A Cross-Cultural Comparison of the Development of Prosocial Behaviour in Infancy

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Abstract

Why do we give money to charity, comfort others who are in distress, or carry heavy boxes when our friends move to a new apartment? Understanding how prosocial behaviours emerge and what might promote or hinder their development in young children is an essential line of research because prosociality is a fundamental feature of our everyday interactions and crucial for the functioning of our societies. However, our current knowledge of early prosociality is relatively limited as most research on this topic has been conducted in Western Educated Industrial Rich Democratic (WEIRD; Henrich et al., 2010) societies. In this thesis, I therefore aimed to examine cross-cultural variability in two key forms of infant prosociality and investigated how helping and sharing behaviours might be related to familial socialisation. Mothers from the UK and Uganda were asked about their parenting practices related to infant sharing and helping when their infants were 14 months old. At 18 months, the infants' sharing and instrumental helping behaviours towards their mothers and an experimenter were experimentally assessed. This revealed significant cross-cultural differences in maternal socialisation of sharing and helping experienced by the UK and Ugandan infants at 14 months. Nonetheless, the likelihood of sharing a toy with an adult did not differ across the two samples of infants. The infants' likelihood of helping an adult, on the other hand, was significantly higher for the Ugandan than the UK infants. Interestingly, the likelihood of infant sharing and helping did not seem to be associated with whether the potential recipient of resources or help was their mother or an experimenter. Overall, the findings revealed by these cross-cultural studies indicate that early sharing might be relatively impervious to environmental variation in socialisation, and that factors influencing cross-cultural variation in instrumental helping rates need further investigation.

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Author's Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

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I set up the Baby Babble project to recruit and collect data with the UK sample. In this role, I recruited 53 mother-infant dyads, led the preparation of materials and protocols for tasks conducted up to 18 months, conducted home visits to collect data, and trained and managed a team of research assistants to help with data collection and management. In Uganda, I led the adaptation of the prosocial protocols in collaboration with the Ugandan research assistants, and then I led data collection, training, and management of research assistants for 5 months. Management of research assistants for data collection in the UK and Ugandan samples was also done by Eve Holden, Nicole Lahiff, Kirsty Graham, Claudia Wilke, Edmund Donnellan, Maggie Hoffmann, Sophie Marshall, and Charlotte Knapper. The following research assistants contributed to data collection and data entry: Rebecca Anderson, Santa Atim, Hellen Biroch, Molly Bowns, Lucy Dunn, Megan Earl, Harold Green, Charlie Ives, Michael Jurua, Yujin Lee, John McCutcheon, Anna Nador, Josephine Paricia, Ellie Parker, Harshanaa Patel, Rhiannon Pearce, Barbora Sodomkova, Emma Sopelsa-Hall, Emma Standley, Sonnie Tan, Maisie Thurman, Florence Tusiime, Joseph Vogliqi, Franziska Wedgell, Daisy Whitwood, and Caitlin Woods.

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Preliminary results from chapters 4 and 5 were presented in a flash talk titled “A Cross-Cultural Comparison of Early Helping Behaviour in British and Ugandan Infants” at the virtual Biennial Meeting of the Society for Research in Child Development in April 2021.

Chapter 1: General Introduction

Why do humans go through the trouble of bending down, picking up a pen and handing it back to the person who has accidentally dropped it? Why do they explain the way to the train station to a lost tourist, give money to charity, offer comfort and advice to friends in distress, or bring bowls of soup to their sick neighbours? Humans engage in a large variety of behaviours which are intended to benefit other individuals but do not entail an immediate payoff for the actors themselves. These behaviours all fit under the umbrella term 'prosocial behaviour' (e.g., Eisenberg, 1986; Wispé, 1972). Understanding how prosocial behaviours emerge, and what might promote or might hinder their development in young children is an essential line of research as prosociality is a fundamental feature of our everyday interactions and crucial for the functioning of our societies. In the context of the current coronavirus pandemic, for example, encouraging prosocial behaviours such as wearing uncomfortable facemasks for the safety of others, can help to protect lives.

1.1 Prosocial Behaviour in Infancy

For centuries, scholars have been intrigued by human prosociality and have tried to discover its roots, to classify its diverse forms, and to understand underlying mechanisms and motivations. A special emphasis has been placed on the question of how children become prosocial beings. When and how do they start to attend to and care about the needs of others in order to help them? Moral philosophers led most of the discussions on the nature of human goodness and morality in the past. Some of them, like 17th century philosopher Thomas Hobbes, claimed that children are naturally selfish and immoral beings who need to be taught to behave generously and cooperatively by society. Others held opposing views, for example Jean-Jacques Rousseau who argued that humans are born kind and fair but are corrupted by society as they grow up.

Somewhat more recently, developmental psychologists have joined this debate, trying to understand the development of prosocial behaviour in infancy and childhood. They have studied prosociality by observing infants in naturalistic interactions with their caregivers or peers and also by testing their prosocial behaviours towards unfamiliar experimenters in more controlled, experimental settings. These studies have revealed that both selfish and cooperative actions seem to be part of children's behavioural repertoire from very early on:

For instance, by their first birthday, infants have been found to share toys with others, to attempt to assist others in everyday situations, and to show concern for individuals in distress (e.g., Boundy et al., 2016; Hammond et al., 2017; Roth-Hanania et al., 2011; Sommerville et al., 2013). Infants will also cooperate with others on cooperative problem solving tasks (e.g., Warneken & Tomasello, 2007) and provide their interaction partners with helpful information or warn them of dangers they are unaware of (e.g., Knudsen & Liszkowski, 2013; Liszkowski et al., 2008). However, at first these behaviours are not always shown very reliably and are often limited to specific recipients or situations in which it is very clearly communicated to the infant how they could be of assistance (e.g., Rheingold et al., 1976; Warneken & Tomasello, 2007). Throughout their second year of life, infants' prosocial behaviours then become more advanced and are shown more reliably in a variety of different situations. For example, as they get older, infants get more proficient at helping others reach various different goals, they begin to attempt to comfort those who are hurt, and become better at coordinating their actions with a partner in cooperative contexts (e.g., Davidov et al., 2021; Warneken et al., 2006; Warneken & Tomasello, 2006).

Even though this general pattern of early emergence and subsequent increase of prosociality across infancy has been repeatedly observed (e.g., Dahl, 2015; Roth-Hanania et al., 2011; Warneken & Tomasello, 2007), it is important to note that there is also quite a lot of variation in the rates at which infants have shown prosocial behaviours across various studies. For instance, prosociality has been found to depend on situational factors, such as the identity of the recipient of help or comfort (e.g., Davidov et al., 2021; Ulber & Tomasello, 2020; Zahn-Waxler et al., 1992) or the costs associated with engaging in a prosocial behaviour (e.g., Giner Torréns & Kärtner, 2017; Svetlova et al., 2010). Moreover, prosocial behaviours can also be influenced by characteristics of the infants themselves, such as their inhibitory control (e.g., Grossmann et al., 2020), their joint attention skills (e.g., Kärtner et al., 2014), or their self-other differentiation skills (e.g., Kärtner et al., 2010; Zahn-Waxler et al., 1992).

1.2 Cross-Cultural Research on Prosociality

It is possible, however, that previous research has so far been underestimating the variability in prosocial behaviour that might exist in infancy, as the vast majority of research

on the emergence and development of prosociality to date has been conducted with infants from Western Educated Industrial Rich Democratic (WEIRD; Henrich et al., 2010) societies. People living in these societies only make up 12% of the world's population (Arnett, 2008; Nielsen et al., 2017) and, perhaps unsurprisingly, their behaviour has been highlighted as not particularly representative of human behaviour in general (Henrich et al., 2010). Studying the behaviour of adults and children from a variety of different backgrounds has revealed a much bigger variation in behaviours related to prosociality than previous studies which only included WEIRD subjects (e.g., Cowell et al., 2017; Henrich et al., 2005; Herrmann et al., 2008; Rochat et al., 2009; Snarey, 1985). This means that our current understanding of early prosociality might be quite limited since cultural effects and the variability associated with them have not been examined sufficiently. So far, only a handful of studies have examined cross-cultural variation in prosociality during infancy (e.g., Callaghan et al., 2011; Corbit et al., 2020; Giner Torréns & Kärtner, 2017; Kärtner et al., 2010; Köster, Cavalcante, et al., 2016), revealing mixed evidence concerning the extent to which prosociality might emerge uniformly across different cultures and the extent to which it might be associated with cross-cultural variation in socialisation practices.

1.3 Influences of Socialisation on Children's Development

Variation in infant prosociality across different cultural contexts is most likely if the emergence of prosocial behaviours is sensitive to early socialisation and other environmental factors. It has been shown before that a diverse range of developmental aspects in infancy and early childhood can be influenced by socialisation, including children's physical development (e.g., Hopkins & Westra, 1990; Super, 2008), emotional regulation skills (e.g., Garner, 2006; Mathis & Bierman, 2015), cognitive development and language skills (e.g., Moreno et al., 2008; Narvaez et al., 2013), and self-regulation skills (e.g., Karreman et al., 2006; Razza & Raymond, 2012). Socialisation has also been found to significantly influence various aspects of young children's social development, including their social understanding (e.g., Gross et al., 2015), their tendency to engage in aggressive behaviours (e.g., Garner et al., 2008; Piché et al., 2016; Pinquart & Kauser, 2018; Romano et al., 2010), and their prosocial behaviours (e.g., Eisenberg et al., 2015; Ramaswamy & Bergin, 2009; Wong et al., 2020).

Parents, siblings, peers, and caregivers in non-parental childcare settings have all been found to play a role in socialising children (e.g., McGrath et al., 2003; Morgan et al., 2012; Romano et al., 2010; Schuhmacher et al., 2017). However, in this thesis, I will focus exclusively on the influence of familial factors (parents and siblings).

1.3.1 Theoretical Framework of Parental Socialisation

Before examining the influence of parenting on the development of prosocial behaviour, it is important to consider a theoretical framework of how parents might shape their children's development. Darling and Steinberg (1993) proposed that there are three different aspects of parenting which can influence child development: (i) the goals that parents have for their children, (ii) the parenting practices that they use to help their children reach these goals, and (iii) their parenting style, which refers to the broader emotional climate in which parents interact with their children and in which socialisation occurs. Four different parenting styles have been identified, which each encompass a number of different parenting practices (Baumrind, 1966, 1971; Deković & Janssens, 1992; Maccoby & Martin, 1983): Authoritative parenting is characterised by an emotional climate of high responsiveness and high control. Authoritative parents are sensitive and responsive to their children's needs, provide and enforce clear rules and expectations, and positively encourage their children's independence and autonomy. They have been found to give suggestions or explanations in order to achieve changes in their children's behaviour, to be supportive and warm, and to make use of positive remarks in interactions with their children (e.g., Deković & Janssens, 1992; Wong et al., 2020). Authoritarian parenting, on the other hand, is characterised by a combination of relatively low responsiveness and high control, which manifests in a high emphasis on obedience to strict rules, limited autonomy for the child, and the use of punitive practices. Authoritarian parents might use practices like verbal hostility, criticism, or corporal punishment in interactions with their children (e.g., Deković & Janssens, 1992; Robinson et al., 1995). Permissive parenting is shown by parents who are high in responsiveness but low in control, meaning that they provide a limited number of rules for their children, do not always follow through on the rules that they set, and often ignore poor behaviour (e.g., Robinson et al., 1995). Lastly, neglectful parenting combines low responsiveness and low control, which can manifest in a failure to

provide emotional support for children or to ensure the fulfilment of children's physical needs and a lack of parental supervision (e.g., Kantor et al., 2004).

1.3.2 Parental Socialisation of Prosocial Development

Parenting Styles and Practices

Several of these parenting styles and practices have been found to be linked to children's prosocial development (e.g., Wong et al., 2020). For instance, a large number of studies have revealed positive associations between young children's prosociality and different parenting practices related to the authoritative parenting style, such as parental warmth (e.g., Daniel et al., 2016; Robinson et al., 1994; Williams & Berthelsen, 2017; Xiao et al., 2018), responsiveness (Davidov & Grusec, 2006; Kochanska et al., 1999; Narvaez et al., 2013; Whiteside-Mansell et al., 2003), and sensitive caregiving (e.g., Brownell & Drummond, 2020; Newton, Laible, et al., 2014; Newton et al., 2016). Higher rates of prosocial behaviour have also been observed in children whose parents use inductions, i.e., who explain to their children why they should behave prosocially and focus on the emotional reactions of others or the consequences of children's behaviour in these explanations (e.g., Eisenberg et al., 2015; Scrimgeour et al., 2013; Zahn-Waxler et al., 1979). How prosocial behaviours might be influenced by positive reinforcement is still unclear to date: In some cases, praising children for behaving prosocially has been found to increase their prosocial behaviour. Garner (2006), for instance, found positive associations between maternal praise and 3- to 6-year-olds' prosocial behaviours. Two longitudinal studies have revealed that parental encouragement and social reinforcement early in the second year of life can predict children's helping behaviour towards the end of their second year (Dahl, 2015; Kärtner et al., 2021). Dahl (2015), however, also found that positive reinforcement at 19 months was negatively related to helping at 24 month. This is in line with findings by Eisenberg et al. (1992) who observed positive reinforcements of requested prosocial behaviours at 19 to 33 months to predict lower frequencies of prosocial behaviour in a peer interaction 2 years later. Other studies, on the other hand, have not found any significant associations between maternal praise and different prosocial behaviours in 18- to 30-months-old infants (e.g., Giner Torréns & Kärtner, 2017; Pettygrove et al., 2013). It has been argued that positive reinforcement might only be effective in increasing prosocial behaviours at certain ages

(e.g., Dahl et al., 2017) or that the negative associations between positive reinforcement and prosocial behaviour in some studies might be due to parents encouraging and praising their children more if they notice that they are generally less likely to engage in prosocial behaviours (e.g., Eisenberg et al., 1992). To understand more about the relationship between positive reinforcement and children's prosocial behaviour further investigations are needed.

Prosocial behaviour in children has been negatively associated with parenting practices and behaviours related to an authoritarian parenting style, such as parental negativity (e.g., Knafo & Plomin, 2006), hostility (e.g., Williams & Berthelsen, 2017), punitive practices (e.g., Romano et al., 2005), and corporal punishment (e.g., Cornell & Frick, 2007; Piché et al., 2016). This is, however, not necessarily true in all settings and contexts. Yagmurlu and Sanson (2009) for instance, conducted a study with Anglo-Australian and Turkish Australian pre-schoolers, finding that for the Turkish Australian children, maternal use of obedience-demanding behaviours was positively related to prosocial behaviours, while this was not the case for the Anglo-Australian pre-schoolers. Similarly, Giner Torréns and Kärtner (2017) found that maternal punitive practices were positively related to 18-month-old infants' helping behaviour in a sample of Indian mother-infant dyads but negatively related in a sample of German mother-infant dyads. This suggests that the extent to which certain parenting practices succeed in promoting prosociality might vary depending on the cultural context in which they are being used (e.g., Eisenberg et al., 2015; Raj & Raval, 2013). It has been proposed that parenting styles that are normative and consistent with the socio-cultural milieu in which they are used won't lead to detrimental effects (e.g., Dwairy et al., 2006).

A recent meta-analysis examining the relationship between different parenting styles and children's prosocial behaviour, which included studies from a variety of different cultural settings, however, revealed authoritative parenting to overall be positively and authoritarian parenting to overall be negatively associated with children's prosociality (Wong et al., 2020). The cultural context of the studies involved in this meta-analysis (categorised as individualistic versus collectivistic) did not moderate these associations. However, the unbalanced nature of the data set (the vast majority of studies were from individualistic cultural settings) may have prevented such associations from being revealed.

It could, however, also indicate that while there appear to be cross-cultural differences in how specific parenting practices relate to children's prosociality, there might be an overall pattern of authoritative parenting styles being more beneficial for children's prosocial development than authoritarian parenting styles.

Socialisation Goals

Besides their parenting style, parents can also influence their children's prosocial development through the goals that they have for their children (Darling & Steinberg, 1993). Parents from different cultural settings have been found to vary in what they consider valuable for their children's development and, thus, in the goals that they set for them (e.g., Keller, 2007; Keller et al., 2010; Suizzo, 2007). It has been proposed that parental socialisation goals and practices reflect the cultural models that are appropriate in the communities that the families live in and that these cultural models can be characterised by two underlying dimensions: (i) interpersonal distance, extending from relatedness to separateness, and (ii) agency, extending from autonomy to heteronomy (e.g., Kağitçibaşi, 1996, 2005; Keller, 2007; Keller et al., 2010). The cultural model typically ascribed to middle-class families living in Western industrial societies is "independence", in which separateness and autonomy are valued and, thus, the prevalent parental goals are for children to become independent and self-sufficient (Kağitçibaşi, 1996, 2005). These goals have been described as "autonomous socialisation goals" (e.g., Keller, 2007). Rural, subsistence farming families, on the other hand, are typically associated with the cultural model of "interdependence", in which relatedness and heteronomy are valued, and parental goals like obedience, acceptance of norms, and harmony within the family and community are common (Kağitçibaşi, 1996, 2005; Keller, 2003). The parental goals of this model have been labelled "relational socialisation goals" (e.g., Keller, 2007). The advantage of this characterisation of parenting is that it captures global diversity in goals and practices. While the parenting styles described earlier in this chapter have been observed in a range of cultural contexts (e.g., Pinquart & Kauser, 2018), they were originally identified in WEIRD settings (e.g., Baumrind, 1971; Raj & Raval, 2013). However, as mentioned above, considering subjects from a variety of cultural settings - rather than focusing on WEIRD individuals only - can lead to a much better understanding of human behaviour and development (Henrich et al., 2010). This is especially the case, if research is done within a theoretical framework that

recognises and describes cross-cultural diversity in behaviours rather than one that simply aims to look for WEIRD behaviours in Non-WEIRD communities. It is therefore important to also consider the influence of parenting goals and practices on children's early prosocial behaviour within the autonomous/relational framework proposed by Kağitçibaşi (1996) and Keller (2007).

While maternal alignment with relational or autonomous socialisation goals has been found to predict various aspects of children's development such as self-regulation or mirror self-recognition (e.g., Kärtner et al., 2011; Kärtner et al., 2012; Lamm et al., 2017), there have only been a few studies examining its association with young children's prosociality: Kärtner et al. (2010) found that mothers of 19-month-old infants living in India aligned more with relational socialisation goals than mothers from Germany, who, in turn, aligned more with autonomous socialisation goals. While there were no overall cross-cultural differences in toddlers' prosocial behaviour towards an experimenter who feigned distress, maternal alignment with relational socialisation goals related to obedience was a significant predictor of the children's comforting behaviour on an individual level. Fonseca et al. (2018) similarly found a positive correlation between maternal alignment with the relational socialisation goal "During the first 3 years of life, children should learn to support others" and the helping behaviour of 18- to 30-month-old infants from rural Brazil. Köster, Cavalcante, et al. (2016) did not directly examine the relationship between socialisation goals and prosociality, but found associations between maternal socialisation goals and certain parenting practices (e.g., assertive scaffolding) which in turn explained variation in toddlers' helping behaviour in Brazil and Germany. Taken together, these findings suggest that maternal socialisation goals, especially alignment with relational socialisation goals, can directly and indirectly promote children's comforting and helping behaviours. Further research on the association between maternal socialisation goals and other forms of prosocial behaviour is still lacking though.

