits their language development, a critical missing piece of evidence was an up-to-date data synthesis of high quality evidence. My DPhil Paper 1 presented a systematic review and meta-analysis of 19 randomised controlled trials on the efficacy of caregiver-directed book-sharing interventions on child language outcomes. This review confirmed the promise of book-sharing, demonstrating significant benefit to child expressive and receptive language. Further, on a sub-sample of studies that reported caregiver book-sharing competence outcomes (e.g. open-ended questioning), a substantial intervention effect was demonstrated.

Importantly, through moderator analysis within the meta-analysis, this paper identified a number of programme factors that were related to success. Notably, it also challenged a multiple conclusions drawn by previous research. First, intervention dosage was an important factor in the success of interventions. Programmes that were brief tended to have minimal effects on child language outcomes. Second, group-based programmes were more successful than one-on-one interventions, which is in line with reviews comparing group-based cognitive stimulation interventions with equivalent home visiting programmes (Rao et al., 2014). Third, while previous research (Mol et al., 2008) had indicated that younger children (i.e. those below the age of three) were more likely to benefit from book-sharing interventions, my review indicated that older children (aged three to six) were just as likely to benefit. This finding is in line with a recent meta-analysis of parenting programmes for child behaviour problems demonstrating that child age was not related to programme success (Gardner et al., 2019). This study by Gardner et al., together with the results

from the meta-analysis presented in this thesis, challenge the common conception that early intervention is always preferable. Fourth, and especially significantly, several previous studies and reviews (Bus et al., 1995; Mol et al., 2008; Ninio, 1980) suggested that caregiver education level was an important moderating factor for effectiveness of book-sharing interventions, with children of less educated caregivers being less likely to benefit. The review revealed that book-sharing interventions can be equally effective when targeted at caregivers with low and high levels of education. Finally, the review found no evidence for country income level having any association with programme effectiveness. Children in LMICs were just as likely to benefit from book-sharing interventions as children in HICs. This is a particularly important question given that the global burden of early developmental and language deficit falls in LMICs – predominantly in sub-Saharan Africa and Asia (Black et al., 2017). This finding should, however, be interpreted with some caution due to the limited number of included trials from LMICs.

1.2 Book-sharing: A silver bullet?

This thesis sought to investigate a range of developmental outcomes that could potentially benefit from a book-sharing intervention. Up to this point, the literature has been somewhat narrow when it comes to the diversity of outcomes explored in book-sharing experimental studies. Few studies have gone beyond exploring the effect of these interventions on child language. However, a strong argument can be advanced that numerous dimensions of parenting and child development could be enhanced by a book-sharing intervention.

However, first it was important to investigate whether certain associations central to the theory of change of the intervention, that have been repeatedly demonstrated in HICs, would hold in a low-income African context. I was able to demonstrate for the first time that the content of caregiver speech is related to their child's social understanding (DPhil Paper 2). Specifically, the use of mental state language, such as references to emotions and causality, is of particular benefit to the development of child social understanding.

This research filled an important gap in the evidence base required to inform how a book-sharing intervention might bring about improvements in child social understanding. By demonstrating the same kinds of associations between parental talk and child social understanding that had been found in HICs (Devine & Hughes, 2018), the question then became how to enhance caregiver mental state talk through a book-sharing intervention in an LMIC context. Indeed, evaluating the impact of potential changes in these critical maternal behaviours on child social understanding became a question of particular interest and importance.

A new, enhanced, age-appropriate book-sharing programme was developed by the candidate with a stronger focus on socio-emotional development. Specific sessions targeting certain types of discussion during book-sharing were added, such as sessions on 'emotions', 'perspectives', and 'intentions'.

The experimental evaluation sought to demonstrate how a book-sharing intervention, infused with content to target certain kinds of caregiver behaviours associated with a number of target child outcomes, could bring about changes across a broad spectrum

of conventional and hitherto unexplored outcomes. Could we design a ‘silver bullet’ book-sharing programme that impacted on much more than just child language?