Overall, these findings indicate that parents may influence the development of prosocial behaviour in their children through their general parenting style, the specific parenting practices that they use, and through the overall socialisation goals they have for their children. It is still unclear, however, how much cross-cultural variation there might be in the ways in which different parenting behaviours influence prosociality. Moreover, further

investigations are needed to understand how different parental behaviours might relate to specific types of prosociality. Many of the studies mentioned above considered composite measures of prosociality (e.g., Eisenberg et al., 1992; Garner et al., 2008; Yagmurlu & Sanson, 2009) or did not differentiate between various forms of prosocial behaviour when comparing across multiple studies (e.g., Wong et al., 2020). Several scholars have suggested, though, that prosociality should not be regarded as one single undifferentiated class of behaviours but instead that different forms of prosociality need to be distinguished and studied separately, in order to understand how they emerge, develop, and might be affected by socialisation (e.g., Dunfield & Kuhlmeier, 2013; Paulus, 2018).

1.4 Different Forms of Prosocial Behaviour

While different forms of prosocial behaviour all share the common intention to benefit another individual, research indicates that they might be based on distinct psychological mechanisms and motivations (e.g., Dunfield, 2014; Kärtner et al., 2014; Paulus, 2014; Radke-Yarrow et al., 1983). It has been shown, for instance, that different measures of prosocial behaviour, such as helping, sharing, and comforting, do not necessarily correlate with each other (e.g., Dunfield & Kuhlmeier, 2013; Dunfield et al., 2011; Hay & Cook, 2007), that they develop at different ages (e.g., Dunfield, 2014; Tomasello & Vaish, 2013), and that their emergence can be predicted by distinct neurophysiological patterns (e.g., Paulus et al., 2013).

As a result, researchers have suggested different ways of classifying the varieties of prosocial behaviour. Hay and Cook (2007), for example, focussed mainly on children's motivations and the different ways they might be interacting with other individuals, and thus, proposed the following three strands of prosocial development: (i) feeling for another (i.e., other-oriented emotions like affection, friendliness, and empathetic concern); (ii) working with another (i.e., cooperative problem-solving, sharing resources, and providing others with help to accomplish their goals); and (iii) ministering to another (i.e., responding to other individuals' needs and wishes, comforting and nurturing others, providing others with required resources).

Another framework suggested by Warneken and Tomasello (2009b) is based on an analogy between early prosociality and economic processes. They propose that prosocial individuals

provide others with goods, services, and information and, correspondingly, their framework includes sharing valuable resources with others, helping others to achieve their goals, and informing others of things they need or want to know as the three major domains of prosocial behaviour.

Dunfield et al. (2011), on the other hand, recommend classifying different prosocial behaviours by the negative state that they respond to. They argue that there are three varieties of negative states that individuals can identify and address when interacting with others: (i) They can witness instrumental needs (i.e., somebody having difficulty completing a goal-directed action) and act by helping the other to achieve their goal; (ii) they can be faced with material needs (i.e., somebody lacking a desired material good) and act by sharing limited resources; or (iii) they can observe emotional needs (i.e., somebody experiencing a negative affective state) and act by comforting the other individual. Dunfield et al. (2011) explain the different developmental trajectories of the different forms of prosocial behaviour by the distinct underlying socio-cognitive skills which are necessary to assess and respond to these different kinds of needs. This is a useful framework of classifying different forms of prosociality because it highlights crucial components of prosociality: understanding the specific need of another person and how to alleviate it, and being motivated to engage in behaviours that alleviate this need (Dunfield & Kuhlmeier, 2013). It is thus this framework which informs my thesis, where I examine two of the three forms of prosocial behaviour Dunfield et al. (2011) propose.

1.5 Previous Research on Sharing and Helping in Infancy

In this thesis, I will focus on two key forms of prosocial behaviour that emerge in infancy: sharing and helping. Even though they have been classified in different ways within the theoretical frameworks of different scholars, their definitions have largely been agreed upon. Sharing has been defined as giving limited or valuable resources to another individual (e.g., Dunfield & Kuhlmeier, 2013; Hay et al., 1991; Warneken & Tomasello, 2009a) and helping, or more specifically instrumental helping, has been defined as trying to facilitate the acquisition of another individual's goal by acting on their behalf (e.g., Dahl, 2015; Dunfield et al., 2011; Rheingold, 1982; Warneken & Tomasello, 2006, 2009b).

Previous research indicates that infants from WEIRD societies start to spontaneously offer toys to others in naturalistic interactions around the age of 10 to 12 months (e.g., Boundy et al., 2016; Hay, 1979; Hay & Murray, 1982) and to share with others in experimental settings at 12 months (Sommerville et al., 2013). Around their first birthday, infants also begin to assist their caregivers with basic chores (Dahl, 2015; Hammond et al., 2017; Hammond & Brownell, 2018) and to retrieve out-of-reach objects for an unfamiliar adult in experimental set-ups (e.g., Köster, Ohmer, et al., 2016; Sommerville et al., 2013; Warneken et al., 2007). Throughout their second year of life, infant sharing and helping becomes more frequent and is shown more consistently in both naturalistic interactions and experimental studies (e.g., Dahl, 2015; Dunfield et al., 2011; Rheingold et al., 1976). It has also been found to become more complex, as infants start to, for instance, participate in a larger variety of chores at home or help experimenters in more complex situations than retrieving objects, such as stacking books or opening cabinet doors (e.g., Hammond & Brownell, 2018; Warneken & Tomasello, 2006). At first, early sharing and helping appear to rely quite heavily on the recipient being explicit about needing or wanting the object in the child's possession or about requiring the infant's help in a certain task (e.g., Brownell, Iesue, et al., 2013; Brownell et al., 2009; Warneken et al., 2007) but once infants approach the end of their second year of life, the number and intensity of cues necessary for them to share or help have been found to decrease significantly (e.g., Svetlova et al., 2010).

So far, the majority of research on infant sharing and helping has been conducted either by observing naturalistic caregiver-infant interactions or by testing infants with an unfamiliar adult in an experimental set-up. Usually, observational studies take place in the participants' homes or in a laboratory setting that aims to imitate a home set-up, while experimental studies are mostly conducted in a more neutral lab setting. Both approaches have revealed valuable insights into the development of early sharing and helping but they each also have their weaknesses. On the one hand, observations of naturalistic interactions can provide us with useful information about how early sharing and helping might occur in everyday life, but they do not allow to control for relevant aspects of the situation, such as specific cues that the infant might respond to or the costs that helping or sharing might entail (Dunfield et al., 2011). In a laboratory setting, on the other hand, a more controlled set-up can be achieved. However, infants and their caregivers might not be able to perform naturally if

they are nervous about or distracted by the new environment. Parents might be subject to demand characteristics if they are not only aware of being watched but are also in a new environment that might suggest to them that they should behave in a certain way. Moreover, infants who tend to be unsure about new settings and unfamiliar adults might struggle to engage with the experimental tasks, while infants who are more neophilic might be distracted by the new environment because they wish to explore it.

Another limitation of the two main approaches in which infant sharing and helping have previously been studied is that controlled experimental trials have mostly been conducted with unfamiliar adults as the potential recipients of resources or help (e.g., Brownell et al., 2009; Dunfield et al., 2011; Gross et al., 2015; Warneken & Tomasello, 2006), while sharing and helping towards caregivers has almost exclusively been studied in more naturalistic interactions (e.g., Boundy et al., 2016; Dahl, 2015; Rheingold, 1982; Rheingold et al., 1976). Predominantly using one methodological approach for one type of recipient and a different approach for another type of recipient makes it hard to compare infant sharing and helping behaviour towards different types of recipients and has resulted in there being limited evidence for how much the identity of or familiarity with a potential recipient of resources or help might matter for early sharing and helping.

Seminal studies on infant prosociality compared sharing and helping behaviours towards an experimenter in an experimental condition, in which the experimenter communicated their need for resources or help, with infants' behaviours in a control condition, in which the experimenter did not indicate any need or desire for resources or help (e.g., Dunfield et al., 2011; Warneken & Tomasello, 2006, 2007). Based on the results of these studies which revealed that infants share and help more frequently in experimental than in control conditions, many recent studies do not include control conditions anymore (e.g., Gross et al., 2015; Grossmann et al., 2020). Control conditions are important, however, to help rule out low-level explanations for seemingly prosocial behaviours, for instance that infants might share or help simply because they enjoy handing objects to others, and the inclusion of control conditions is therefore crucial for inferring whether or not infants share or help in response to another individual's specific need (e.g., Dunfield et al., 2011).

As mentioned above, another major limitation of our knowledge on the development of infant sharing and helping is that it is mainly based on research with samples from WEIRD

backgrounds (Nielsen et al., 2017). So far, we know very little about the variability of infants' sharing and helping behaviours across different cultures. Similarly, our understanding of how different familial factors like parenting practices or socialisation goals might relate to infant sharing and helping is also limited as research in this area has mostly been conducted with infants from WEIRD backgrounds (e.g., Brownell, Svetlova, et al., 2013; Dahl, 2015; Kärtner et al., 2021; Pettygrove et al., 2013). Cross-cultural research on this is crucial, however, because the variability in parental behaviours is potentially much larger across different cultural settings than within one single culture.

Moreover, while there have been a handful of studies that have examined early predictors of infant helping and sharing in WEIRD settings (e.g., Dahl, 2015; Eisenberg et al., 1992; Kärtner et al., 2021), there have so far been no cross-cultural studies on this topic. Research that examines how earlier parenting practices might relate to infant prosociality at a later age, and not just parental behaviours that occur concurrently with the studied prosocial behaviours, is vital for establishing how environmental factors might relate to the emergence of prosocial behaviour. Parenting practices change as the infant ages and the behaviour of an infant assessed at a certain age is likely influenced not just by concurrent parenting practices, but also shaped by those in their past. Cross-cultural research on the associations between infants' early experiences and their later prosocial behaviour is therefore important, but currently missing from the literature.

1.6 Current Thesis

1.6.1 Aims of the Current Thesis

In order to address the limitations of existing research outlined above, this thesis aims to examine the following questions:

1) To what extent do infants from different cultural settings engage in sharing and helping behaviours at 18 months?
2) Is early maternal socialisation of sharing and helping associated with the emergence of sharing and helping in infancy?

I aimed to address these questions by conducting studies with mother-infant dyads from two different cultural settings: an urban setting in the UK and a rural setting in Uganda. By testing UK and Ugandan infants, I sought to meet the need for research on infant sharing

and helping that includes both WEIRD and Non-WEIRD samples. The choice to conduct my research with these two particular groups of mother-infants dyads was an opportunistic one, as I was able to join a larger, already existing, longitudinal project on the development of infants' social cognition that took place in an urban UK setting and in rural Uganda. However, theoretical considerations also influenced this choice: It seemed important to understand the influence of different parenting practices and socialisation goals on prosocial behaviour in infancy because this has been understudied. Previous research has shown that mothers from rural Non-WEIRD settings are more likely to align with relational socialisation goals and to be more likely to use relational socialisation practices than mothers from urban WEIRD settings (Keller, 2007), and I, thus, expected there to be variation in the early socialisation of prosociality that infants from an urban UK setting and infants from rural Uganda would experience. Ongoing research with these two populations has confirmed that these two samples were an excellent choice for a relational and an autonomous sample, as a study by Holden et al. (in review) has shown that the mothers did not only differ in their attitudes – with the Ugandan mothers' attitudes being more relational and the UK mothers' attitudes being more autonomous – but that several of their behaviours also aligned with these attitudinal measures. For instance, the Ugandan infants experienced more distributed caregiving, more body contact with their mothers, and were closer to their mothers at night than the UK infants.

Moreover, studying infant sharing and helping in a sample of Ugandan infants is of interest in light of the existing literature because previous research comparing the sharing behaviour of Ugandan children to that of children from WEIRD societies has revealed mixed results: On the one hand, in a study by Blake, McAuliffe, et al. (2015), children from rural Uganda and children from urban North-American settings showed similarities in their advantageous inequity aversion. Other studies have, however, found significant cross-cultural differences in Ugandan and US-American children's inequity aversion (Paulus, 2015) and in Ugandan and German children's sharing behaviour with different types of recipients (Scharpf et al., 2017). This indicates that, during middle childhood, Ugandan children might show similar behaviour to that of children from WEIRD societies in certain aspects of prosociality but not in others. To what extent the sharing and instrumental helping behaviours of Ugandan infants might be comparable to those of infants from a WEIRD setting remains an open

question so far as previous research in Uganda has only been conducted with children in early or middle childhood.

I focussed on sharing and helping behaviours at the 18-month time point in order to maximise comparability with previous cross-cultural work on prosociality in infancy (e.g., Giner Torréns & Kärtner, 2017; Köster, Cavalcante, et al., 2016).

Infants' sharing and helping behaviours were tested in controlled experimental trials conducted in the infants' homes. This was done to address the limitation of previous research in which experimental studies have mostly been administered in laboratory settings. By assessing infant sharing and helping through experimental tasks in a home environment, I sought to minimise variation in potential confounding factors across participants (e.g., the cues given by the recipient or the cost of sharing/helping) while at the same time aiming to make the situation as naturalistic as possible and, thus, maximise ecological validity. In the sharing and helping tasks, infants engaged with both their mothers and with an experimenter. This allowed me to test whether or not the identity of the recipient might be associated with sharing and helping in infancy and it addressed the lack of previous research on infants' sharing and helping behaviours towards their mothers in controlled experimental settings.

Importantly, the helping task in this thesis included a control condition as I aimed to examine infant helping in response to need. Therefore, the control condition was designed to rule out low-level explanations for helping, such as enjoying handing back objects or trying to engage in social interactions. In contrast to helping, it is much harder to remove any need for sharing as someone may always benefit from having more of a resource. Therefore, in the sharing task, I ran two experimental conditions which varied in whether explicit cues were given, in order to see whether children were reliant on explicit cues in order to share.

This thesis includes data that were collected when the infants were 11, 14, and 18 months old. At 11 months, mothers were asked if their infants engaged in helping or sharing in everyday life. This permitted examination of whether precocious early prosocial behaviour was related to later prosocial performance on experimental tasks at 18 months. At 14 months, mothers were asked about their use of various parenting behaviours related to

early sharing and helping. This was done to address the lack of previous studies examining the associations between early socialisation and subsequent infant prosociality across different cultural settings

1.6.2 Outline of the Current Thesis

In chapter 2, I present a study conducted to investigate cross-cultural variation in UK and Ugandan infants' sharing and helping behaviour at 18 months. Infants' toy sharing with their mothers and an experimenter was assessed in a controlled experimental task which consisted of two experimental conditions which varied in whether explicit cues were given. This enabled examination of whether or not the infants were reliant on explicit cues in order to share. The infants' instrumental helping behaviour towards their mothers and an experimenter was measured in a controlled experimental helping task which included an experimental condition, in which the adult indicated their need for an out-of-reach object, and a control condition. I examined whether the infants' likelihood of sharing or their likelihood of helping in response to need was related to the identity of their interaction partner (mother or experimenter) and/or the infants' cultural background (UK or Uganda).

In chapter 3, I sought to explain cross-cultural variation in infant sharing and helping at 18 months by examining maternal socialisation practices. Mothers were asked about their parenting practices related to early sharing and early helping when their infants were 14 months old. First, I characterised group-level differences in different demographic variables and in the number of parenting practices mothers used to socialise early prosociality in their infants, and examined whether they varied in a way that might explain group-level differences in helping. Subsequently, I investigated whether maternal socialisation of prosociality might explain individual variation in instrumental sharing and helping at 18 months.

Chapter 2: Early Sharing and Helping Behaviour in UK and Ugandan 18-Month-Old Infants

2.1 Abstract

Children growing up in Western Educated Industrial Rich Democratic (WEIRD) societies have been found to help and share objects with adults early in their second year of life. Much less, however, is known about the sharing and helping behaviour of infants from other cultural settings. The present study aimed to examine individual and cultural variation in early sharing and instrumental helping behaviour in a diverse sample of 18-month-old infants. To achieve this, 82-83 infants from two cultural groups (38-39 infants from rural Uganda and 43-45 infants from a medium-sized city in the UK) were tested in a Toy Sharing task and/or an Out of Reach Helping task. Infants completed both tasks once with their mothers and once with a local experimenter. In the Toy Sharing task, infant preference for the two toys to be offered was assessed before they completed two or three conditions. In the Request condition, the infant's interaction partner (mother or experimenter) had an objective need for toys and made their desire for one of the two infant's toys explicit, both gesturally and verbally. In the No Request condition, the objective need remained but no cues indicating desire for a toy were given. In the control condition, no clear objective need and no cues for desire were present. Infants only participated in the control condition if they had shared in the No Request condition. The overall likelihood of sharing in the Request condition did not differ across the two cultural groups nor across the type of interaction partner. However, of the infants who shared in the Request condition more UK than Ugandan infants gave their preferred toy to an experimenter. Likelihoods of giving the preferred toy to the mother were similar across cultural groups. The Out of Reach Helping task consisted of an experimental condition where the interaction partner (mother or experimenter) pretended to drop an object by accident and then unsuccessfully reached for it, and a control condition where the interaction partner purposefully dropped the object on the floor and did not reach for it. Helping was defined as retrieving the object in the experimental, but not the control condition. Analyses revealed that the Ugandan infants were more likely to help their mothers or an experimenter than the UK infants and that the Ugandan infants were also faster to help an experimenter than the UK infants. Infants'

likelihood of helping did not differ across the type of interaction partner. However, more UK than Ugandan infants retrieved the object for their mothers in both the experimental and the control condition, suggesting that they might be less sensitive to their mothers' signals of need. These results suggest that the propensity to share was relatively similar in 18-month-old infants from two very different cultural backgrounds, however Ugandan infants were significantly more likely to help an adult than infants from the UK. Further investigations are necessary to understand what might lead to the differences and similarities observed between the UK and Ugandan samples in the present study.

2.2 Introduction

As outlined in chapter 1, humans show a variety of different cooperative and prosocial behaviours towards others, including strangers, which has likely been fundamental for the success of our species (Tomasello, 2009). This chapter focusses on sharing and helping as two fundamental types of prosocial behaviour. Even though the majority of human conflicts, be it between young siblings at home or on a larger geopolitical scale, revolve around the distribution of resources (Dunn, 1988; Rochat & Robbins, 2016), sharing valuable resources is also one of the key prosocial behaviours we engage in. On an individual level, adults do not only share resources generously amongst kin but are also willing to donate money to charity to help complete strangers. Moreover, in many modern human societies, the importance of sharing is also reflected in taxation and social security systems which aim to formalise equitable distributions of resources. Equally, helping others has benefits from an evolutionary, interpersonal, and societal perspective (Dahl, 2015). Given the fundamental importance of sharing and helping to successful social functioning in our species, understanding how these prosocial behaviours emerge during development is extremely important. It is vital that we understand how and when the cognitive and motivational abilities for fairness, sharing, and helping arise in development and whether they are associated with environmental factors. I shall start by considering what cognitive and motivational abilities are necessary for sharing to emerge and what is known about the developmental trajectory of sharing behaviours in infancy and early childhood, before turning my attention to helping later in the chapter.

2.2.1 Sharing

Cognitive Prerequisites for Sharing

In order to engage in sharing behaviour, two pivotal abilities are needed: (i) from a cognitive perspective, children need to be able to recognise unequal distributions and unmet material needs in others and (ii) from a motivational perspective, they need the motivation to alleviate this need in others and to overcome egocentric desires to keep resources for themselves (Dunfield, 2014; Gross et al., 2015).

Early in their second year of life, North American and European infants start to recognise inequality in resource distributions and show a preference for equal distributions. Looking

paradigms have revealed that 12- and 15-month-old infants seem to expect resources to be distributed equally when observing an actor allocate resources between two recipients (Schmidt & Sommerville, 2011; Ziv & Sommerville, 2017). By 16 months, infants prefer touching or interacting with agents who had previously allocated resources equally over agents who had allocated resources unequally and seem to expect other individuals to exhibit a similar preference (e.g., Burns & Sommerville, 2014; Geraci & Surian, 2011). Infants at this age have also been found to spontaneously reward actors whom they had observed distributing resources equally (Ziv et al., 2021). Slightly later, at 17 and 21 months, infants appear to expect resources to be distributed equally between two actors who did the same amount of work, but to expect resource distribution according to effort when one actor had contributed more to a task (Sloane et al., 2012; Wang & Henderson, 2018). Moreover, 25-month-olds have been found to preferentially help an individual who had previously distributed food resources equally between two puppets over an individual who had given all resources to one of the puppets (Surian & Franchin, 2017). This indicates that relatively early in their development, infants growing up in Western Educated Industrial Rich Democratic (WEIRD; Henrich et al., 2010) societies are able to recognise unequal distributions and have specific expectations about resource allocations when observing third-party interactions. Studies have also shown that early sensitivity to fairness correlates with infants‘ altruistic sharing behaviours at the same age (Schmidt & Sommerville, 2011; Sommerville et al., 2013), demonstrating the importance of this cognitive element of sharing to the development of the behaviour as a whole.

Whilst young infants seem sensitive to equal distributions, few studies have examined their understanding of unmet needs as a cognitive element independently from the motivation to alleviate it. Recognising unmet material needs in others when the infants themselves are part of the interaction and in control of the resources to be distributed or shared seems to be a challenge for infants. In a study by Brownell, Iesue, et al. (2013) with US-American infants, most 24-month-olds only shared after an adult experimenter had verbalised her desire for a toy while 18-month-olds primarily shared after having received an explicit request for a toy. This suggests that infants might require some sort of scaffolding in order to recognise unmet needs in others and that the intensity of scaffolding needed might decrease with age. When needs are made explicit through non-verbal cues like an

outstretched hand or verbal requests WEIRD infants have been found to share quite readily with others (e.g., Brownell et al., 2009; Dunfield et al., 2011; Schmidt & Sommerville, 2011). This could indicate that the motivation to share with direct interaction partners is present quite early in infancy. It is hard to rule out the possibility, however, that children at that age are simply complying with adult requests rather than sharing prosocially.

There is some indication that the tendency of infants to struggle with spontaneous sharing (i.e., without being explicitly scaffolded to share by an adult) may be largely driven by motivational rather than cognitive factors, as older linguistically competent children show an interesting dissociation between understanding others' needs and the motivation to alleviate that need. Smith et al. (2013) found that 3- to 8-year-old US-American children stated that they should share half of their rewards with another child, that other children should do so as well, and they predicted that another child would share equally with them. Before the age of seven, however, the same children did not engage in equal sharing but rather kept the majority of the rewards for themselves. This gap between the knowledge of what they ought to do and children's actual sharing behaviour could either indicate that they do not have the motivation to share or that they lack the self-regulation to overcome egocentric desires. In a study by Blake, Pivosan, et al. (2015), Italian children aged 7 to 12 showed a similar knowledge-behaviour-gap. In older children (> 9.5 years) the extent of dissociation between understanding and behaviour was mediated by self-regulation abilities. This suggests that self-regulation might play a role in dissociations between understanding others' needs and acting to alleviate that need.

To sum up, children start to develop the necessary abilities for sharing quite early in their development. It appears, however, that the interplay between their understanding of others' material needs and their motivation to alleviate these needs might be quite complex and that these abilities are not very easily studied in isolation. It is therefore also important to examine the development of children's sharing performances more holistically.

Naturalistic Observations of Sharing

In order to measure children's early sharing behaviour in a more holistic manner, one line of research has examined how infants behave in naturalistic interactions with one or multiple interaction partners (caregivers, unfamiliar adults, or peers). In these studies, infants are

typically provided with a number of age-appropriate toys and are then observed with regards to how often they give toys to their interaction partners during a set amount of time. The interaction partners' engagement with the infants can vary anywhere from only being responsive to infant-initiated interactions (e.g., Bretherton et al., 1981) to naturalistic play-sessions (e.g., Boundy et al., 2016).

These types of studies have shown that around their first birthday, children from WEIRD societies seem willing to spontaneously share toys during play sessions with their caregivers (e.g., Boundy et al., 2016; Bretherton et al., 1981; Hay, 1979; Rheingold et al., 1976). For instance, Boundy et al. (2016) found that 83% of the UK 10- to 13-month-olds in their study initiated instances of showing and giving toys to their mothers. The frequency at which infants spontaneously give objects to their caregivers has been observed to increase over the second year of life (e.g., Hay, 1979; Rheingold et al., 1976).

Twelve- to 24-month-old US-American children have also been found to share toys with strangers but to generally do so at lower rates than with their caregivers (Bretherton et al., 1981; Rheingold et al., 1976). Bretherton et al. (1981) found that infants' sharing rates with unfamiliar adults increased over the second year of life, too, but that they remain consistently lower than sharing rates with the infants' mothers.

Additionally, young children from the UK and the US have also been observed to spontaneously share with familiar and unfamiliar peers, even though they appear to do so at lower rates than with caregivers and unfamiliar adults (Hay, 2006; Hay et al., 1991). In a study by Hay et al. (1991), there was significant individual variation in the frequency of giving toys, but on average, 12- to 26-month-old children shared multiple times with two peers in a 20-minute-long session. Moreover, this study indicates that sharing with peers increases with age as 2-year-olds were more generous than 1-year-olds. Levitt et al. (1985), on the other hand, found no instances of spontaneous sharing between US-American children aged 29 to 36 months who were separated by a barrier. When their mothers asked them to share with the peer, however, 65% of the children complied. More research is needed to see if the lack of spontaneous sharing in this study might be a function of age, indicating that children get more possessive with peers as they approached the age of three, or if it had to do with the methodology of having a barrier between the children, which

might have meant that the child in control of the toys did not feel like they were part of an interaction with the peer.

Experimental Studies

Another avenue of studying sharing behaviour in infancy is conducting experimental studies in which children are given possession over a certain number of objects, typically toys or food, while an unfamiliar experimenter does not get anything. It is then observed whether the children give one or more of these objects to the experimenter who makes their desire for an object more or less explicit.

At 12 months, nearly half of the US-American infants in a study by Sommerville et al. (2013) shared a toy with an experimenter who gave repeated direct requests. The percentage of infants who shared increased to 68% for 15-month-olds tested in a very similar set-up (Schmidt & Sommerville, 2011). The sharing behaviour of 18-month-old North-American infants has been found to be quite variable across different experimental studies: In a study by Brownell, Iesue, et al. (2013), 29% of the 18-month-old US-American infants gave a toy to an experimenter who gave increasingly explicit cues (starting with sighing and looking sad and ending with a direct request for toys). In a different study by Brownell et al. (2009), US-American infants could allocate a snack to only themselves or one snack to themselves and one to an experimenter who stated their desire for food. Only 14% of the 18-month-olds chose the option in which they both received a piece of food. Dunfield et al. (2011), on the other hand, found that 42% of the 18-month-old Canadian infants in their study shared at least one of four crackers with an experimenter who held out their hand but did not verbalise their desire for food. The results of these studies indicate that there is a lot of variability in the likelihood of sharing at 18 months. Further investigations are needed to understand to what extent different methodologies (e.g., the specific cues given to the infants or the amount of food or toys available) drive this variability.

As infants get older, their likelihood of sharing has been found to increase: Compared to 18-month-olds, North American 24- to 30-month-olds were more likely to share with an experimenter and did so after receiving fewer cues (e.g., Brownell, Iesue, et al., 2013; Brownell et al., 2009; Dunfield et al., 2011; Svetlova et al., 2010). For instance, in the study

by Brownell, Iesue, et al. (2013) 76% of 24-month-olds shared a toy and in the study by Dunfield et al. (2011), 54% of 24-month-olds shared food with the experimenter.

Some experimental studies have also been conducted with pairs of same-aged children in which one child receives three toys via a study apparatus while the other child receives just one. Sharing rates in these studies are determined by observing whether the child who receives more equalizes and gives a toy to their "unlucky" peer. The sharing rates of German 24-month-olds in studies by Hamann et al. (2011) and Ulber et al. (2015) appear to be somewhat reduced compared to the studies with adults mentioned above. Further research is needed, however, to understand whether this is due to a reduced willingness to share with peers or if it might be caused by methodological differences between the two types of studies.

To sum up, the studies outlined here indicate that one important factor influencing sharing in infancy is the identity of the recipient: In naturalistic studies, sharing rates are highest with the caregiver and decrease for unfamiliar adults and even further for peers. In experimental studies, infants appear to be more likely to share with unfamiliar adults than with peers. But even within studies that hold the identity of the interaction partner consistent, considerable differences in infant sharing have been found. This suggests that there are other factors impacting early sharing behaviour as well.

Factors that Influence the Likelihood or Rate of Infant Sharing

Another important aspect that varied across the studies reviewed above is how explicit the recipient made their desire for the objects in the infant's possession. As indicated above, experimental studies in which more explicit cues, like holding out a hand or asking for toys/snack, were given (e.g., Brownell, Iesue, et al., 2013; Dunfield et al., 2011; Pettygrove et al., 2013; Sommerville et al., 2013) have revealed higher likelihoods of sharing than studies with more subtle cues (e.g., Brownell et al., 2009; Dunfield & Kuhlmeier, 2013). Studies that directly examined the influence of requesting on early sharing found that direct requests increased sharing with experimenters and mothers for North-American 12- and 18-month-olds but not for 15-month-olds (Hay & Murray, 1982; Rheingold et al., 1976). Thus, the way recipients indicate their desire and need for objects seems to influence sharing

behaviour in infancy, but more studies should specifically investigate this influence and how it might develop with age.

One other potential factor that may influence an infant's propensity to share might be how costly sharing is for the infants. Sharing rates could be influenced by whether infants have to give up resources in order for their interaction partner to receive some, by how many objects are available, and by the kind of objects to be shared. The vast majority of studies examining sharing behaviour in infancy so far have looked at situations in which infants needed to give up toys or food in order to share. Brownell et al. (2009), however, tested infants' sharing behaviour in an experimental set-up in which allocating food to an experimenter did not involve a cost for the infant. They did not observe higher sharing rates than those found in other studies. However, as their study also varied in other important aspects, for instance, in that the experimenter only voiced her desire for food but never made any direct gestural or verbal requests, more research specifically investigating the influence of having to give up resources on sharing behaviour in infancy is needed. Hay et al. (1991) observed that the number of available toys to 12- to 26-month-olds influenced their sharing behaviour with peers but the direction of this effect varied with contextual factors, indicating that more research is needed to fully understand whether having more resources supports more generous behaviour in infants. A handful of studies with North-American infants have examined whether the type of object to be shared might influence sharing rates but their results have been mixed: Rheingold et al. (1976) found significant differences in the frequency at which 18-month-olds spontaneously gave different kinds of toys to their mothers, with animate objects like dolls or animals being shared more often than, for example, vehicles or domestic items. Dunfield and Kuhlmeier (2013), on the other hand, found 36-month-olds to share two different kinds of rewards, stickers and food, at equal rates. In studies in which infants were first asked to indicate a preference for one of two toys and then prompted to share either of the two toys, about half of the 12- and 15-month-olds who shared gave their preferred toy while the other half gave their unpreferred toy (Schmidt & Sommerville, 2011; Sommerville et al., 2013). This suggests that at certain ages or under certain circumstances, infants' sharing behaviour might be influenced by the types of objects to be shared but further research on this topic is needed.

Another methodological factor that appears to influence sharing in some studies is providing infants with subtle cues of possession. In experimental peer studies by Hamann et al. (2011) and Ulber et al. (2015), 24-month-old German infants shared more with their peer if half of the rewards were associated with each child, either through colour or location cues. Brownell, Iesue, et al. (2013), on the other hand, who first distributed toys equally between an experimenter and a child and then gave all toys to the child, did not find that the 18- and 24-month-old infants in their study differentiated between the toys who had previously been given to them or the experimenter when sharing with the experimenter. Future research should investigate whether subtle cues of possession only increase sharing rates with peers or whether the initial allocation of toys to the child and the experimenter in the study by Brownell, Iesue, et al. (2013) was not a strong enough indicator of possession.

As children age and enter early childhood, factors that started influencing sharing behaviour in infancy continue to do so and even more aspects become relevant: The cost of sharing, for instance, becomes a more prominent factor for sharing behaviour, as 3- to 6-year-olds from WEIRD backgrounds have been found to be consistently more generous in their resource allocation when it is not associated with a cost for themselves than when they have to give up rewards (e.g., Fehr et al., 2008; Paulus & Moore, 2014; Thompson et al., 1997). House et al. (2013) also observed this pattern of behaviour in children from Non-WEIRD backgrounds but the age at which children's sharing rates started to be influenced by whether sharing was costly or not seemed to differ between cultures. The influence of the type or value of an object to be shared on children's sharing behaviour during early childhood remains unclear, with some studies finding higher sharing rates for certain items, while others have not found the value of a reward to be correlated with sharing behaviour (e.g., Birch & Billman, 1986; Rao & Stewart, 1999; Robbins et al., 2016; Rochat et al., 2009; Warneken et al., 2011).

Another factor that starts becoming relevant for sharing for children at around 3 years of age seems to be the way in which children receive the objects to be shared. German 3-year-olds have been found to share more with a peer after having received resources through collaboration rather than through parallel work or windfall scenarios (e.g., Hamann et al., 2014; Hamann et al., 2011; Warneken et al., 2011). From 3 years of age onwards, sharing becomes also more contingent on the relationship with the recipient, as children start

sharing more with friends than with acquaintances or disliked peers (e.g., Birch & Billman, 1986; Moore, 2009). However, children from different cultural backgrounds seem to differ in the age of emergence of this behaviour (e.g., Scharpf et al., 2017). Children's sharing decisions also start to be influenced by other characteristics of the recipient, like need or merit - a tendency that has been found to increase with age (e.g., Baumard et al., 2012; Damon, 1977; Hook & Cook, 1979; Huppert et al., 2019). Considering merit and need, however, seems to be influenced by cultural norms regarding resource distributions and appear to not develop uniformly across children from different cultural backgrounds (e.g., Huppert et al., 2019; Schäfer et al., 2015).

Characteristics of the children themselves also appear to impact their sharing behaviour: For instance, more advanced theory of mind skills have been found to be associated with higher generosity in early and middle childhood (e.g., Cowell et al., 2017; Kogut et al., 2015; Robbins et al., 2016; Vonk et al., 2018; Yu et al., 2016), even though this has not been found in all studies examining this relationship, or for all types of sharing (e.g., Rochat et al., 2009; Yu et al., 2016). Other individual factors, like children's attachment security (Beier et al., 2019; Paulus et al., 2015), ownership understanding (e.g., Brownell, Iesue, et al., 2013), emotional responsiveness (Rajhans et al., 2016), and executive functions (Cowell et al., 2017) have also been linked to their sharing behaviour.

Thus, children have been found to start sharing toys and food with different recipients early in their second year of life. Sharing rates appear to generally increase throughout infancy and early childhood but seem to be quite variable and to depend on different situational factors as well as characteristics of the recipients and the children themselves.

Cross-Cultural Research on Sharing

It is important to note that the conclusions I have drawn from the available literature on the development of early sharing and fairness is overwhelmingly based on children from WEIRD societies. As detailed in chapter 1, it is possible that we are currently still underestimating how variable early sharing might be, given the pervasive WEIRD sampling bias in the current literature. To my knowledge, so far, no studies have examined potential cross-cultural differences in sharing behaviour during infancy. Studies with older children and adults from various different cultural backgrounds have, however, revealed much bigger variations in

behaviours related to fairness and sharing than studies that only include WEIRD subjects (e.g., Cowell et al., 2017; Henrich et al., 2005; Rochat et al., 2009). Our understanding of cultural effects on early sharing and the variability associated with them remains limited to date. In addition, we are still not clear about the ages at which cross-cultural differences in sharing emerge. Some studies have found cross-cultural differences at relatively early ages, suggesting that these might start to emerge early in development: Rochat et al. (2009), for instance, found 3- to 5-year old children from Peru, Fiji, and China to be more generous towards an experimenter than children from the United States or disadvantaged children from Brazil. Rao and Stewart (1999) found Chinese and Indian 4-year-olds to share more food with peers than American children of a similar age in a study by Birch and Billman (1986). Moreover, Blake, McAuliffe, et al. (2015) found that North-American children rejected unequal food allocations that were disadvantageous for themselves at an earlier age than, for instance, children from Mexico or Senegal. Other studies, however, have indicated that cross-cultural differences in sharing behaviour only emerge later in development, which could suggest that sharing rates in infancy might be similar across different cultures or that it might depend on what kind of sharing situation the children are facing: Cowell et al. (2017), for example, found that levels of generosity in children from five different countries were fairly similar at the ages 5 to 6 and that they only started to diverge more distinctly between the ages of 7 and 10. Similarly, Huppert et al. (2019) compared the sharing behaviours of children from individualistic and collectivist cultures, and found similarities in the behaviour of 4- and 5-year-olds, while differences in resource allocation decisions only emerged at the age of 6. Blake, McAuliffe, et al. (2015) also found that when faced with an unequal allocation of food that was advantageous for themselves, children from seven diverse cultural settings behaved relatively similarly during early childhood, but as they entered pre-adolescence, children from two North-American settings and from Uganda started to reject these advantageous allocations of food while children from other Non-WEIRD settings did not. Moreover, House et al. (2013) also only found differences in sharing behaviour between children from six societies in middle childhood. They observed that as children aged, their sharing behaviour increasingly resembled that of adults in their society, suggesting that different societal norms on resource distribution start shaping the children's behaviour at that age. Thus, the age of emergence of cross-cultural differences in sharing behaviour remains unclear to date and investigations of the sharing behaviour in

infants from different cultural backgrounds are needed in order to understand more about this, as well as to provide a more accurate estimate of variability of early sharing rates.

Variation in infant sharing rates across different cultural contexts is most likely if the emergence of sharing is sensitive to early socialisation and other environmental factors. Some studies have examined the association between infants' sharing behaviour and their early social environment and experiences, but so far, this has only been done with infants from rather homogeneous cultural backgrounds: Gross et al. (2015), for instance, did not find a connection between the sharing rates of 18- to 30-month-old North-American infants and their parents' self-reported socialisation practices related to prosocial behaviour. A study by Pettygrove et al. (2013) looked at associations between maternal socialisation techniques during a clean-up episode and 18- to 30-month-old US-American infants sharing behaviours. They found spontaneous sharing to be negatively related with maternal reasoning (e.g., explaining the clean-up situation to the infant) but no further associations with other socialisation techniques. Brownell, Svetlova, et al. (2013), on the other hand, found that North-American parents who more often elicited emotional talk from their children during a joint book reading activity had children who shared more frequently and more spontaneously with an experimenter. Hence, some aspects of parental socialisation might have an influence on sharing behaviour in infancy while others that have been studied appear not to. But as these studies have so far only examined these associations within WEIRD societies where the variation in socialisation practices will be more limited than when studying this cross-culturally, we might have missed relevant factors for the development of sharing behaviour.

Thus, the focus on WEIRD children in previous research, especially in infancy, might have obscured variations in the development of early sharing behaviour that can only be revealed by cross-cultural work. To date, it remains unclear, for example, whether early sharing emerges uniformly in infants from different cultural groups despite the different environments they may be developing within.