The trial demonstrated a number of important outcomes. As expected from previous research, the intervention brought about noteworthy benefits to child language and attention. It also enhanced positive parenting behaviours in both book-sharing and play contexts. Notably, the intervention led to substantial improvements in caregiver complex cognitive talk, and also home-based measures of conversational turns; possibly the strongest naturalistic measure of serve-and-return parenting behaviour. As such, this experiment demonstrated unequivocally that the dialogic book-sharing intervention had benefits well beyond child language development.

The wider benefits of the intervention highlighted above all concern aspects of parenting known to be relevant to optimal child development. It is therefore particularly salutary that the corresponding benefits to child development which might have been anticipated were not apparent. Thus, despite the significant impact of the intervention on maternal emotion and causal talk, no significant difference was found between groups on measures of child social understanding directly after the intervention or at six-month follow-up. Similarly, though considerable benefits from the intervention to caregiver positive parenting practices were demonstrated – for example, sensitivity and reciprocity in book-sharing and play contexts, verbal and physical guidance during challenging situations, and reductions in psychological violence, amongst others – the impact on measures of child behaviour were limited. Thus, no group differences were observed at any assessment point for child defiance, aggression, or pro-social behaviour. The only meaningful change found for child

behaviour was a significant reduction in dysregulative strategies during a 'frustration' task.

These results could be interpreted in two ways. First, given that we were able to bring about meaningful changes in many of the parenting behaviours known to predict the outcomes of child social understanding, defiance, aggression and pro-social behaviour, one possibility is that the limited timeframe of assessments – a six-month window post-intervention – was not long enough for observable changes to be brought about in these areas of child development and behaviour. A longer-term follow-up would be required for a definitive rejection of the null hypothesis.

There is another possible interpretation of these null findings that speaks directly to the content of the intervention itself. Thus, it could be the case that in order to bring about meaningful and observable changes in child behaviour in the short term, it is necessary to address management of difficult child behaviour more directly within the intervention content. Some useful lessons can be taken from a recently published study involving a low-income United States population, where a parenting programme (Behavioural Parent Training: BPT), was embedded within a book-sharing intervention (Chacko et al., 2017). Effectively, they aimed to use book-sharing as a vehicle to deliver BPT training and methods. The latter included standard behavioural management techniques (Webster-Stratton, 1998) such as use of time-out, establishing of routines, and strategies such as ignoring and distraction to reduce problem child behaviours. This approach differed to that used in the current study, where although certain parenting principles were embedded (e.g. praise), effectively the programme was a book-sharing intervention only, rather than a positive parenting

intervention. Through their hybrid approach Chacko and colleagues (2017) were able to improve positive parenting, reduce harsh parenting and improve child behaviour on certain parent-reported measures. It is therefore plausible that the fact that the current study was not able to improve child behaviour may well be explained by the absence of traditional parenting strategies from the intervention content; successfully targeting risk factors for behaviour problems such as child attention and sensitive parenting may not be sufficient to improve child behaviour outcomes. Indeed, this was reflected in a recent study involving two meta-analyses focusing on critical parenting programme components for disruptive child behaviour (Leijten et al., 2019). The authors concluded that intervention success relied on two key components: positive reinforcement *and* non-violent discipline techniques.

2. Strengths and Limitations

This DPhil thesis added valuable insights to the book-sharing, ECD and parenting literature, particularly as it pertains to vulnerable families in LMIC contexts. It presented the first known meta-analysis of RCTs of book-sharing interventions, the first known analysis of the family-level predictors of child social understanding in LMICs and an RCT providing valuable new evidence that a book-sharing intervention could potentially have an impact on a broad spectrum of outcomes beyond that of child language.

A key strength of this thesis was its limited reliance on caregiver-reported data with regards to both parenting behaviours and child outcomes. The study used multiple observational measures where caregiver-child interactions were recorded and later coded. These involved interactions in free play, book-sharing, frustration and

compliance tasks, and picture explanation tasks. Children were also directly assessed using cognitive, language and theory of mind measures, and the home-language environment was assessed using LENA recording devices. A problem that plagues this field is the amount of caregiver-reported data collected, which does not always correlate well with observational measures. This is because participants are likely to report favourably on things they have learned about or expect to see as a result of the programme (e.g. their children's language improving). Though very time and resource intensive, the study was fortunate to have had the necessary expertise and resources in South Africa and the UK to code large amounts of video-recorded observational data of caregivers and children engaging in a variety of tasks. The resulting database is unique in this field. Nevertheless, it is important to acknowledge several limitations in order to appropriately contextualise the results.