2.2.2 Instrumental Helping

In a similar way to sharing, the development of early helping behaviour has received considerable research effort in recent years (e.g., Martin & Olson, 2015; Paulus, 2020;

Svetlova et al., 2010; Warneken & Tomasello, 2006). There are a number of different types of helping, such as empathic and altruistic helping (e.g., Svetlova et al., 2010), informing (e.g., Liszkowski et al., 2008), and social helping (e.g., Beier et al., 2014), but the type of helping that has received the most attention in the developmental literature so far, and that I will focus on in this chapter, is instrumental helping. Instrumental helping has been defined as actions intended to facilitate the acquisition of another individual's goal by acting on their behalf (e.g., Dahl, 2015; Rheingold, 1982; Warneken & Tomasello, 2006). For an infant's behaviour to be considered instrumental helping, they do not need to actually be helpful, however, as their intention to assist another is considered sufficient (Eisenberg et al., 2007; Giner Torréns et al., 2021). Studying instrumental helping is a promising way of better understanding prosocial behaviour as it has been observed to be one of the earliest forms of prosociality to emerge in the human development (Dunfield, 2014). Infants have been found to try to help their caregivers in everyday life, appearing to be highly motivated to help others achieve their goals in a variety of different situations (e.g., Dahl, 2015; Grusec, 1991; Rheingold, 1982).

Cognitive Prerequisites for Helping

In order to help another individual reach their goals, a helper does, however, not only need to be motivated to act on behalf of the other person. They also need the cognitive ability to both understand the intended but unachieved goal and to identify effective ways of acting that will allow the recipient to achieve it (Dunfield, 2014; Warneken & Tomasello, 2006). Previous research suggests that infants develop the ability to understand the behaviour of other individuals in terms of their underlying intentions and goals early on: For instance, by 6 months, US-American infants show signs of understanding actions performed by human agents but not by inanimate objects to be goal- or object-directed (Woodward, 1998). Moreover, German 9-month-old infants have been found to exhibit more patience towards interaction partners who are unable rather than unwilling to share with them (Behne et al., 2005). Looking time paradigms have revealed that 9-month-old German and 10-month-old Japanese infants appear to expect an agent to help a character who is unable to reach an object rather than a character who does not require help, indicating that by this age, infants can identify characters in need of help, at least in out-of-reach scenarios (Köster et al., 2019; Köster, Ohmer, et al., 2016). Another indicator of infants' growing understanding of others'

intentions is that by 14 months, infants have been found to preferentially imitate purposeful rather than unintentional acts (Carpenter et al., 1998). Additionally, 15-month-old infants from different cultural backgrounds have been shown to infer what somebody has been unsuccessfully trying to do by subsequently performing these actions without having witnessed the intended outcome before (e.g., Bellagamba & Tomasello, 1999; Callaghan et al., 2011; Meltzoff, 1995). Thus, children seem to acquire the cognitive skills necessary to identify others' needs and goals, which are in turn crucial for effectively helping others instrumentally, in their first two years of life.

Research Approaches

In order to find out at which point in their development children acquire the ability to instrumentally help others and to understand how this behaviour subsequently develops over time, two broader types of approaches can be taken: On one hand, researchers have observed children in their natural environment or interviewed parents about their children's helping behaviour in everyday life. On the other hand, many studies on instrumental helping have been conducted in laboratory settings trying to control for potentially confounding factors that may be present in more natural situations. While observational studies are useful for capturing complex, natural occurrences of early helping and for getting an idea of parental and cultural influences, studies in the lab can give us a clearer picture of early helping under specific conditions. I will now consider what these two approaches have discovered about the development of early instrumental helping, starting with naturalistic observations.

Naturalistic Observation or Parental Report

Naturalistic observation studies suggest that helping starts to emerge in everyday life at about 12 months of age. For example, Hammond et al. (2017) asked Canadian parents about the earliest occurrences of helping that they had observed in their 12- to 48-month-old children. They found that, on average, parents remembered helping behaviours to first appear around their infant's first birthday. Moreover, US-American parents in a study by Hammond and Brownell (2018) reported that their 12- to 59-month-olds participated in everyday household chores, such as tidying up their toys or throwing away trash, and that the number of different chores that their children tried to help with increased with age.

Similarly, when observing US middle-class families at home, Dahl (2015) found that helping behaviour was already present in 13-month-old infants and that it significantly increased during the second year of life. In the same study, Dahl (2015) also interviewed mothers of 11- to 25-month-old US-American infants, revealing that 89.40% of them reported that their infant having recently tried to help them in everyday life. Peruvian, Indian, and Canadian mothers in a study by Callaghan et al. (2011) reported that their infants started helping with household chores between the ages of 14 and 17 months. These results indicate that helping behaviours towards caregivers in everyday life situations emerge early in the second year of life and then increase in frequency and variety as infants get older.

Studies examining infants' early helping behaviour in naturalistic situations with adults who are not their caregivers have so far been quite rare. Rheingold (1982) conducted a study that took place in a laboratory setting but aimed at simulating a home environment. In the first part of the study, 18- to 36-month-old North-American infants and one of their parents encountered a variety of unfinished chore-like tasks. All infants were found to participate in at least some of these tasks when their parent performed them, with the older infants helping in a larger variety of tasks than the younger infants. In the second part of the study by Rheingold (1982), the same infants saw an unfamiliar experimenter who engaged in different household chores, such as putting away groceries. The vast majority of infants helped the unfamiliar person in one or more of these tasks, which suggests that, at least from 18 months onwards, infants are capable and motivated to not only assist their caregivers but also unfamiliar adults in chore-like tasks.

While infants appear to be relatively eager to help their caregivers and other adults early in their development, naturalistic helping behaviour towards peers appears to occur less frequently. When playing with an unfamiliar peer, only 7% of the 24- to 36-month-old UK infants in a study by Ensor et al. (2011) showed helping behaviour towards the other child. Fujisawa et al. (2008) found evidence of helping behaviour in Japanese 44- and 55-month-olds interactions with peers, but the rate at which these behaviours occurred were relatively low as well. Whether this is due to young children being less motivated to help their peers or to the fact that, in naturalistic interactions, peers might provide young children with less opportunities to help them than adults requires further investigation.

Interviewing parents about their infants' helping behaviours or observing children in naturalistic interactions are useful approaches for identifying the age at which children start to help others in everyday life and the types of situations in which they attempt to be helpful. It is, however, difficult to know how reliable parental reports truly are. For instance, when Hammond et al. (2017) asked parents of 12- to 48-month-old children at which age they had first observed helping in their children, they found that parents of older children were more likely to report a later age of emergence of everyday helping. This suggests that parental reports can be affected by memory issues. It is also possible that parents may be susceptible to social desirability biases in that they might over-report desirable behaviours, such as being helpful, because they would like to present themselves and their children in a positive light. Naturalistic observations can also be biased, insofar that the infants' behaviours are contingent on the behaviour of other individuals. If one infant is given more opportunities to help or is scaffolded more strongly to assist by their caregiver than other infants, it might become difficult to compare the rates at which these infants help. It is, therefore, also important to examine helping behaviour in more controlled settings where all children receive the same number of opportunities and the same amount of prompting to help. Experimental studies conducted in the laboratory are a helpful way of comparing infants' helping behaviour at different ages or across different situations.

Experimental Approaches

A typical scenario used to assess early helping in controlled experimental settings is the following: The child witnesses an adult experimenter accidentally drop an object and then unsuccessfully reach for it while giving a predetermined series of cues. These cues typically consist of first looking at the out-of-reach object and then generally involve some form of communication, such as looking at the child, verbalising the problem, and/or directly asking the child for help. The number, duration, and intensity of cues varies across studies. Before their first birthday, infants' helping rates in these types of situations have been found to be quite low (e.g., Köster et al., 2019; Köster, Ohmer, et al., 2016). By 12 to 14 months, however, a considerable number of German and US-American infants have been found to help an experimenter by picking up the out-of-reach object and handing it to them (e.g., Sommerville et al., 2013; Warneken & Tomasello, 2007). This age of emergence in experimental studies is in line with what has been reported in more naturalistic

observational and interview studies (e.g., Dahl, 2015; Hammond et al., 2017). The results of experimental studies also mirror those of naturalistic studies in terms of showing that infants become more likely to help others as they get older: Helping rates towards an experimenter have been found to generally increase with age, particularly in studies that assess multiple age-groups with the same paradigm, but helping rates are quite variable across different studies. Table 2.1 illustrates these trends by presenting a selection of studies that report the percentage of infants helping in a single out-of-reach trial.

Table 2.1

Percentage of infants who helped an experimenter in a single experimental out-of-reach trial presented by age in months

Age	Rate	Country	Operationalisation of helping	Study
12m	60%	USA	Retrieving an out-of-reach ball for an experimenter	Sommerville et al. (2013)
17m	36%[1]	USA	Retrieving an out-of-reach beanbag for one of two experimenters	Dahl et al. (2013)
18m	~52%[2]	Germany	Retrieving an out-of-reach pen for an experimenter	Giner Torréns and Kärtner (2017)
	~70%[2]	India	Retrieving an out-of-reach pen for an experimenter	Giner Torréns and Kärtner (2017)
18m	57%	USA	Picking up at least one out of six wooden out-of-reach sticks for an experimenter	Pettygrove et al. (2013)
20m	77%	Italy	Retrieving an out-of-reach ball for one of two experimenters	Surian and Franchin (2017)
21m	67 - 80%	Canada	Retrieving an out-of-reach toy for one of two experimenters	Dunfield and Kuhlmeier (2010)
22m	43%[1]	USA	Retrieving an out-of-reach beanbag for one of two experimenters	Dahl et al. (2013)
26m	43%[1]	USA	Retrieving an out-of-reach beanbag for one of two experimenters	Dahl et al. (2013)

Age	Rate	Country	Operationalisation of helping	Study
30m	91%	USA	Picking up at least one out of six wooden out-of-reach sticks for an experimenter	Pettygrove et al. (2013)
	73%	Italy	Retrieving an out-of-reach ball for one of two experimenters	Surian and Franchin (2017)
36m	91%	USA	Retrieving an out-of-reach pen for an experimenter	Beier et al. (2014)

[1] Infants participated in multiple trials but helping rates are only reported for their behaviour on the first trial

[2] Percentages reported from figure

The variability in helping rates found across different experimental studies could be due to cultural or socialisation differences between certain study populations. Alternatively, it could be caused by methodological differences between the studies. One important methodological point to consider is whether or not the infants in a particular study retrieve an out-of-reach object because they understand the experimenter's need for help. To control for this, a study by Warneken and Tomasello (2007), for instance, included both experimental trials in which an experimenter gave cues indicating their need for help to reach an "accidentally" dropped object, and control trials, in which the experimenter purposefully threw the object to the floor and did not reach for it. The 14-month-old German infants in their study retrieved the objects in control trials significantly less than in experimental trials. The inclusion of a control trial is crucial for inferring that children helped in the experimental trials because they understood and acted on the adult's instrumental need and helps rule out alternative explanations for their behaviour, such as enjoyment of or prior reinforcement for retrieving objects. Control trials have, however, not been included in a large number of recent studies on early helping (e.g., Giner Torréns & Kärtner, 2017; Grossmann et al., 2020). Table 2.2 presents the helping rates found in two studies that included an experimental and a control condition and reported helping rates for a single trial each, adding further variability to the likelihood of infants helping in an out-of-reach task when 18 and 24 months old (see Table 2.1 and Table 2.2).

Table 2.2

Percentage of infants who helped an experimenter in a single experimental out-of-reach trial compared to their helping behaviour in a single control trial, presented by age in months

Age	Rate	Country	Operationalisation of helping	Study
18m	41%	Germany	Retrieving an out-of-reach object for an experimenter in the experimental condition but not in the control condition	Paulus et al. (2013)
	Exp: 33% Con: 4%	Canada	Retrieving an out-of-reach toy for an experimenter	Dunfield et al. (2011)
24m	Exp: 50% Con: 0%	Canada	Retrieving an out-of-reach toy for an experimenter	Dunfield et al. (2011)

Note. Exp = Experimental condition, Con = Control condition

While 14-month-olds help by giving back out-of-reach objects, there are indications that this may not generalise to other situations where help is needed. For instance, Warneken and Tomasello (2007) found that 14-month-old infants do not help when an adult is unable to overcome a physical obstacle or uses the wrong means to achieve their goal. In these situations, the adult's goals and possible effective interventions might be too complex for children of that age to understand. Eighteen-month-olds, on the other hand, seem to have developed the cognitive skills necessary for understanding more complex situations. At 18 months, infants from different cultural backgrounds, such as Germany, India, and Peru, have been found to spontaneously help by not only picking up objects but also by, for example, opening the doors of a cabinet for an adult whose hands are full or by stacking books for an adult who has unsuccessfully tried to do so before (e.g., Callaghan et al., 2011; Warneken & Tomasello, 2006).

In order to identify need for help, 18-month-olds still seem to rely on clear cues, such as reaching gestures or comments that spell out the problem (e.g., "It does not open!"; Svetlova et al., 2010; Warneken et al., 2007). Only as they get older and pass their second birthday, do children become more proficient at understanding others' needs. In a study by

Warneken (2013), for instance, 25- to 30-month old US-American infants picked up objects even when the adult who had dropped them was still unaware of the problem, hence had not given any communicative or behavioural cues. Likewise, 30-month-olds from the US have been found to need significantly less verbal and behavioural cues than 18-month-olds in order to help an adult experimenter (e.g., Drummond et al., 2014; Pettygrove et al., 2013; Svetlova et al., 2010). Parental behaviour has been shown to mirror these steps in cognitive development as parents seem to adapt the cues they give to their infants depending on the children's ages: When trying to get their infants to help them, parents of 18-month-olds have been observed to make more specific, action-oriented requests (e.g., "Get a clip"), whereas parents of 24-month-olds gave more abstract, need-oriented messages (e.g., "This is so much work"; Waugh et al., 2015).

The vast majority of experimental studies on early instrumental helping so far have been conducted with an adult experimenter as the potential recipient of help. Experimental studies that assess infants' helping behaviours towards other individuals, on the other hand, have been very rare so far. To my knowledge, infants' instrumental helping towards a caregiver has, to date, only been examined in one experimental study, which has not yet been published in a peer-reviewed journal: Baldwin et al. (2020) tested 18- and 30-month-old US-American infants' instrumental helping behaviour towards a caregiver and an unfamiliar experimenter. At both ages, the infants received higher helping scores in trials with their mothers than in trials with an unfamiliar adult, indicating that instrumental helping towards caregivers can also be found in controlled, standardised settings and might occur at higher levels than towards unfamiliar experimenters.

Instrumentally helping a peer has received slightly more attention in previous research: In a study by Hepach, Kante, et al. (2017), for instance, approximately half of the 18- and 30-month old German infants helped an unfamiliar peer by retrieving an out-of-reach object for them. When directly comparing helping behaviour towards unfamiliar peers and unfamiliar adults in the same task, Ulber and Tomasello (2020) found that 75% of the German 26- to 46-month-olds they tested helped a peer to open a locked box while only 42% of them helped if their partner was an adult. These findings suggest that when given the opportunity to instrumentally help a peer, young children do so and that this becomes more robust with age.

To conclude, both observational and experimental studies have shown that children acquire the ability to help other people with the accomplishment of their goals around their first birthday and that their helping behaviour becomes more frequent and more elaborate during infancy and beyond. Some of the studies outlined above also indicate that the identity of the recipient can influence helping rates. In naturalistic studies, helping rates towards caregivers and unfamiliar adults have been found to be much higher than those towards peers, while in experimental studies that directly compared helping rates towards different recipients, young children appeared to help their caregivers and peers more than unfamiliar adults. However, as the vast majority of naturalistic studies have examined instrumental helping towards caregivers while most experimental studies have investigated helping towards unfamiliar adults, further investigations are necessary to understand more about how helping behaviours might differ towards different kinds of recipients.

Factors that Influence the Likelihood or Rate of Infant Helping

Besides the identity of the potential recipient of help, there are other characteristics of the recipient as well as situational circumstances that might also increase or decrease infants' willingness and ability to help. Research in the past few years has aimed to identify factors that might influence infants' helping behaviour, such as the degree of familiarity or previous interactions between the infant and the recipient, the costs of helping, and characteristics of the infants themselves. I will now briefly outline the evidence for each of these factors.

Firstly, whether or not an infant has previously interacted with a particular individual appears to impact their helping behaviour towards that individual, as German 16-month-old and Australian 18- to 36-month-old infants have been found to show higher helping rates towards experimenters with whom they had previously played than towards completely unfamiliar experimenters (Allen et al., 2018; Schuhmacher et al., 2019). In a study by Hepach, Haberl, et al. (2017) on the other hand, German 18-month-olds helped unfamiliar and familiar experimenters at similar rates. This suggests that in some – but not all – cases, being familiar with a potential recipient of help can increase infants' likelihood of helping. The circumstances under which familiarity with a person in need of help might impact early helping behaviour requires further investigation though.

It is, however, not only the degree of familiarity between an infant and their experimenter that can impact the infant's helping behaviour, but also the kind of interaction that the infant and the experimenter previously engaged in. In a study by Barragan and Dweck (2014), 1- to 2-year old infants from the US helped experimenters with whom they had previously engaged in reciprocal play more frequently than experimenters who had engaged in parallel play or no play at all. Moreover, 14-month-old Canadian infants have been found to be significantly more likely to help experimenters who had previously moved synchronously rather than asynchronously with them (Cirelli et al., 2014), and 18-month-old German infants in a study by Buren et al. (2019) were more helpful towards an experimenter with whom they had previously engaged in joint music making than towards an experimenter with whom they had previously looked at a book. The fact that infants help more after engaging in certain joint activities with an experimenter could be due to the fact that these activities lead the infants to like their experimenters better and therefore subsequently help them more. It could also be that these activities establish a cooperative framework in which the experimenter and infant are interacting. Supporting this suggestion, it seems that relatively indirect indications of cooperative settings can increase helping as well. For example, infants have also been found to be more helpful after being mimicked – both towards the mimicker and towards a different experimenter (Carpenter et al., 2013) and after having been shown affiliative primes (Over & Carpenter, 2009).

In a similar vein, whether or not a recipient has previously behaved cooperatively towards a third party or towards the infants themselves has also been found to influence infants' helping behaviour: In a study by Dahl et al. (2013), 17- to 27-month-olds from the US were given multiple occasions to either help an adult who had previously been uncooperative or one who had played cooperatively with another adult. While the younger infants in this sample generally helped both adults, the children in the eldest age group (25-27 months), showed a preference for helping the cooperative agent. Similarly, Surian and Franchin (2017) found 25-month-old Italian infants to be more likely to help an experimenter who had previously distributed resources equally between two puppets than an experimenter who had distributed resources unequally. Vaish et al. (2010) observed that 35- to 38-month-old German infants helped a neutral adult more than an individual who had intentionally harmed a third party or had expressed the intention to do so. However, most children also

helped the harmful actor when given the chance to subsequently help again. This indicates that before their second birthday, infants might help experimenters irrespective of their previous behaviour in third-party-interactions. Older infants, on the other hand, seem more likely to base their decision to help others on previous social interactions that they witnessed, at least in forced-choice situations in which they have to decide whom of two individuals they want to help first. If they are given multiple occasions to help, however, they also appear to help both formerly selfish and prosocial individuals.

Evidence on whether infants' helping behaviour is affected by a recipient's direct previous prosocial behaviour towards the infants themselves has been mixed: On the one hand, in a forced-choice paradigm, 21-month-old Canadian infants have been shown to preferentially help an experimenter who had previously shared with them or tried to unsuccessfully share rather than an experimenter who had demonstrated no intention to share with them at all (Dunfield & Kuhlmeier, 2010). Similarly, in an observational study, Fujisawa et al. (2008) detected a weak but significant correlation between the frequencies of helping and receiving help that occurred in free-play interactions between Japanese pre-schoolers (mean ages 44 months and 55 months), even when controlling for friendship and affiliation. Warneken and Tomasello (2013a), on the other hand, reported that almost all of the German 28- to 32- and 40- to 44-month-olds in their study helped an experimenter, irrespective of whether or not the experimenter had previously helped the children. These findings suggest that young children possess a strong propensity to help any individual who is in need. However, when they are forced to choose between two competing potential recipients of help, young children appear to prefer to help those who had previously shown cooperative behaviours towards them.