2.1 Limitations of systematic review and meta-analysis (DPhil Paper 1)

A key limitation of this review was the lack of available follow-up assessment of children. While all studies included baseline and immediate post-intervention assessments, few provided any data on outcome beyond immediate post-intervention assessment. This leaves unanswered the question of durability of effects. The language and pre-literacy skills that interactive book-sharing interventions help to build are only fully realised when a child enters the schooling system and begins to engage with formal literacy instruction. As such, it is of critical importance that a longitudinal study design is employed to establish whether the impressive short-term benefits for child language are evident at the point of school entry.

The second limitation was the non-standardised reporting in primary studies. In recent years, particularly in medical and related journals, an expectation to adhere to the Consolidated Standards of Reporting Trials (CONSORT) guidelines (Schulz, Altman, & Moher, 2010) in reporting RCT findings has become the norm. However, in the education and development literature the same uniformity of reporting has not occurred (Mallett, Hagen-Zanker, Slater, & Duvendack, 2012). This created some difficulties for data extraction, particularly as it related to the risk of bias assessment. For example, more than half of the included studies did not provide information about random sequence generation or allocation concealment, and 13 out of the 19 trials included were not pre-registered.

A third limitation is that a wide variety of language measures were used in the included studies. Although almost all were standardised and well-validated instruments, this variability in assessment introduced heterogeneity into the results.

2.2 Limitations of the empirical papers (DPhil Papers 2 and 3)

First, as is a commonly acknowledged problem with intervention studies and RCTs, this study lacked a satisfactory long-term follow-up. While we did conduct a six-month post-intervention follow-up assessment, which is longer than the follow-up time for the great majority of book-sharing RCTs (Dowdall, et al., 2019), we still remain ignorant of the long-term impact of book-sharing interventions, particularly as they relate to child outcomes at school entry. A long-term follow-up was precluded for two reasons. First, the BEBS study was conducted with a limited budget: the possibility of collecting more data and the expense involved in collecting and coding the kinds of observational outcomes included in this study were unfeasible. Second,

the research ethics board at Stellenbosch University stipulated that the intervention should be offered to the control group immediately after the six-month follow-up, in line with the body of evidence suggesting the benefits of this kind of intervention for children. This is not to say that a long-term follow-up when the children enter school is fully precluded; however, a matched synthetic control group would need to be created.

Second, although systematic assessment measures were used, local norms (i.e. standard scores) were not available for any of them. As such, we were limited in our ability to interpret the clinical significance of the findings against a background population.

Third, the caregiver sample almost exclusively comprised mothers or other female caregivers – only three caregivers were male. The fact that only one book-sharing trial has focused on the impact of book-sharing training on fathers highlights the significance of this limitation (Chacko et al., 2017).

Fourth, due to the young age of the children in the study, we were unable to assess the impact of caregiver talk on more traditional theory of mind tasks such as false belief. This limits our ability to compare our results with much of the literature on this topic. This limitation is mitigated by the fact that by focusing on younger children and precursors to fully fledged theory of mind, findings were produced that did serve to advance the field in which this work falls.

Fifth, we were unable to analyse certain variables due to low occurrences. For example, due to the low frequency (<5%) of caregivers being rated as 'physically harsh' in the Don't Touch and Clean Up tasks, and verbally harsh in the Clean Up task, we were unable to analyse these variables, despite evidence to suggest the pervasiveness of harsh parenting and violence in South Africa (Breen et al., 2015). This raises a possible limitation with the observational approach employed. It is possible that the observed caregiver-child interactions in the 'lab' setting may not have provided a completely accurate depiction of how these dyads interact at home, due to possible perceived-demand effects on the part of the caregivers, particularly when it came to certain behavioural categories such as harsh physical parenting. Indeed, with observational methods such as those used in this study, there is a possibility that the data may be limited by both questions of accuracy and short observational periods. With brief lab-based observational periods, there is a lower likelihood of picking up low-rate behaviours that might only occur a few times a day (Gardner, 2000).