Apart from previous behaviours of the recipient, another factor that may influence infants' propensity to help others is how costly helping is for the infant. Are infants still prepared to help when it involves difficulties or inconveniences for them? Warneken et al. (2007) found that having to get over an array of obstacles in order to arrive at an out-of-reach-object did not change the rates at which German 18-month-olds picked up the objects and handed it back to an experimenter. It remains questionable, however, whether children considered climbing over an obstacle course as actually costly or rather as fun. When the costs of helping were raised by differences in how much the out-of-reach-objects weighed, however,

US-American 18-month-olds have been found to help an experimenter significantly less when they needed to carry a heavy block that they were just able to lift as compared to a block they could comfortably carry (Sommerville et al., 2018). In addition to making helping physically effortful, the costs of helping can be increased by engaging children in an alternative activity which they then have to abandon in order to help. Studies have shown that 18- to 24-month-old infants from Germany and India who were playing individually with attractive distractor toys helped an adult to reach an object at similar rates as children who were not engaged in another activity - even though helping meant having to abandon the toy (Giner Torréns & Kärtner, 2017; Warneken & Tomasello, 2008, 2013b). However, when playing socially with another experimenter, German and Indian 18-month-olds showed significantly less helping behaviour than when they were playing alone or not playing at all (Giner Torréns & Kärtner, 2017). This indicates that being involved in an attractive play interaction can raise the costs of helping to a level where infants are less prepared to engage in it. Thus, when costs are slightly raised, infants will still readily help an adult in need. Only a considerable rise in costs will lead to decreased helping rates. This highlights the high motivation for helping that infants seem to possess and suggests that they might find the action of helping itself joyful or rewarding (Paulus & Moore, 2014; Warneken & Tomasello, 2009a).

Lastly, early helping behaviour can also be influenced by characteristics of the infants themselves: For instance, positive associations have been revealed between infants' instrumental helping and their fine and gross motor skills (Schuhmacher et al., 2019; Sommerville et al., 2018), their attachment security (Beier et al., 2019), their joint attention skills (Kärtner et al., 2014), and the amount of attention that they pay to fearful faces (Grossmann et al., 2018). Moreover, 18-month-old infants with greater inhibitory control have been found to help less frequently than infants with lower inhibitory control (Grossmann et al., 2020). Evidence concerning a link between infants' sociability and their helping behaviour have been mixed so far, as Hammond and Carpendale (2015) observed a positive association, while Grossmann et al. (2020) found no significant association. Taken together, these studies indicate that different aspects of infants' cognitive, motor, and social development might influence their early helping behaviour but that further research might be needed to more fully understand some of these associations.

To sum up, previous research based mainly on Western Educated Industrialised Rich Democratic (WEIRD; Henrich et al., 2010) populations indicates that young children are generally highly motivated to help others in both naturalistic contexts and laboratory settings. Their helping rates can be quite variable across studies, however, depending on a variety of different situational factors, previous experiences that the infants made with the recipient of help as well as characteristics of the infants themselves.

Cross-Cultural Research on Early Instrumental Helping

As the vast majority of studies on early instrumental helping have been conducted with infants from WEIRD societies, it is difficult to know whether the patterns observed in WEIRD cultures are representative of robust developmental processes that occur across different cultures and societies, or whether these are specific to WEIRD populations and that we therefore might have underestimated the true extent of variability in early helping behaviour in humans (e.g., Nielsen et al., 2017; see chapter 1). To date, only a small number of studies have compared early instrumental helping rates across WEIRD and Non-WEIRD societies, and this limited number of comparisons have revealed mixed results. Some studies suggest slightly different ages of onset and developmental trajectories for children from different cultural contexts, whilst others find no cultural differences. For instance, Giner Torréns and Kärtner (2017), found significant differences in the helping rates of German and Indian 18-month-olds, with more Indian than German infants helping an experimenter retrieve an out-of-reach object, regardless of the amount and type of distraction the infants had to overcome in order to help. Callaghan et al. (2011), on the other hand, reported similar frequencies of help for Canadian, Indian, and Peruvian 18-month-olds towards an experimenter in multiple different instrumental helping tasks. The 24-month-old infants in their study did, however, differ in the number of trials in which they helped: Canadian 24-month-olds assisted the experimenter more often than the Indian and Peruvian infants did. A study by Köster, Cavalcante, et al. (2016), again revealed similar levels of helping in 18- to 30-month-old infants from urban Germany, urban Brazil, and rural Brazil, when helping consisted of picking up out-of-reach objects for an experimenter. In a task where the infants' mothers asked them to get different objects from across the room and place them on a table, on the other hand, helping rates were higher for the German infants than for the infants from both Brazilian samples. Whether the different patterns of

results across the two helping tasks found by Köster, Cavalcante, et al. (2016) are due to the slightly different nature of the two tasks or due to the fact that they were performed by different recipients of help (the mother versus a less familiar experimenter) remains unclear and requires further investigation. Overall, these studies suggest that infants from different cultural settings engage in instrumental helping but that the rates at which they help might vary at different ages and across different tasks. Further cross-cultural research is strongly needed in order to understand more about how instrumental helping emerges and develops during infancy across diverse cultural contexts. We also need to understand the early life experiences that may vary cross-culturally and that may be associated with the emergence and development of children's early helping behaviour.

2.2.3 Current Study

In order to address the lack of cross-cultural research on sharing and helping behaviour in infancy, I tested a culturally diverse sample of infants from the UK and Uganda in experimental sharing and helping tasks. The tasks were conducted during two home visits when the infants were 18 months old, on one visit with the infants' mother and on the other visit with a local experimenter. Manipulating the identity of the recipient was important, particularly in the helping task, given the scarcity of studies that directly compare helping rates towards different kinds of recipients.

Sharing Task

In the Toy Sharing task, each time an infant completed the task, they participated in two experimental conditions: the Request condition and the No Request condition. A subset of infants additionally participated in a control condition. All conditions started with a preference assessment, in which the infant was asked to choose one of two toys (the chosen toy was then treated as their preferred toy). Afterwards, the infant received both of these toys. In the Request condition, their interaction partner (either the mother or an experimenter) received no toys and gave a series of cues that made their need and desire for a toy increasingly explicit. In the No Request condition, the interaction partner did not receive any toys either but they did not give any cues indicating a desire or need for a toy.

In order to explore whether infants who shared in the No Request condition were doing so because they had been previously reinforced or simply enjoyed giving objects to a partner,

we ran a control condition with the infants who had shared in the No Request condition. In this control condition, the interaction partner had their own set of toys and did not give any cues either, which meant that their need for toys was reduced as compared to the two experimental conditions. It is important to acknowledge, however, that it is difficult to completely remove a need for toys, as one could argue that there might always be a need for more toys. Only 14 children shared in the No Request condition, and therefore, only 14 children completed the control condition. Sharing rates for the control condition are only reported descriptively.

I measured the infants' likelihood of sharing with their interaction partner in each of the two experimental conditions. As sharing rates were low in the No Request condition, I was only able to examine the behaviour of the infants who shared in the Request condition more closely. For those infants I looked at the latency of their sharing behaviour (after which cue they gave a toy to their interaction partner). I also examined whether infants shared their preferred or unpreferred toy, as previous research has found sharing of preferred toys ("altruistic sharing") as opposed to sharing of unpreferred toys ("selfish sharing") to be related to a greater sensitivity to fairness norms (Schmidt & Sommerville, 2011; Sommerville et al., 2013; Ziv & Sommerville, 2017).

Instrumental Helping Task

In order to examine whether or not infants helped in response to the recipient's need, each time an infant completed the task, they participated in an experimental and a control condition. In the experimental condition, the adult (the mother or experimenter) pretended to accidentally drop an object on the floor and then unsuccessfully reached for it while giving a series of cues aimed at prompting the infant to hand them the object. In the control condition, the adult purposefully dropped the object on the floor saying "There" and then did not reach for it. Helping was operationalised as retrieving the object in the experimental condition but not in the control condition. This was done in order to identify infants who helped in response to the adult's need for help, as opposed to infants who handed over the object regardless of the adult's need or infants who did not help at all. I measured the infants' likelihood of helping with each of their interaction partners and, additionally, for

those infants who were identified as helpers, I examined the latency of their helping behaviour in the experimental condition (i.e., after which cue they helped).

Aims and Hypotheses

Sharing Task. One aim of the present study was to investigate whether 18-month-olds from two different cultural backgrounds differed in their sharing behaviours (i.e., the likelihood of sharing in response to need, the latency of sharing, and the value of the shared toy). To my knowledge, there have been no previous cross-cultural studies on sharing behaviour with 18-month-old infants, as the youngest participants in previous studies so far have been 3- to 4-year-old children (e.g., Blake, McAuliffe, et al., 2015; House et al., 2013; Rochat et al., 2009). Some of these studies found their youngest participants to share at similar rates (e.g., Blake et al., 2016; House et al., 2013; Huppert et al., 2019), while others found differences in their sharing rates (e.g., Blake, McAuliffe, et al., 2015; Rochat et al., 2009). Studies on children's resource allocations and inequity aversions that have specifically included children from Uganda have also revealed mixed results, with some finding similarities in the sharing behaviour of children from Uganda and children from WEIRD settings (e.g., Blake, McAuliffe, et al., 2015), while others found cross-cultural differences (e.g., Paulus, 2015). Therefore, my hypothesis concerning the likelihood of sharing for the infants in the two populations was exploratory. As far as I know, there have been no cross-cultural studies on the latency of sharing, which means that I did not make any predictions on whether or not there would be differences in the latency of sharing across the two groups of infants. With regards to the value of the shared toy, previous studies with WEIRD children found that the likelihood of 12- and 15-month-olds to give a preferred or an unpreferred toy to an experimenter was similar (Schmidt & Sommerville, 2011; Sommerville et al., 2013). Cross-cultural studies on the type of object to be shared have so far only been conducted with older children: Rochat et al. (2009) found an overall tendency in 3- to 5-year-old children to keep special items rather than share them with an experimenter, but that Peruvian children were more generous than, for example, children from Brazil, China or the USA. When sharing with peers, US-American, Chinese, and Indian 3- to 5-year-olds have been observed to share preferred and unpreferred food items at similar rates (Birch & Billman, 1986; Rao & Stewart, 1999). As UK and Ugandan children were not part of these cross-cultural studies

that focussed on older children, my hypothesis concerning the likelihood of sharing the preferred toy was also exploratory.

The second aim of this study was to examine whether the identity of the infants' interaction partner might be related to the likelihood of sharing in the 18-month-olds from this culturally diverse sample. Previous research indicates that the identity of and the relationship with a recipient can relate to children's sharing behaviour as children have been found to be more generous towards familiar individuals and individuals whom they are friends with: As mentioned above, research in infancy has revealed that US-American children in their second year of life spontaneously give more toys to their mothers than to strangers (Bretherton et al., 1981; Rheingold et al., 1976). To my knowledge, there has been no work done on the role of the recipient's identity for sharing behaviour in infants from Non-WEIRD backgrounds though. Studies with older children, however, have revealed interesting cross-cultural differences in the age of emergence of this behaviour: At 3 years of age, North-American children have been found to direct dolls to give more resources to friends and family than to strangers and to share more with peers whom they are friends with than with acquaintances, at least when sharing is costly (e.g., Birch & Billman, 1986; Moore, 2009; Olson & Spelke, 2008; Vonk et al., 2018). Chinese and Indian 3- to 4-year olds, on the other hand, have been observed to share at similar rates with friends and with less familiar children (Rao & Stewart, 1999; Yu et al., 2016). Yu et al. (2016) found Chinese children to only start favouring friends over strangers in their resource allocation once they reach the age of five. Similarly, Paulus and Moore (2014) found German 3-year-olds to not differ between friends and disliked peers, but 4- to 6-year-olds to share more with friends than with peers whom they did not like playing with. In a replication of this study with Ugandan children, Scharpf et al. (2017) found, in contrast to German children, that the 4- to 7-year-old Ugandan children's sharing rates did not differ between friends, disliked peers, and strangers. Taken together these studies indicate that once children base their sharing behaviour on the degree of familiarity with the potential recipients, they tend to favour familiar individuals or friends over strangers or disliked peers. The age at which they start considering familiarity in sharing decisions, however, can differ quite substantially between cultures, with children from some WEIRD backgrounds appearing to start doing so at slightly younger ages. Based on these previous results, I expected the 18-month-old infants in this

study to share more with their mothers than with the experimenters but for this difference to be more pronounced in the UK than in the Ugandan sample.

As the data for this study were collected within a larger longitudinal project with a team of multiple experimenters, the degree of familiarity between infants and their experimenters varied slightly between participants. I did, however, not expect these smaller variations to be significantly associated with sharing rates and was instead more interested in the bigger contrast of infants' sharing with their mothers compared to their sharing with another, considerably less familiar adult. But since the identity of a recipient has been found to be associated with sharing rates, I tested whether the degree of familiarity between each infant-experimenter-dyad related to the infants' sharing rates with the experimenter.

Although some studies have found no sex differences in early sharing behaviour (Beier et al., 2019; Brownell, Iesue, et al., 2013; Brownell et al., 2009; Cowell et al., 2017; Dunfield & Kuhlmeier, 2013; Dunfield et al., 2011; Hay, 1979; Svetlova et al., 2010; Vonk et al., 2018), some studies have found girls to share more than boys (Fabes & Eisenberg, 1998; Hay & Murray, 1982; Ulber et al., 2015) as well as sex differences in sensitivity to the familiarity of the recipient (Birch & Billman, 1986; Fehr et al., 2008). Thus, it was important to control for the sex of the infants in the present study.

Helping Task. Another aim of the present study was to investigate whether 18-month-olds from two different cultural backgrounds differed in their helping behaviour (i.e., the likelihood of helping in response to need and the latency of helping). Previous cross-cultural studies on instrumental helping at this age have revealed mixed results: Some have found 18-month-old infants from WEIRD and Non-WEIRD societies to help at similar rates (Callaghan et al., 2011; Köster, Cavalcante, et al., 2016), while others have found significant cross-cultural differences (Giner Torréns & Kärtner, 2017). Therefore, and because infants from the UK and Uganda have, so far, not been included in cross-cultural research on early helping, my hypothesis concerning the likelihood of helping for the infants in the two populations studied here was exploratory. Similarly, I did not make any predictions on whether there would be differences in the latency of helping between the two cultural groups, as previous cross-cultural studies on infant helping have, to my knowledge, not reported latencies of helping.

Moreover, in the present study I aimed to test whether the identity of the potential recipient of help would be related to the infants' likelihood of helping them. Previous research indicates that being familiar with a potential recipient of help can increase infants' likelihood of helping them (e.g., Allen et al., 2018) and that young children are more likely to help a friend than a neutral peer (Engelmann et al., 2019). One previous study has directly compared helping behaviour towards caregivers and unfamiliar experimenters and found that 18-month-old US-American infants received higher helping scores in trials with their mothers than in trials with the experimenter(Baldwin et al., 2020). Whether the recipient's identity might be associated with the helping behaviour of infants from different cultural backgrounds differently has not been studied yet. Therefore, I hypothesised that the UK and Ugandan infants in this study would, overall, show more helping behaviour towards their mothers than towards the local experimenter but I did not have a prediction about whether or not this difference would be stronger for one of the two cultural groups.

As mentioned above, the data for this study were collected as part of a larger longitudinal project by a team of multiple experimenters. Therefore, the degree of familiarity between infants and the adult who tested them did not only vary between the two types of interaction partners (mothers versus experimenters), but also within the group of experimenters, as some infants were slightly more familiar with their Out of Reach Helping task experimenter than others. As detailed above, previous studies indicate that infants' helping behaviour can be influenced by whether or not they have previously interacted with an experimenter (Allen et al., 2018; Schuhmacher et al., 2019). In these studies, familiarity was manipulated by whether or not the experimenter had played with the infant shortly before testing them in a helping task. In the present study, however, all infants interacted with the experimenters before participating in the Out of Reach Helping task with them, as all home visits started with a short warm-up phase and included multiple other tasks during which the experimenter engaged with the infant. To my knowledge, it has not been investigated yet whether having met an experimenter months before being tested on a helping task with them might relate to infants' helping behaviour towards the experimenter. Therefore, I examined whether the degree of familiarity between each infant-experimenter-dyad might relate to the infants' helping rates towards the experimenter and, extrapolating

from previous findings that short-term familiarity matters (e.g., Allen et al., 2018), I predicted there to be a positive association between familiarity and helping.

Moreover, some studies have found no sex differences in infants' helping behaviour (e.g., Beier et al., 2019; Drummond et al., 2014; Gross et al., 2015; Hammond & Carpendale, 2015; Kärtner et al., 2014; Köster, Cavalcante, et al., 2016; Svetlova et al., 2010; Warneken & Tomasello, 2008), while other studies have observed sex differences, with some finding girls to help more than boys (e.g., Dahl et al., 2017; Fabes & Eisenberg, 1998; Newton, Goodman, et al., 2014; Rheingold, 1982), some finding boys to help more than girls (e.g., Schuhmacher et al., 2019), and others finding boys and girls to help at different rates on different kinds of helping tasks (e.g., Dunfield & Kuhlmeier, 2013). Although examining sex effects was not an objective of this study, given the potential for infant sex to be associated with helping outcomes, I controlled for the sex of the infants in my analyses.

Helping and Sharing Tasks. I also examined whether demographic factors, such as infant age, maternal age, household composition, and maternal socialisation goals, were associated with the main study outcomes (infant sharing and helping), in order to highlight factors that may also influence helping and sharing, generating potential directions for future research.

Lastly, despite previous research indicating that sharing and helping might be based on distinct psychological mechanisms and motivations (e.g., Dunfield, 2014; Paulus et al., 2013) and that these behaviours do not necessarily correlate in infancy (e.g., Dunfield et al., 2011), I examined whether infants sharing and helping were related in the present study since I had assessed these behaviours in the same cohort at the same age.

2.3 Methods

2.3.1 Overall Project

The data presented in this thesis were part of a larger cross-cultural, longitudinal project following mother-infant dyads from the UK and Uganda for the first two years of the infants' lives. The larger project aimed at studying the development of different socio-cognitive skills (e.g., prosocial behaviour, joint attention, language development) in infancy as well as cross-cultural differences in maternal attitudes, behaviours, and mother-infant-interactions.

Mothers were invited to sign up for the project during pregnancy or up until their infant was 6 months old. All testing took place at the participants' homes and depending on the age of the infant when signing up, the mothers were first visited either while still pregnant, shortly after the infant was born, when the infant was 3 months old, or when the infant was 6 months old. On that first visit, mothers gave overall written consent for their and their infant's participation in the longitudinal project up until the infant's second birthday. Subsequently, teams of researchers conducted two hour-long experimental visits with the mother-infant dyads at the following time points: when infants were 3, 6, 9, 10, 11, 12, 14, 15, 18, and 24 months old. At 11, 15, 18, and 24 months, the participants were visited twice. At each of the time points, a different array of observations, interviews, and tests was administered and whenever a new experimental task was introduced, a task-specific information sheet and consent form were provided to mothers.

Ethical approval for the project was obtained from the ethics committee at University of York Psychology Department, the Regional Ethics Committee at the Ugandan Virus Research Institute, and the Ugandan National Council for Science and Technology.