Sixth, the empirical papers did not account for the possible influence of children being HIV-exposed uninfected. While this area of research is still in its infancy, a number of studies that have indicated that HIV-exposed uninfected children might have poorer developmental outcomes compared with HIV-exposed uninfected children (McHenry et al., 2018). While the evidence base is mixed, certain studies, including a South African study (Wedderburn et al., 2019), have demonstrated impairments in cognitive and language performance of HIV-exposed uninfected children when compared to unexposed children. Given this emerging evidence base, controlling for HIV exposure may have benefitted the analysis.

Finally, although missing data was not a particularly prominent feature in the trial, as follow-up rates were high (over 85%), it is nevertheless important to mention the possible influence of missing data on the outcome variables. For example, the characteristics of the missing participants may have accounted for some of the observed changes between times two and three in the outcome variables. Therefore, a limitation in the study was the lack of a complete case analysis, where only participants with complete data for all time points were included. This approach may have helped to uncover the influence of missing data on the final results.

3. Implications for Policy and Programming

The central findings of this thesis have a number of implications for future programming and policy in the area of ECD and parenting, particularly with regards to book-sharing programmes in LMICs.

A meta-analysis of RCTs is widely considered to be the strongest form of evidence for the efficacy of an intervention. This thesis presented the first such meta-analysis in relation to book-sharing and in doing so, put forward the strongest most up-to-date evidence synthesis of book-sharing as an educational and social intervention. Given the satisfactory effect sizes that emerged for child expressive and receptive language, the case for investing in caregiver-directed book-sharing programmes as an early intervention for improving child language outcomes is given strong empirical support. These interventions show efficacy across a variety of settings and modalities, which is encouraging for taking them to scale. Indeed, a strong argument could be made that book-sharing should be included in any programme that seeks to support early literacy and language development in infants and young children.

Beyond this primary finding, the review also contained some important practical insights for programming and policy. From a programming perspective, a critical insight was that dosage matters. The analysis suggested that there is a dose effect, with brief interventions (less than 60-minutes of contact time) being unlikely to result in meaningful improvements in children's language abilities. Interventions involving multiple sessions, on the other hand, with extended contact time between the instructor and caregiver, are highly likely to result in substantial improvements to child language. Interestingly, this indicates that book-sharing interventions may operate slightly differently compared to early attachment-based parental sensitivity interventions, where meta-analyses have suggested that 'less is more' and the most effective interventions do not use a large number of sessions with families (Bakermans-Kranenburg, Van Ijzendoorn, & Juffer, 2003; van IJzendoorn, Bakermans-Kranenburg, & Juffer, 2005).

Further, the analysis indicated that group-based interventions were more effective than one-on-one interventions, possibly by virtue of the forms of social support offered in this format which has been reported in a number of intervention studies (Vally et al., 2015; Weisleder et al., 2017). However, this finding should be interpreted with some caution given the limited number of studies that used a one-on-one format in the meta-analysis.

From a policy perspective, the analysis revealed three key messages. First, child age did not moderate intervention impact as has previously been suggested (Bus et al., 1995; Mol et al., 2008). Older children (aged three to six years) were just as likely to

benefit from these interventions as were children under the age of three. Second, the analysis demonstrated that caregiver education level did not affect how children benefitted from the intervention. This finding was of particular importance, as previous research (Mol et al., 2008) had indicated that children of less educated caregivers were less likely to see a benefit from these interventions, in effect exacerbating social inequities. This result should reassure policy makers that it is valuable to invest in book-sharing programmes in vulnerable communities, where caregivers have lower levels of education. Finally, and somewhat linked to the previous finding, the analysis suggested a strong degree of universality to these interventions. The programme intervention effects were just as strong in LMICs as they were in HICs. Indeed, the model actually showed slightly stronger outcomes in LMIC contexts, but this should be interpreted with caution given the low number of studies from LMICs. Given that relative to more comprehensive ECD and parenting interventions, book-sharing programmes are inexpensive and can be easily delivered, this result points to a promising avenue for improving child outcomes in LMIC settings.

The BEBS study added further weight of evidence for book-sharing interventions in LMIC settings. Indeed, from an advocacy perspective there is now a strong case to be made for Government and NGOs to consider rolling out these kinds of programmes at a larger scale.

This study produced certain critical insights that could be used to advocate for future programming. In particular, the significant effects found for conversational turns and

certain parenting behaviours such as complex cognitive talk, could help to convince policy makers that book-sharing is more than just an early literacy activity.

Conversational turns, as measured by the LENA recording device and software, represent a home-based, observational proxy of serve-and-return parent-child interaction. Recent evidence has shown how critical these reciprocal interactions (as measured by LENA) are to future child academic performance (Gilkerson et al., 2017; Gilkerson et al., 2018; Zimmerman et al., 2009) and brain development (Romeo et al., 2018). As such, demonstrating that conversational turns can be significantly positively affected by a book-sharing intervention is the kind of evidence that can be used to convince policy makers of the benefits of book-sharing. Further, the overwhelmingly positive impacts demonstrated on a number of caregiver positive parenting behaviours, such as sensitivity, reciprocity, complex cognitive talk, verbal and physical guidance, and reductions in psychological violence add an additional dimension to how policy makers may understand the impact of this kind of intervention.

Programmatically, the BEBS intervention added and adapted content that should be considered for inclusion in future book-sharing programmes. Of particular novelty and relevance were the sessions on emotions, intentions and perspectives. The new sessions were developed to stimulate discussion of mental states. The finding of a considerable improvement in caregiver complex cognitive talk demonstrated that the inclusion of these sessions can lead to marked changes in the quality of caregiver talk known to support child social understanding. Indeed, from a programmatic

perspective, this thesis provides a strong case for including this content in future programming.

4. Directions for Future Research

This DPhil project also contains a number of implications for future research. The main implications relate to longer study timelines, book-sharing for fathers, combined book-sharing and parenting interventions, integrated health care systems programmes, and barriers and facilitators.

As has been mentioned in previous chapters, future evaluations would benefit from including longer-term follow-up data. The systematic review (Paper 1) highlighted this need, with only two studies having a follow-up period longer than one year. Longer time horizons could help to determine whether programme effects endure or diminish over time or, in fact, become larger over time compared to immediate follow-up assessments. Following children up at school entry could potentially provide stronger policy incentives for programme investment.

Second, as was demonstrated in both the systematic review and empirical study, father participation in book-sharing programmes is virtually non-existent. Though no restrictions were placed on caregiver gender and fathers were encouraged to participate, out of 140 caregivers only three were fathers in BEBS. Indeed, only one study to date has specifically targeted fathers (Chacko et al., 2017). This study demonstrated very promising results. Future research could consider exploring father-only book-sharing programmes or look at 'whole family' interventions that target both caregivers.

Third, the empirical study was not able to demonstrate reductions in child problem behaviours, or improvements in child social understanding and pro-social behaviour in the short term. Accordingly, future research could consider including more programme content on parenting behaviour management strategies (e.g., time-out) in order to strengthen the parenting components necessary to change child behaviour. A number of recent evaluations of parenting programmes in South Africa (Ward et al., 2019) have shown promising results in terms of child behaviour, and future research could look at developing and evaluating a fully integrated book-sharing and parenting programme. For greater delineation of active ingredients, a four-arm trial or factorial experimental design (Collins, Dziak, Kugler, & Trail, 2014) could be used.

Fourth, as has been demonstrated in the United States, the potential for scaling book-sharing interventions is considerably enhanced through integration into existing public systems of provision such as the healthcare system. Compared to many LMICs, South Africa has a well-established system of reaching mothers and young children through antenatal care and routine immunisation clinic visits (Hall et al., 2019). Designing and evaluating a book-sharing programme for this context could help pave the way for structural integration of these kinds of early literacy and parenting interventions into healthcare systems: much like the Reach out and Read (High et al., 2014) and Video Interaction Project (Mendelsohn et al., 2011) in the United States where many clinics in low-income areas are equipped with special reading areas, and volunteers share picture books with children and mentor caregivers on effective book-sharing strategies while the caregivers wait to be seen by the nurse or doctor.