Study Sites and Longitudinal Project Participants

UK Participants. In the UK, 53 mother-infant dyads living in and around the city of York participated in the longitudinal project. They were recruited at local Baby Sensory classes and children's centres, through a project facebook page and website, through York Mumbler (a website advertising local events and opportunities for families), and through word-of-mouth. Mother-infant-dyads were invited to join the project if the mother was a native English speaker. At points where we were oversubscribed with potential participants, we strove to maintain a balance of male and female infants, as well as firstborns and children with siblings.

All mothers from the UK sample grew up in the UK (Ethnicity: 42 white UK, seven UK undisclosed, one mixed UK, and one undisclosed) and only spoke English with their infant. All of them were literate and had completed secondary school. Eighty-six percent of the mother had additionally received an undergraduate or postgraduate degree.

For 47% (24/51) of mothers, the participating infant was their first child. They were on average 32.5 years old (*SD* = 3.7; range = 25 - 41) when the infant was born. Twenty-five

infants participating in the project were female and 28 were male. Four of the infants were twins (two pairs). The mother was the primary caregiver for all UK infants and, for all infants, their father acted as a caregiver as well. For none of the UK infants, caregivers younger than 17 years were ever listed as a caregiver.

The majority of UK infants were able to sit and crawl by 9 months and more than half of the UK infants walked by 15 months of age.

All UK families lived in houses with mains plumbing and electricity. On average, the UK mother-infant dyads spent more than half of their time doing daily activities indoors. The experimental visits for this project were conducted inside the families' houses. Mothers were asked to choose the room of the house most appropriate for testing, which was the living room in most cases.

Out of the 53 UK mother-infant dyads, 48 participated in the whole length of the longitudinal project. Five participants dropped out of the project earlier due to time constraints or because they moved away from York. They ended their participation after the following visit: one at 6 months, one at 9 months, two at 12 months, and one at 15 months. Additionally, the Covid-19 pandemic disrupted the end of data collection, meaning that two participants could not be visited for data collection at 18 months.

Ugandan Participants. In Uganda, 45 mother-infant dyads living in the Nyabyeya parish, Masindi district, participated in the project. They were recruited at local village and church meetings and through word-of-mouth. Mothers-infant-dyads were invited to join the project if the mother's main language was one of the three languages into which our study materials had been translated (Swahili, Alur, and Lugbara). At points where we were oversubscribed with potential participants, we strove to maintain a balance of male and female infants, as well as firstborns and children with siblings.

Forty-two mothers from the Ugandan sample had been raised in Uganda, two grew up in the Democratic Republic of the Congo (DRC), and one was born in the DRC but moved to Uganda when she was 8 years old. Forty-three Ugandan mothers provided information about their ethnolinguistic group indicating that 37% (16/43) of them identified as Alur, 33% (14/43) as Lugbara, and 30% (13/43) as part of another ethnolinguistic group (Acholi, Akebu, Balendru, Banyoro, Kakwa, Kaliko, or Madi). Mothers reported speaking a median of 2

languages with their infants (range = 1 - 6). Forty-three mothers spoke Swahili with their infants, 26 Alur, 25 Lugbara, seven Ruyuro, five English, two Acholi and in addition each of the following languages was spoken by one mother with her infant: Kakwa, Lendu, Kganda, Winuro, Kiganda, and Luou.

Twenty-four percent of the mothers in the Ugandan sample (11/45) reported being able to read and write, 36% (16/45) reported some level of reading and writing skills, and 40% (18/45) reported not being able to read or write at all. Sixty-four percent (29/45) had received some level of primary and 18% (8/45) some level of secondary school education. The remaining 18% (8/45) of mothers reported having not received any formal education.

The mothers were on average 27.11 years old (*SD* = 7.0; range = 16 - 42) when the participating infant was born. For 23% (10/45) of them, this was their first child. Twenty-four of the participating Ugandan infants were female and 21 were male. One infant was a twin; sadly, the second twin passed away and data for him was not included in the project.

The mother was the primary caregiver for all Ugandan infants. The father was listed as a caregiver for 41% (18/45) of the infants. All Ugandan infants were regularly cared for by individuals aged 17 years or younger.

The majority of Ugandan infants were able to sit by 6 months, crawl by 9 months, and walk by 12 months of age.

The Ugandan families lived in compounds consisting of several buildings used for different specific purposes (e.g., sleeping, cooking). The houses of the compounds were mud or brick houses with roofs made out of straw or iron sheet. Water sources and latrines were located outside of the houses. None of the buildings had mains electricity but some families owned small personal solar panels. When the infants were 3 to 6 months old, the mother-infant dyads spent on average more than half of their time for daily activities indoors, but from 9 months onwards, they spent the majority of their time for daily activities outdoors.

Out of the 45 Ugandan mother-infant dyads, 42 participated until the end of the longitudinal project. Three participants dropped out before the end because they moved away from Nyabyeya: One after the 6 months visit, one after the 9 months visit, and one after the 12 months visit. Since the Ugandan participants belonged to several different

ethnolinguistic groups, it was possible that regarding them as one homogenous sample might not be appropriate. Previous research conducted with the participants of this larger longitudinal project indicates, however, that the Ugandan participants from the different ethnolinguistic groups did not form distinct clusters but rather that the Ugandan participants showed similar behaviours and attitudes across all ethnolinguistic groups, for example, in terms of the mothers' attitudes towards their infants' development and in terms of the infants' social environment (Holden et al., in review). Therefore, I deemed it appropriate to treat the Ugandan participants as one cultural group.

It is important to note that the UK sample and the Ugandan sample differed on a variety of factors, such as rurality, maternal education, and SES. These demographic factors are therefore confounded with the cultural group the participants belonged to.

2.3.2 Toy Sharing Task

Participants of the Toy Sharing Study

Overall, 47 UK infants (22 female, 25 male) and 40 Ugandan infants (22 female, 18 male) participated in the toy sharing study. This sample size was constraint by the number of participants in the overall project and therefore could not be informed by a power analysis.

The data for this study were collected during two 2-hour-long sessions when the infants were 18 months old. These two sessions were on average 9.43 days apart (range: 2 – 28 days) and included a variety of different tasks and measures. The data relevant for this study were collected during a Toy Sharing task. Infants participated in this task twice: In one session, they did the task with a local experimenter, and in the other session, they did the same task with their mothers.

Unfortunately, some of the trials were deemed invalid after closer inspection during video coding and could therefore not be included in the analyses (see section "Administration Error and Attrition" in Results). The final numbers of infants who were included in the analyses can be found in Table 2.3. When participating in the task with an experimenter, the infants included in the analyses were on average 18.09 months old (*SD* = 0.34). When participating in the task with their mothers, they were on average 18.04 months old (*SD* = 0.33).

Table 2.3

Number of infants per culture and interaction partner included in the analyses

Culture	Interaction partner	Number of infants with valid trials
UK	Experimenter	40 (20 female, 20 male)
UK	Mother	31 (16 female, 15 male)
Uganda	Experimenter	35 (20 female, 15 male)
Uganda	Mother	31 (18 female, 13 male)

Note. Overall, 45 UK and 38 Ugandan infants were included in the analyses. Most of them (54 infants) contributed data from trials with both the experimenter and the mother, while some only contributed data from trials with one interaction partner (21 experimenter only; 8 mother only)

Moreover, mothers were asked to fill in a Background Questionnaire when their infants were on average 12.13 months (*SD* = 0.33), 14.96 months (*SD* = 0.31), and 17.95 months old (*SD* = 0.28).

Toy Sharing Task

Toy Sharing Task Materials. In the UK, the task was filmed with Panasonic HC-VX870 4K and Panasonic HC-V HD camcorders. In Uganda, filming was done with Panasonic HC-VX870 4K camcorders with external microphones (Sennheiser MKE 400). Bluetooth earpieces (IAVCC P9-TWS) were used to play a pre-recorded and carefully timed set of instructions to mothers and experimenters during the task that detailed the cues the adult needed to give to the infant, to try and standardise the timing and improve accuracy of cue delivery to the infant.

In each trial, infants received one out of four sets of toys. Different toy sets were used in the UK and Uganda to try to ensure that the infants were familiar with the types of objects presented to them. In the UK, two toy sets consisted of a toy car and a plastic ring (Figure 1A; Figure 1B) and the other two toy sets consisted of a rubber duck and a rolled up piece of coloured paper (Figure 1C; Figure 1D). In Uganda, two of the toy sets consisted of a toy phone and a spoon (Figure 1E; Figure 1F) and the two other toy sets consisted of a toy plate and a piece of colourful cloth (Figure 1G; Figure 1H). Two small cardboard trays (25 x 10 cm) were used to distribute toys to the infant and the mother/ experimenter.

UK

Figure 1. Toys used in the Toy Sharing task in the UK and Uganda at 18 months: UK set 1 shown in A and B; UK set 2 shown in C and D; Uganda set 1 shown in E and F; Uganda set 2 shown in G and H.

Toy Sharing Task Procedure. Trials with an experimenter were administered by a team of two researchers: E1, the main experimenter who was the infant's interaction partner in the task and E2, an assisting experimenter. In trials with the mother, the mother took the place of E1, while E2 had the exact same role as in trials with the experimenter.

Each time an infant participated in the Toy Sharing task, they participated in multiple conditions. All infants participated in two experimental conditions (Request and No Request). Infants who gave a toy to their interaction partner in the No Request condition, additionally participated in a control condition. The main differences between these three

conditions are summarised in Table 2.4. In the Request condition and the No Request condition, the infant received two toys while the adult received none. This was done to create an objective imbalance, i.e., a visible need for toys in the adult. In the control condition, the adult received their own set of toys and therefore needed the infant's toys less. The adult only communicated a need and desire for the infant's toys in the Request condition but not in the No Request condition nor in the control condition.

The present study was conducted within a larger project, which meant that on the home visits, data was not only collected on infant sharing but also on a considerable number of other socio-cognitive variables. This resulted in there being only a limited amount of time for data collection on prosociality. Due to these time constraints, a single trial approach (i.e., one trial per condition) as it has been successfully used in the previous literature, for instance by Dunfield et al. (2011), was deemed most appropriate.

Table 2.4

Differences between the three conditions of the Toy Sharing task

	Request condition	No Request condition	Control condition
Clear objective need for toys	Yes	Yes	No
Need is communicated to the infant	Yes	No	No

Before the start of each trial, mothers were given instructions on how to behave during the trial: For trials in which E1 was going to be the infant's interaction partner, mothers were asked to not interact with their infants during the trial. UK mothers were instructed to read something instead and Ugandan mothers were instructed to look at their nails. For trials, in which the mother was going to be the interaction partner, one experimenter trained the mother, ideally out of sight and out of earshot of the infant, while the second experimenter played with and distracted the infant. Whenever possible, the experimenter first demonstrated how to act in the upcoming trial and then asked the mother to practice while giving her feedback. Some UK infants, however, were reluctant to be separated from their mother, which meant that fully practicing the task with their mothers was not possible.

Instead, the experimenter quietly instructed the mother verbally and played the cues on the Bluetooth earpiece for her. The aim was to ensure that all mothers had received instructions of how to behave in the trial, that they were familiar with the cues they needed to give, and had the opportunity to ask questions, before starting the trial.

Trials in all conditions started with the infant sitting next to the relevant adult (E1 or the mother) and opposite E2 (see Figure 2) and then followed the same basic structure of three steps: (1) a preference assessment, (2) a short toy distribution phase, and (3) the test phase.

In the preference assessment, E2 presented the infant and the adult with two different toys, and said “Look [infant’s name] and [adult’s name]! There is a [toy 1] and a [toy 2].” E2 then turned to the infant and said “[Infant’s name], which one would you like?” If the infant reached for, pointed at, or touched one of the toys, this toy was coded as their preferred toy (and the other toy as their unpreferred toy). If the infant did not make a choice or made an unclear choice by reaching for both toys simultaneously, E2 repeated the question a few times. If the infant never indicated a preference for one of the toys, the experimenter judged which toy the infant had looked at more to identify the preferred toy for the trial. E2 then turned to the adult and asked “[Adult’s name], which one would you like?” The adult stated that they liked both (“I like the [toy 1] and I like the [toy 2]”).

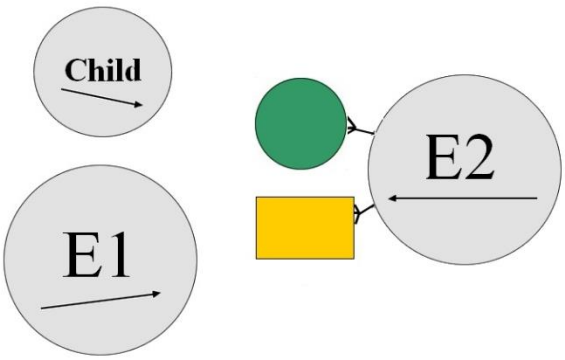

Figure 2. Set up during the preference assessment performed by an assistant experimenter (E2) in a trial in which the experimenter (E1) is the infant’s interaction partner. Arrows indicate the direction individual are facing.

In the subsequent toy distribution phase, E2 first gave a cardboard tray to the adult, saying “Here you go, [adult’s name]”, and then gave a cardboard tray to the infant, saying “Here you go, [infant’s name]”. In all conditions, the two toys from the preference assessment

were put on the infant's tray. In the Request condition and the No Request condition, the adult's tray was empty. In the control condition, the adult received a very similar set of toys to the ones given to the infant that differed only in colouration (e.g., when the infant received a yellow car and orange ring (Figure 1A), the adult received a red car and a yellow ring (Figure 1B). E2 then got up and walked a few feet away, pretending to busy themselves with some paperwork or a phone.

The test phase of the trial started with the adult trying to get the infant's visual attention. In most cases, the adult called the infant's name, but if the infant did not look up at the adult, they sometimes additionally used tactile gestures (e.g., tapping the infant on the shoulder) or auditory signals (e.g., snapping their fingers). In some cases, no attention getting behaviour was necessary because the infant was already looking at the adult. In some other cases, the infant never looked up at the adult and the adult therefore tried to get into the visual field of the infant by moving their torso and hands to where the infant was looking.

In the Request condition, the adult then held out their hand (palm facing up) and gave a series of cues aimed at prompting the infant to share a toy with them. In order to make it easier for the infant to share, the adult focused on the toy that the infant had previously not chosen in the preference assessment (i.e., the unpreferred toy). First, the adult looked at the unpreferred toy for six seconds (cue 1). Then they gaze alternated between the unpreferred toy and the infant's face for another six seconds (cue 2). Subsequently, they gave a verbal cue stating their need for a toy ("Look, *I* don't have *any* toys!", cue 3) and finally, after a brief pause to give the infant time to respond to the previous cue, they made a direct request for a toy ("Can *I* have one please?", cue 4). After another brief pause to give the infant a chance to respond, the trial ended. If the infant gave a toy to the adult at any point during the trial, the trial ended earlier.

In order to standardise the timing of these cues across participants, a recording of instructions reminding the adult of what to do and when to start each cue were played over a Bluetooth earpiece (see Table 2.5). E2 started the recording as soon as E1/the mother had put out their hand. Mothers and experimenters had been told beforehand to begin delivering a new cue only after having heard a short beeping noise that indicated the end of the instructions for that cue. Mothers in the UK and experimenters in both groups wore the Bluetooth earpiece themselves. In Uganda, mothers did not wear the earpiece but instead

were instructed by a local research assistant who listened to the recording and then quietly repeated the instructions out loud. Whenever possible, the research assistant instructed the mother in a different language to the one the mother was addressing the infant in.

Table 2.5

Instructions played for mothers and experimenters through a Bluetooth earpiece during the test phase of the Request condition. Adults were instructed to not act on the instruction until the beep at the end of each instruction.

Time stamp in recording at which the cue started (in seconds)	Content of the recording	Cue being delivered to the infant
0.00	2 sec silence	Hold out hand and look at unpreferred toy
2.00	Continue holding out your hand. Alternate looking at the toy and your child's face.	Hold out hand and look at unpreferred toy
6.00	Beep. 2 sec silence	Alternate looking at the unpreferred toy and the infant's face while holding out hand
8.00	Continue holding out your hand. Look at your child and say "Look, I don't have any toys"	Alternate looking at the unpreferred toy and the infant's face while holding out hand
13.30	Beep. 2.5 sec silence	"Look, I don't have any toys" whilst looking at the infant and holding out hand
15.80	Continue holding out your hand. Look at your child and say: "Can I have one, please?"	Look at unpreferred toy or infant whilst holding out hand

Time stamp in recording at which the cue started (in seconds)	Content of the recording	Cue being delivered to the infant
20.00	Beep. 6 second silence	"Can I have one, please?" whilst looking at the infant and holding out hand
26.00	Wonderful, thank you! You can now play with your child.	Look at unpreferred toy or infant whilst holding out hand

In the No Request condition, after having gained the visual attention of the infant, the adult said "Hi!" and waved at them. These brief affiliative communicative signals were included to show the infant that the adult was part of the trial but that they did not actively signal wanting or needing a toy. They were also meant to keep the No Request condition more comparable to the Request condition (both included a gesture directed at the infant at the start of the trial and verbal communication). Subsequently, the adult read something (in the UK) or looked at their nails (in Uganda) for 30 seconds.

In the control condition, the adult also said "Hi!" and waved at the infant. In the subsequent 30 seconds, they quietly played with the set of toys that they had received. If an infant took one of the adult's toys, the adult continued playing with the remaining toy. If the infant took both toys, the adult looked at the floor until the infant gave back a toy or until the trial ended. Only infants who had given a toy to the adult in No Request condition participated in the control condition. I included this condition in an attempt to identify infants who gave toys in the other conditions not because they reacted to the adult's need or desire but simply because they enjoyed or had been taught to hand objects to others no matter the situation.

Toy Sharing Task Counterbalancing. The following aspects of the experiment were counterbalanced across participants: whether it was the mother or an experimenter who did the task with the infant on the first visit, whether the Request condition or No Request condition was done first on a particular visit, and which toy set was used.

Toy Sharing Task Coding. Below, I describe how the following aspects of the videos were coded: Trial validity and the infants' sharing behaviour. Moreover, I detail how Inter-Observer Reliability was assessed.

Trial Validity. In order to be included in the analyses, infants needed to have a valid Request condition, a valid No Request condition, and, if applicable, a valid control condition. Trials were deemed invalid if the video quality of a trial was insufficient for coding, if the infant was distressed or too fussy to pay attention to the trial, if the infant was distracted by an object that was not part of this experimental task, or if the test phase of a trial in which the infant did not share was shorter than 25 seconds. Trial duration was measured from the moment the adult held out their hand (Request condition) or waved (No Request condition and control condition) until the adult stopped giving cues or stopped reading/ looking at their nails. Trials that lasted longer than 30 seconds were considered valid but coding stopped after 30 seconds.

In order for the trials to provide a valid test of infant sharing, it was important that key facets of the procedure were attended to by the infant. Table 2.6 summarises the key points of understanding and their operationalisation that were required for trials to be deemed valid and retained for analysis.

Table 2.6

Key points infants needed to have the opportunity to understand about the trial they participated in and the corresponding criteria for trial validity

Trial type	Key point infant needed to have the opportunity to understand	Criteria for valid trial
All trial types	Whether the adult needs or does not need any toys (i.e., has the adult received toys from E2)	Infant must have seen adult's tray at some point in the trial
Request	Adult is non-verbally requesting toy	Infant must have seen adult's outstretched hand before 3rd cue where need is made explicit verbally

Trial type	Key point infant needed to have the opportunity to understand	Criteria for valid trial
No Request	Adult has no desire for toys	Infant needs to have received at least one active signal expressing 'no need': (i) seeing the adult wave or (ii) hearing them say 'Hi!' [1]
Control	Adult has no desire and less of a clear need for toys	Infant needs to have received at least one active signal expressing 'no need': (i) seeing the adult wave; (ii) hearing them say 'Hi!' [1] or (iii) seeing adult playing with their toys

Note. [1] Although the protocol asked adults to produce both of these signals, sometimes they were omitted due to adult error or because the infant failed to visually attend to the wave gesture

I aimed for there to be a gradual increase of the intensity in which the adult communicated their need for a toy in the Request condition and therefore arranged the cues from simply looking at the unpreferred toy to giving a direct request. Trials in which the adult erroneously gave a verbal cue before giving non-verbal cues or added their own unscripted cues were not considered valid.

Some infants needed their mothers to sit with them while they participated in the trial with the experimenter. In those cases, mothers were instructed to read or look at their nails and not to interact with the infant. Some mothers, however, misunderstood and started playing with their infants during the trial, which meant that these trials were invalid. In some other cases, infants insisted on sitting on their mothers' lap during a trial in which the mother was their interaction partner. This was acceptable as long as the mother moved so that her hands and head were visible to the infant. It had to be clear for the infant that she was a participant in the trial as well. Trials in which the spatial constellation made it unclear for the infant whether the mother was part of the trial or not had to be excluded.

Sharing Behaviour. All valid trials were coded for whether the infant shared a toy with the adult or not. Sharing was defined as putting one of the infant's toys or their tray in the

adult's hand or lap or on the adult's tray and letting go of the toy. Clear attempts to share that were unsuccessful because of poor motor coordination (e.g. looking at the adult or reaching out to the adult, but dropping the toy just short of their lap or hand) were still counted as sharing.

For the infants who shared a toy in the Request condition, it was additionally coded whether they gave their preferred or unpreferred toy to the adult, provided that they had made a clear choice in the preference assessment. Overall, 24 infants (10 in trials with an experimenter, 14 in trials with the mother) who gave a toy but failed to make a clear choice in the preference assessment were excluded from analyses using this measure. I also coded after which cue the infant gave the toy to the adult.

Finally, it was coded whether the infants showed any uncooperative behaviours in the Request condition, such as hiding their toys or taking the adult's toys. ***Video Coding Training and Inter-Observer Reliability.*** Four independent observers coded the videos of the Toy Sharing task. I developed the coding scheme, coded the training trials and trained the other three observers. The three observers all started by coding the same 22 trials, for which scores were compared and feedback was given. This revealed a mean Cohen's Kappa score of 0.83 for observer AN, 0.88 for CI, and 0.75 for GG when compared with my coding (Cohen, 1960). As this indicated that the videos were being coded reliably, the three observers then started coding independently. I later double coded some additional trials for each observer to ensure that the quality of coding remained high: I coded 28 of the trials that AN had coded, which revealed a mean Kappa score of 0.79. Moreover, I coded 10 additional trials for CI and GG each, which resulted in mean Kappa scores of 0.88 and 0.80 respectively. Overall, 15.35% of the total trials were double coded and the Kappa scores indicated that the quality and reliability of coding remained consistently high.

2.3.3 **Instrumental Helping**

Participants of the Out of Reach Helping Study

Overall, 47 UK infants (22 female, 25 male) and 40 Ugandan infants (22 female, 18 male) participated in the Helping study. This sample size was constraint by the number of participants in the overall project and therefore could not be informed by a power analysis.

The data for this study were collected during two 2-hour-long sessions when the infants were 18 months old. These two sessions were on average 9.31 days apart (range: 0 – 28 days) and included a variety of different tasks and measures. The data relevant for this study were collected using an Out of Reach Helping task. Infants participated in this task twice: In one session, they participated in the task with a local experimenter, and in the other session, they participated in the same task with their mothers.

After closer inspection during video coding, some of the trials were deemed invalid and could therefore not be included in the analyses (see section ”Administration Error and Attrition” in Results for more details). The final numbers of infants who were included in the analyses can be found in Table 2.7. When participating in the task with an experimenter, the infants included in the analyses were on average 18.06 months old (*SD* = 0.35). When participating in the task with their mothers, they were on average 18.06 months old (*SD* = 0.29).

Table 2.7

Number of infants per culture and interaction partner included in the analyses

Culture	Interaction partner	Number of infants with valid trials
UK	Experimenter	42 (20 female, 22 male)
UK	Mother	25 (13 female, 12 male)
Uganda	Experimenter	36 (20 female, 16 male)
Uganda	Mother	27 (16 female, 11 male)

Note. Overall, 43 UK and 39 Ugandan infants were included in the analyses. The majority of them (48 infants) contributed data from trials with both an experimenter and the mother, while the rest only contributed data from trials with one interaction partner (30 experimenter only; 4 mother only)

Out of Reach Helping Task

Out of Reach Helping Task Materials. In the UK, the task was filmed with Panasonic HC-VX870 4K and Panasonic HC-V HD camcorders. In Uganda, filming was done with Panasonic HC-VX870 4K camcorders with external microphones (Sennheiser MKE 400). Bluetooth

earpieces (IAVCC P9-TWS) were used to play a pre-recorded and carefully timed set of instructions to mothers and experimenters during the task that detailed the cues the adult needed to give to the infant, to try and standardise the timing and improve accuracy of cue delivery to the infant.

During the Helping task, the infant's interaction partner (the mother or an experimenter) sat behind a small table. Each trial started with them dropping an object, either a plastic water bottle or the lid of a plastic jar (see Figure 3 for pictures of the items). The same types of objects were used in the UK and Uganda, as bottles and screw top jars are commonly used objects in both communities. For each individual infant, the mother and the experimenter used different objects (one used the bottle, the other one used the jar) when administering the trial. Each interaction partner used the same object across both the experimental and the control condition.

Figure 3. Bottle and jar used in the Out of Reach Helping task.

Out of Reach Helping Task Procedure. Each time an infant participated in the Out of Reach Helping task, they participated in two conditions: an experimental condition and a control condition. As mentioned above, given the time constraints on the home visits, where a broad set of data for the overall project was collected, a single trial approach (i.e., one trial per condition) as it has been successfully used in previous research (e.g., Dunfield et al., 2011; Giner Torréns & Kärtner, 2017) was deemed most appropriate for the Out of Reach Helping task as well.

Trials in all conditions started with the infants' interaction partner (the mother or an experimenter) sitting behind a small table (see Figure 4). Whenever possible, the infant sat

on the floor on the opposite side of the table. If infants were unwilling to sit, however, trials were also started with them standing (either on the opposite side of the table, or in some cases, at the side of the table).

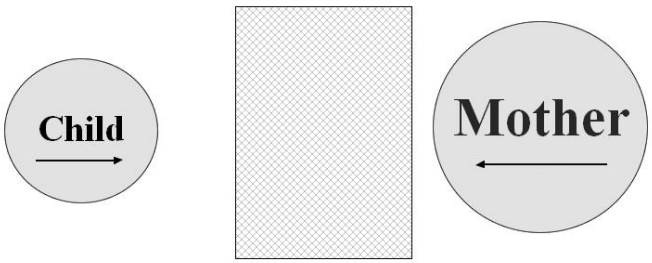

Figure 4. Set up in a trial with the mother. Arrows indicate the direction individuals are facing

Before the start of each trial, mothers were instructed on how to behave: For trials in which the experimenter was going to be the infant's interaction partner, mothers were instructed to not interact with their infant during the trial. UK mothers were asked to read something instead and Ugandan mothers were asked to look at their nails. For trials, in which the mother herself was going to be the interaction partner, one experimenter trained the mother, ideally out of sight and out of earshot of the infant, while a second experimenter played with and distracted the infant. Whenever possible, the experimenter first demonstrated how to act in the upcoming trial and then asked the mother to practice while giving her feedback. Some UK infants, however, were reluctant to be separated from their mothers and it was, therefore, not possible to fully practice the task with the mothers. In these cases, the experimenter quietly instructed the mother verbally and played the cues on the Bluetooth earpiece for her, so she was familiar with the cues she would receive in the trial and their timings. It was aimed to ensure that all mothers had received instructions of how to behave in the trial, were familiar with the cues they needed to give, and had the opportunity to ask questions, before starting the trial.

At the beginning of each trial, the interaction partner tried to get the infant's visual attention, for example, by calling their name or by tapping on the table. Once the infant looked at them, they (a) opened the water bottle, drank from it, and closed it again or (b) unscrewed the lid of the jar.

In the experimental condition, the interaction partner then pretended to accidentally drop the bottle or the lid of the jar on the floor on the opposite side of the table while saying "Oops". In trials in which the lid of the jar was dropped, the adult put the jar on the table and let go of it. Immediately after dropping the object (i.e., the bottle or lid), the adult reached across the table towards the object and gave a series of cues aimed at prompting the infant to retrieve it for them: First, they looked at the object for six seconds (cue 1). Then they gaze alternated between the object and the infant's face for another six seconds (cue 2). Subsequently, they gave a verbal cue highlighting their need for help ("Look, I can't reach it!", cue 3) and finally, after a brief pause to give the infant time to respond to the previous cue, they made a direct request for help ("Can you get that please?", cue 4). After another brief pause to give the infant a chance to respond, the trial ended.

If the infant picked up the object and moved it so that it stayed out of the adult's reach, the adult moved their arm so that they continued to reach for the object in its new location. If the infant brought the object within the adult's reach, the adult stopped reaching for it and instead put their hand next to the object with their palm facing up, i.e., making a requesting gesture. If the object was clearly within their reach, the adult did not give cue 3 and 4 as these did not make sense anymore. Instead they simply continued to gaze alternate between the object and the infant's face. If the infant retrieved the object at any point during the trial (i.e., gave it to the adult or put it on the table and let go of it for more than one second), the trial ended earlier.

In order to standardise the timing of these cues across participants, a recording of instructions reminding the adult of what to do and when to start each cue were played over a Bluetooth earpiece (see Table 2.8). An assistant experimenter started the recording as soon as the experimenter or the mother had dropped the object. Mothers and experimenters had been told beforehand to begin delivering a new cue only after having heard a short beeping noise that indicated the end of the instructions for that cue. Mothers in the UK and experimenters in both groups wore the Bluetooth earpiece themselves. In Uganda, mothers did not wear the earpiece but instead were instructed by a research assistant who listened to the recording and then quietly repeated the instructions out loud. Whenever possible, the research assistant instructed the mother in a language other than the one she used when speaking to the infant.

Table 2.8

Instructions played for mothers and experimenter through a Bluetooth earpiece during the experimental condition. Adults were instructed to not act on the instruction until the beep at the end of each instruction.

Time stamp in the recording at which the cue started (in seconds)	Content of the recording	Cue being delivered to the infant
0.00	2 sec silence	Look and reach towards dropped object
2.00	Continue reaching. Alternate looking at the object and your child's face.	Look and reach towards dropped object
6.00	Beep. 2 sec silence	Alternate looking at the object and infant's face whilst reaching for object
8.00	Continue reaching. Look at your child and say "Look, I can't reach it"	Alternate looking at the object and infant's face whilst reaching for object
12.30	Beep. 2.5 sec silence	"Look, I can't reach it" whilst looking at infant and reaching for object
14.80	Continue reaching. Look at your child and say "Can you get that please?"	Look at object or infant and reach for object
18.80	Beep. 6 second silence	"Can you get that please?" whilst looking at infant and reaching for object

Time stamp in the recording at which the cue started (in seconds)	Content of the recording	Cue being delivered to the infant
25.00	Wonderful, thank you! You can now play with your child. Beep	Look at object or infant and reach for object

In the control condition, the interaction partner purposefully dropped the object on the floor saying “There”. The word “There” was included to emphasize the deliberate nature of the adult’s action, as previous research has shown that words like “Oops” and “There” can help 18-month-old infants to distinguish between accidental and intentional actions (Carpenter et al., 1998). It was also included in order to keep the beginning of the control condition comparable to the beginning of the experimental condition, insofar that dropping the object was accompanied by a verbal signal in both. Afterwards, the adult read something (in the UK) or looked at their nails (in Uganda) for 30 seconds.

At the end of any trial in which the infant had not retrieved the object, the mother or experimenter got up and retrieved the object themselves.

Out of Reach Helping Task Counterbalancing. The following aspects of the experiment were counterbalanced across participants: whether it was the mother or an experimenter who did the task with the infant on the first visit, whether the experimental condition or control condition was done first on a particular visit, and which object (bottle or jar) was used by the mother and the experimenter.

Out of Reach Helping Task Coding. Below, I will describe how the following aspects of the videos were coded: Trial validity and the infants’ helping behaviour. Moreover, I will detail how Inter-Observer Reliability was assessed.

Trial Validity. In order to be included in the analyses, infants needed to have a valid experimental condition and a valid control condition. Trials were deemed invalid if the infant was distressed or too fussy to pay attention to the trial, if the infant was distracted by

an object that was not part of this experimental task, or if a trial in which the infant did not retrieve the object was shorter than 25 seconds. Trial duration was measured from the moment the object hit the floor until the adult stopped giving cues or stopped reading/ looking at their nails. Trials that lasted longer than 30 seconds were considered valid but coding stopped after 30 seconds.

In order for the trials to provide a valid test of infant helping, it was important that key facets of the procedure were attended to by the infant. Table 2.9 summarises the key points of understanding and their operationalisation that were required for trials to be deemed valid and retained for analysis.

Table 2.9

Key points infants needed to understand about the trial they participated in and the corresponding criteria for trial validity

Trial type	Key point infant needed to have opportunity to understand	Criteria for valid trial
All trial types	The object was dropped on the floor	Infant must have seen the adult dropping the object or the object lying on the floor
Experimental	Adult is unsuccessfully trying to get the object	Infant must have seen adult's reaching hand before 3rd cue where their need is made explicit verbally
Control	Adult has no desire for the object	Infant needs to have received at least one active signal expressing 'no need': (i) seeing the adult purposefully drop the object or (ii) hearing them say 'There' [1]

Note. [1] Although the protocol asked adults to produce both of these signals, sometimes they were omitted due to adult error or because the infant failed to visually attend

It was important that dropping the object looked accidental in the experimental condition and did not look accidental in the control condition. Trials were considered invalid whenever these prerequisites were not met, for instance, when the adult appeared to drop the object on purpose in the experimental condition or when they said “Oops” in the control condition.

The Out of Reach Helping task was designed to include a gradual increase of intensity in which the adult communicated their need for help with reaching the object on the floor in the experimental condition. Therefore, the cues were arranged in order from simply looking at the object to giving a direct request for help. Trials in which the adult gave a verbal cue in the non-verbal cue period, erroneously combined the two verbal cues (e.g., said “Look, I can’t reach it, can you get that please?”) or added their own unscripted cues were not considered valid. Other errors with cues, such as continuing to reach towards an empty spot on the floor after the infant had moved the object in the experimental condition also led to trials being considered invalid.

Experimenters and mothers were instructed to let go of the jar on the table after having dropped the lid, so that infants were free to interact with the jar and the lid in whichever way they wanted. Trials in which mothers held on to jar and therefore limited the actions their infants could take were deemed invalid.

Lastly, in some cases the object rolled so far away from the infant that it was not feasible for them to retrieve it within the time frame of the trial. This meant that these trials were not considered valid either.

Helping Behaviour. All valid trials were coded for whether the infant helped the adult by retrieving the object or not. Retrieving the object was defined as either handing it to the adult or putting it on the table and letting go for at least 1 second. Clear attempts to hand the object to the adult that were unsuccessful because of poor motor coordination (e.g. looking at the adult or reaching out to the adult, but dropping the object just short of their hand) were still counted as handing over the object.

Putting the object on the table without letting go for at least 1 second was not counted as helping as it was unclear whether the infants were doing this to help the adult or if they were simply using the table as surface for playing with the object.

I then identified all helpers – infants who retrieved the object in the experimental condition and not the control condition. This was done to identify infants who helped in response to the adult's need or desire for assistance, as opposed to infants who handed over the objects regardless of the adult's need or infants who did not help at all.

Video Coding Training and Inter-Observer Reliability. Three independent observers coded the videos of the Out of Reach Helping task. I developed the coding scheme, coded the training trials and trained the other two observers. I coded 39 trials (10% of the total number of trials). AN and CI started by coding the same 39 trials. This revealed a mean Cohen's Kappa score of 0.81 for AN and 0.78 for CI when compared with my coding (Cohen, 1960). Afterwards, I gave feedback and discussed any discrepancies identified through the reliability coding process with the two coders. As the Cohen's Kappa scores indicated that the videos were being coded reliably, the two observers then started coding independently.

2.3.4 Familiarity of the Experimenters in the Sharing and Helping Tasks

Due to the longitudinal nature of the overall project, some infants had already met their 18 months Toy Sharing or Out of Reach Helping task experimenter on one or more previous experimental visits, while other infants saw their experimenters for the first time on the 18 months visit. As data collection in Uganda took place in a smaller, more close-knit community, some Ugandan experimenters interacted with some of the participating families outside of this study because they, for example, frequented the same shops or church. Therefore, there were different degrees of familiarity between the infants and their 18 months experimenters. To check whether these differences in familiarity might have been associated with infants' sharing or helping behaviour towards the experimenters, I categorised the infants' familiarity with their experimenters into low, medium, and high (see Table 2.10). The distribution of participants for the helping and sharing tasks across the three familiarity categories is shown in Table 2.11).

Table 2.10

Categories of familiarity between the experimenters and the infants

Category of familiarity	Definition
High	The experimenter reported having interacted with the infant outside of experimental visits.
Medium	The experimenter had been on two or more experimental visits with the infant in the last 6 months (no reported interactions outside of experimental visits).
Low	The experimenter had been on no or one experimental visit with the infant in the last 6 months (no reported interactions outside of experimental visits).

Table 2.11

Numbers of infants per category of familiarity by prosocial task and by culture

Category of familiarity	Sharing		Helping	
	UK	Uganda	UK	Uganda
High	0	13	0	13
Medium	19	10	21	10
Low	21	12	21	13

2.3.5 Demographic Variables

I also considered how important demographic variables might have been related to the infants' helping and sharing behaviours using the data detailed in this section.

Background Questionnaire

At 12, 15, and 18 months, mothers completed a Background Questionnaire that consisted of 50 items covering background and demographic information about the participating family.

In the UK, mothers completed a hard copy during an experimental visit. In Uganda, due to the participating mothers' low literacy rate, the questions were translated into a language that the mother was fluent in by a local research assistant. The mothers responded verbally and their answers were recorded on hard copies of the questionnaires by a research assistant.

For the current study, I focused on the information that the mothers provided about the infant's date of birth, their own age at the infant's birth, the number of different languages they spoke with their infant, and the number of children who stayed in the same household as them and their infant. Mothers were asked about dates of births and languages spoken only once, when they filled in the questionnaire for the first time. They were, however, asked about household members at each of the three time points. Each time, mothers were asked to report how many individuals aged 16 years or younger had lived in their household during the last 3 months. For each of these individuals, mothers reported whether they had stayed in their household full-time or part-time. For part-time household members, mothers were asked to indicate for how long or how often each individual had stayed with them. In order to be considered a part-time household member in the analyses (rather than just a visitor), individuals had to stay at the participants' house for at least one night at a time.

Household Members Measure Calculation. To get a single representative measure of the number of children that the infants shared a household with, I first added up the number of individuals aged 16 years or younger who had lived in the participants' household in the 3 months leading up to each time point (12, 15, and 18 months) separately. I weighted the amount of time that each of these individuals had spent in the household in the following way: Full-time household members received a score of 1, as well as part-time household members who had spent more than 50% of their time in the family's household. Individuals who had spent between 25 and 50% of their time in the household in the last 3 months received a score of 0.5. Individuals who had spent less than 25% of their time in the household in the last three months received a score of 0.25. If a mother did not give clear estimates of the amount of time an individual had spent in the household (e.g., "She comes to visit sometimes and stays for two days at a time"), the individual received a score of 0.25. This resulted in three separate household member scores for each mother-infant dyad, one for the 12-, 15-, and 18-month time point respectively. I then took the mean of these three

scores to generate the final mean number of children who had lived in the participants' households when infants were 9 to 18 months old. For mothers who had not provided information about the number of children living in their household at one of the three time points, I took an average of the remaining two household member scores. This was the case for three Ugandan and zero UK mothers.