Lastly, there is a paucity of research into barriers and facilitators of adherence in the book-sharing literature. There appears to be almost no qualitative work done in this field, which would help to unpack the challenges caregivers experience with these programmes and the elements they find useful. As part of the BEBS study, qualitative interviews were conducted with a sub-group of caregivers who took part in the intervention. These data will be written up in a paper that explores this particular question.

5. Dissemination and Policy Impact

Dissemination of findings from this DPhil has included (1) two first-authored publications in peer-reviewed journals, and a further two first-authored publications currently under revision, (2) presentations at international conferences and workshops, (3) talks at the Clinton Global Initiative and the Salzburg Global Seminar, (4) presentations to South African University research groups, (5) presentations to South African governmental departments, and (6) blog posts and plain language research briefs for lay audiences.

Intervention manuals and training materials have been included in the World Health Organisation's 'Parenting for Lifelong Health' suite of materials, available through their website and supported by a local NGO, 'The Mikhulu Trust'. I have actively supported the work of the Mikhulu Trust in South Africa, and through this work, book-sharing is now gaining significant traction in local policy circles. For example, through numerous engagements and presentations to the Western Cape Department of Health, the department is now beginning to integrate picture books and book-sharing training into their systems. Picture books developed for the BEBS programme are

now being distributed to new parents as part of 'parenting packs' in a number of districts in the Western Cape. In September 2019, the first orientation sessions were held in the Western Cape for public health workers on the integration of book-sharing into provincial structures. This is a tangible and promising show of policy support for dialogic book-sharing in South Africa. In addition, through the Mikhulu Trust, book-sharing has been integrated into the public library systems in the greater city of Cape Town area.

6. Conclusion

Basic education remains one of the most challenging issues in contemporary South Africa. Compared to many poorer countries, South African children perform far worse on international measures of reading comprehension and literacy. The President has made reading a national priority and has recognised the role of early childhood development and parenting in addressing this priority.

This DPhil thesis presents new and timely evidence on a simple and inexpensive intervention that effectively targets parenting and early childhood development outcomes. In a systematic review and meta-analysis, I reported findings that confirm the promise of caregiver-directed book-sharing interventions for child language development. However, the systematic review also pointed to a paucity of evidence from LMICs and, importantly, demonstrated that the majority of RCTs only included measures of child language while overlooking potentially important parenting and child cognitive, socio-emotional, and behavioural outcomes. The systematic review also contained some important lessons for policy and future programming. It showed that, contrary to conclusions drawn from some of the early research, less educated

caregivers and older children benefit just as much from these interventions as their better-educated and younger counterparts.

Given that the intention was to include socio-emotional outcomes in an intervention study, as a preliminary to reporting the trial data, the first empirical paper in this thesis addressed the question of which caregiver mechanisms promote social understanding in young South African children. It demonstrated that it is the quality rather than the quantity of caregiver speech that plays a pivotal role in supporting children's social understanding. Specific types of language, in particular mental state and causal references, were found to play a central role. The results of this paper provided novel and important evidence that the ways in which South African caregivers talk to their children directly influences their children's social understanding. Further, the findings reported in this paper endorsed the a priori hypothesis of using a book-sharing intervention to increase caregiver engagement in these critical types of discourse with their children.

Finally, based on a randomised controlled trial of a carefully designed book-sharing intervention in an impoverished South African community, which included strategies for enhancing parenting practices relevant to the development of child social understanding, I reported positive programme effects across a number of parenting and child developmental outcomes. However, the trial also showed that changes to specific parenting behaviours do not always lead to changes in associated child outcomes in the short term.

Overall, the findings of this thesis support the conclusion that book-sharing programmes could be an effective strategy for addressing many of the early deficits that compromise child educational outcomes in South Africa.

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