Socialisation Goals

The relational goal scores for the mothers in the present study were obtained from Holden et al. (in review). When the infants were 11 months old, mothers were given a questionnaire based on the Socialisation Goals Questionnaire by Keller (2007) to assess the importance they attributed to autonomous and relational socialisation goals. Holden et al. (in review) extracted maternal alignment with relational or autonomous socialisation goals and calculated a relational goal score for each individual mother. A positive relational goal score indicates that the mother aligned more with relational than with autonomous socialisation goals. A negative relational goal score indicates a stronger alignment with autonomous than with relational socialisation goals. A score of zero indicates that the mother did not consistently chose relational nor autonomous statements as more important.

All of the participants who were included in the present study were also included in the study by Holden et al. (in review). The Holden et al. (in review) sample was slightly larger than the sample of the present study because to be included in the present study, participants needed valid Sharing and/or Helping data at 18 months. Therefore, the participants of the present study were a subsample of the Holden et al. (in review) sample. The present study analysed the data of 83 participants, while the Holden et al. (in review) study included 97 participants.

2.3.6 Statistical Analyses for the Sharing and Helping Tasks Data

Cultural Variation in Demographic Variables

In order to test if the two cultural groups differed in important demographic variables, I ran an independent samples t-test on maternal age at the infant's birth. For the remaining variables, data were not normal and therefore violated the assumptions of parametric tests. Instead, I conducted non-parametric Mann-Whitney U tests (Mann & Whitney, 1947) to

examine if Ugandan and UK infants differed in age when they were tested, if the Ugandan and UK infants differed in the number of children they shared a household with, and if Ugandan and UK mothers differed in their relational goal scores. Finally, UK mothers only spoke one language with their children (zero variation). Therefore, I conducted a one sample Wilcoxon signed rank test (Wilcoxon, 1945) to test if the median number of languages spoken in Ugandan was significantly higher than one. Appropriate effect sizes are reported for all tests (for parametric tests Cohen's D and for non-parametric tests an r value where $r = z/\sqrt{N}$).

Preliminary Analyses on Associations between Demographic Variables and Sharing and Helping

I used point-biserial correlations to examine whether important demographic factors related to the infants' performance in the Toys Sharing task and the Out of Reach Helping task. The following five demographic variables were included in these preliminary analyses: maternal age at the infant's birth, infant age when being tested at the 18 month time point, mean number of children living in the same household as the infant, number of different languages the mother reported speaking with her infant, and the relational goal score (as obtained from Holden et al. (in review)). Each of these five demographic factors was correlated with (i) infant sharing behaviour in the Request condition with an experimenter, (ii) infant sharing behaviour in the Request condition with their mother, (iii) infant helping behaviour towards an experimenter, and (iv) infant helping behaviour towards their mother.

Modelling Approach

In the next part of my analyses, I aimed to examine associations between infant sharing and helping, cross-cultural differences in infant sharing and helping, and associations between familiarity with a recipient of resources or help and infant prosociality towards that recipient. To examine these questions I conducted five Generalised Linear Mixed Models (GLMM; Baayen, 2008). Running GLMMS rather than simpler statistical tests, such as correlations or linear regressions, was the most appropriate statistical approach for this thesis because screening the Toy Sharing task trials and the Out of Reach Helping task trials for validity meant that while the majority of infants contributed trials with both their mother and an experimenter, certain participants only contributes data from trials with an

experimenter and others only contributed data from trials with their mothers. This repeated sampling of some but not all participants meant that I needed to deal with the issue of pseudoreplication in order to avoid type 1 errors. GLMMs allowed me to enter the identity of the child as a random factor, addressing the issue of pseudoreplication in the data set (Waller et al., 2013).

The five GLMMs, which I will describe in more detail in the following sections, were all ran with binomial error structure and logit link function. All models were fitted in R Studio (version 4.0.2) using the function glmer of the R package lme4 (version 1. 1-21; Bates et al., 2015). Likelihood ratio tests (Dobson, 2002) were used to compare each full model (including all fixed and the random effects) with a null model (only including the control variables and random effects). This was done to test whether variance in the data was better explained by the full model than by the null model. The individual fixed effects for each model were tested using likelihood ratio tests (Barr et al., 2013; R function drop1 with argument "test" set to "Chisq"). Whenever a full-null model comparison revealed a better fit of the full model than the null model but no significant interaction effect was found, I used a second likelihood ratio test (Dobson, 2002) to compared the null model with a reduced model, which had the same fixed and random effects structure as the full model but did not include the interaction term.

I determined Variance Inflation Factors (VIF, Field, 2005) for a standard linear version of each model to rule out collinearity. All models were also checked for model stability by comparing the estimates from the full model based on all data with the estimates from models that lacked one level of the random effects at a time (Nieuwenhuis et al., 2012).

I derived confidence intervals for all models using the function bootMer of the package lme4, using 1000 parametric bootstraps and bootstrapping over the random effects (argument use.u set to TRUE). I determined the effect sizes suggested by Nakagawa et al. (2017) using the R function r.squaredGLMM of the package MuMIn (version 1.43.6; Barton, 2018), which returns R^2-like effect sizes for the entirety of the fixed effects (marginal R^2, $R^2_{GLMM(m)}$) and for the entirety of the fixed and random effects (conditional R^2, $R^2_{GLMM(c)}$).

Model 1: Relationship between Sharing and Helping

The first model I ran aimed to investigate the relationship between infant sharing and helping across the two experimental tasks. The outcome variable of the model was "Was the infant identified as a helper in the Out of Reach Helping task (Yes/No)". The full model included the following fixed effects: sharing in the Request condition (Yes/No), culture (UK or Uganda), and the interaction of sharing in the Request condition and culture as predictor variables, as well as interaction partner (mother or experimenter) and infant sex (female or male) as control variables. Additionally, infant ID and adult ID were included as random effects. The null model only included the control variables of interaction partner and infant sex and the random effects. The optimiser "bobyqa" was used when fitting this model.

The following VIF were revealed for this model: 1.12 for sharing, 1.04 for culture, 1.09 for infant sex, and 1.04 for interaction partner. The model stability test revealed the model to be fairly stable (see Results).

The model included data from 68 experimenter trials in the Toy Sharing task and the Out of Reach Helping task and from 41 mother trials in the Toy Sharing task and the Out of Reach Helping task.

Main Analyses on Infant Sharing

Sharing Models. As sharing rates were very low in the No Request condition, I only conducted inferential statistics on the infants' sharing behaviour in the Request condition. In order to do that, I ran two Generalised Linear Mixed Models (GLMM; Baayen, 2008) to (i) check if infant sharing with an experimenter in the Request condition was significantly related to the familiarity between the infant and that specific experimenter and (ii) to examine whether the infants' sharing behaviour in the Request condition was associated with their cultural group and/or by the identity of their interaction partner.

Model 2: Experimenter Familiarity and Sharing. In the model testing the association between familiarity and sharing behaviour in the Request condition, the following fixed effects were included in the full model: familiarity (high, medium, or low), culture (UK or Uganda), and infant sex (female or male) and the random effect of experimenter ID was included. Additionally, in order to keep type I error rate at the nominal level of 5% (Barr et

al., 2013; Schielzeth & Forstmeier, 2009), all theoretically identifiable random slopes components (familiarity and sex within adult ID) were included. Before being included as random slopes components, familiarity and sex were manually dummy coded and centred. The correlations between random intercepts and slopes were first included in the model, but as they appeared to be unidentifiable (indicated by absolute correlation parameters of one; Matuschek et al., 2017), they were excluded from the final model. The optimiser "bobyqa" was used when fitting this model. The null model had the same fixed and random effect structure as the full model but did not include familiarity (Forstmeier & Schielzeth, 2011).

The following VIF were revealed for this model: 1.18 for familiarity, 1.33 for culture, and 1.06 for infant sex. The model stability test revealed the model to be fairly stable (see Results). The model included data from 75 Toy Sharing experiments with an experimenter.

Model 3: Effect of Cultural Group and Interaction Partner on Sharing. In the model investigating the associations between the infants' sharing behaviour in the Request condition and their cultural group and interaction partner respectively, I included the following fixed effects: culture (UK or Uganda), interaction partner (mother or experimenter), the interaction of culture and interaction partner, and infant sex (female or male). Additionally, infant ID and adult ID were included as random effects. As there appeared to be no significant association between familiarity and sharing behaviour (see "Model 2: Experimenter Familiarity and Sharing" in Results), familiarity was not included as a fixed effect in this second model. The null model only included infant sex and the random effects (Forstmeier & Schielzeth, 2011).

The following VIF were revealed for this model: 1.01 for culture, and 1.00 for interaction partner and infant sex respectively. The model stability test revealed the model to be fairly stable (see Results). The model included data from 75 Toy Sharing experiments with an experimenter and data from 62 Toy Sharing experiments with the mother (total 137 experiments).

Shared Toy and Latency of Sharing. Following visual examination of the data, I used three Fisher's exact tests to statistically compare three aspects of behaviour in infants who had shared a toy in the Request condition. I examined (i) the distribution of Ugandan and UK

sharers who shared their preferred toy with the experimenter, (ii) the distribution of Ugandan and UK sharers who shared with the experimenter before the first verbal cue, and (iii) the distribution of Ugandan and UK sharers who shared with their mother before the first verbal cue. I used Fisher's exact tests because the assumption of Pearson's chi-square tests that all expected frequencies need to be greater than 5 was not met (Howell, 2006). The data were analysed using IBM SPSS Statistics (Version 26). I considered two-tailed p-values. Odds Ratios were calculated as indicators of effect size.

Main Analyses on Infant Helping

Helping Models. I ran two Generalised Linear Mixed Models (GLMM; Baayen, 2008) to (i) check if helping behaviour towards an experimenter was significantly associated with the familiarity between the infant and that specific experimenter and (ii) to examine whether the infants' helping behaviour was associated with their cultural group and/or by the identity of their interaction partner. Both models were fitted with the optimiser "bobyqa".

Model 4: Experimenter Familiarity and Helping. In the model testing the association between familiarity and helping behaviour, the following fixed effects were included in the full model: familiarity (high, medium, or low) as a predictor variable, and culture (UK or Uganda) and infant sex (female or male) as control variables. Additionally, in order to keep type I error rate at the nominal level of 5% (Barr et al., 2013; Schielzeth & Forstmeier, 2009), sex within adult ID was included as a random slope. Before being included as a random slopes component, sex was manually dummy coded and centred. The correlation between the random intercept and slope was first included in the model, but as it appeared to be unidentifiable (indicated by absolute correlation parameters of one; Matuschek et al., 2017), it was excluded from the final model. The null model had the same control variables and random effect structure as the full model but did not include the predictor variable of familiarity(Forstmeier & Schielzeth, 2011).

The following VIF were revealed for this model: 1.15 for familiarity, 1.31 for culture, and 1.01 for infant sex. The model stability test revealed the model to be fairly stable (see Results). The model included data from 78 Out of Reach Helping experiments with an experimenter.

Model 5: Cultural Group and Interaction Partner*.* In the model investigating the associations between the infants' helping behaviour and cultural group and interaction partner, the following fixed effects were included in the full model: culture (UK or Uganda), interaction partner (mother or experimenter), and the interaction of culture and interaction partner as predictor variables, and infant sex (female or male) as a control variable. Additionally, infant ID and adult ID were included as random effects. As there appeared to be no significant association between familiarity and helping behaviour (see "Model 4: Experimenter Familiarity and Helping" in Results), familiarity was not included as a fixed effect in this second model. The null model only included the control variable of infant sex and the random effects.

The following VIF were revealed for this model: 1.00 for culture and 1.01 for interaction partner and infant sex each. The model stability test revealed the model to be fairly stable (see Results). The model included data from 78 Out of Reach Helping experiments with an experimenter and data from 52 Out of Reach Helping experiments with the mother.

Latency of Helping and Behaviour of Non-Helpers. Following visual examination of the data, I used three Fisher's exact tests to statistically compare three aspects of behaviour in helpers and non-helpers. I examined, (i) the distribution of Ugandan and UK infants identified as helpers who helped the experimenter before the first verbal cue, (ii) the distribution of Ugandan and UK infants identified as non-helpers who did not help their mothers in either condition, and (iii) the distribution of Ugandan and UK infants identified as non-helpers who helped their mothers in both conditions. I used Fisher's exact tests because the assumption of Pearson's chi-square tests that all expected frequencies need to be greater than 5 was not met (Howell, 2006). The data were analysed using IBM SPSS Statistics (Version 26). I considered two-tailed p-values. Odds Ratios were calculated as indicators of effect size.

2.4 Results

2.4.1 Administration Error and Attrition

The participants that had to be excluded from analyses of sharing and helping, and the reasons for these exclusions are shown in Table 2.12 and Table 2.13 respectively.

Table 2.12

Reasons for exclusion from analyses and number of infants excluded from the Sharing analyses by culture and interaction partner

	UK		Uganda	
	Experimenter	Mother	Experimenter	Mother
Attrition (Left the project)	5	5	5	5
Missed the visit	1	5	1	2
Condition missing	1	1	0	1
Fussiness / distress	0	0	1	2
Distraction by other object	3	0	1	0
Test phase < 25 seconds	0	3	0	0
Video quality insufficient	0	0	0	1
Infant never looked at the adult's tray	2	1	1	0
Req: Infant did not see adult's outstretched hand before cue 3	0	2	0	0
Req: Error with cues	0	1	0	2
No Req: Infant did not see adult wave nor heard them say "Hi"	0	3	0	1
Interaction with mother in an experimenter trial	1	0	1	0
Unclear spatial constellation	0	1	0	0

Note. Req = Request condition, No Req = No Request condition

Table 2.13

Reasons for exclusion from analyses and number of infants excluded from the Helping analyses by culture and interaction partner

	UK		Uganda	
	Experimenter	Mother	Experimenter	Mother
Attrition (Left the project)	5	5	5	5
Missed the visit	2	4	0	3
Condition missing	0	0	1	1
Fussiness / distress	0	1	0	4
Distraction by other object	1	1	1	0
Test phase < 25 seconds	2	2	0	0
Infant never looked at the object	0	0	1	0
Exp: Dropping the object did not look accidental	0	2	0	0
Exp: Infant did not see the adult reach for the object	0	2	0	0
Exp: Error with cues	0	3	1	4
Con: Dropping the object looked accidental	0	3	0	0
Adult did not let go of the jar	0	5	0	0
Object too far away for infant to feasibly get it	1	0	0	1

Note. Exp = Experimental condition, Con = Control condition

2.4.2 Demographic Variables as a Function of Culture

Demographic information for the UK and the Ugandan participants of the current study is presented in Table 2.14. Inferential statistics testing whether there were cross-cultural differences in these demographic variables across the two sample revealed that UK mothers were significantly older than the Ugandan mothers when their infant was born, that the

Ugandan infants were significantly older than the UK infants when they completed their 18 month time point, that the Ugandan infants shared their households with a significantly greater number of children than the UK infants, that the Ugandan mothers spoke a significantly larger number of languages with their infants than the UK mothers, and that the Ugandan mothers aligned significantly more strongly with relational socialisation goals than the UK mothers.

Table 2.14

Demographic information for the UK and Ugandan participants

			Significance test			
	UK	Uganda	Test statistic	df	*P*	Effect size
Maternal age[1]	*M* = 32.91, *SD* = 3.58 (N = 44)	*M* = 27.50, *SD* = 7.07 (N = 40)	*t* = -4.36	56	<0.001	*d* = -0.98
Infant age[2]	*Mdn* = 17.92, *IQR* = 0.25 (N = 46)	*Mdn* = 18.25, *IQR* = 0.35 (N = 40)	*U* = 1333.50		<0.001	*r* = 0.39
Siblings/ Household members[3]	*Mdn* = 1.00, *IQR* = 1.00 (N = 46)	*Mdn* = 3.08, *IQR* = 3.63 (N = 40)	*U* = 345.50		<0.001	*r* = 0.55
Languages mother speaks with child[4]	*Mdn* = 1.00, *IQR* = 0.00 (N = 46)	*Mdn* = 2.00, *IQR* = 1.00 (N = 40)	*W* = 780.00		<0.001	*r* = 0.89
Relational goals score[5]	*Mdn* = -0.11, *IQR* = 0.67 (N = 46)	*Mdn* = 0.33, *IQR* = 0.67 (N = 38)	*U* = 367.50		<0.001	*r* = 0.50

Note. [1] Maternal age at birth of the participating infant; [2] Infant age at the 18 month time point; [3] Household members aged 16 years or younger; [4] Number of different languages mothers reported speaking with the infant; [5] Relational goal scores obtained from (Holden et al., in review)

2.4.3 Sharing and Helping Rates as a Function of Culture

Table 2.15 and Table 2.16 show descriptively how sharing and helping rates in the different conditions of the experimental tasks varied with culture.

Table 2.15

Sharing rates: Percentage of infants who gave a toy in each condition per group and interaction partner

	Experimenter		Mother	
	Uganda	UK	Uganda	UK
Gave a toy in the Request condition	45.71% (16/35)	60.00% (24/40)	61.29% (19/31)	64.52% (20/31)
Gave a toy in the No Request condition	11.43% (4/35)	5.00% (2/40)	12.90% (4/31)	12.90% (4/31)
Gave a toy in the control condition	0.00%) (0/4)	0.00% (0/2)	50.00% (2/4)	25.00% (1/4)

Table 2.15 shows that the majority of UK infants shared a toy with their mother and with an experimenter in the Request condition. A similar percentage of Ugandan infants shared a toy with their mothers in the Request condition but only slightly less than half of the Ugandan infants shared a toy with the experimenter in the Request condition. Sharing in the No Request condition did not occur very frequently, with only a small percentage of UK and Ugandan infants sharing a toy with their mothers or experimenters. Only a very small number of infants participated in the Control condition – none of them shared a toy with the experimenter but some of these infants did share a toy with their mothers.

Infants were identified as helpers if they retrieved the object in the experimental but not in the control condition, however, Table 2.16 shows how the infants behaved in the experimental and control condition separately, to aid comparability of these results with those of previous literature (e.g., Dunfield et al., 2011; Pettygrove et al., 2013). In the

remainder of this chapter, I will, however, use the more conservative measure of whether infants were identified as helpers or not.

Table 2.16

Helping rates: Percentage of infants who retrieved the object in the experimental and control condition per group and interaction partner

	Experimenter		Mother	
	Uganda	UK	Uganda	UK
Retrieved the object in the experimental condition	63.89% (23/36)	47.62% (20/42)	74.07% (20/27)	72.00% (18/25)
Retrieved the object in the control condition	11.11% (4/36)	23.81% (10/42)	11.11% (3/27)	56.00% (14/25)

Table 2.16 shows that the majority of Ugandan infants retrieved the object in the experimental condition, while only a small number of them did so in the control condition. This pattern was similar for trials with experimenters and mothers. In the UK, on the other hand, in trials with an experimenter, slightly less than half of the infants retrieved the object in the experimental condition. In UK trials with the mother, infants showed a different pattern of behaviour: Similar to the Ugandan infants, the majority of UK infants retrieved the object in the experimental condition but while the Ugandan infants did not do so in the control condition, more than half of the UK infants retrieved the object for their mothers in the control condition.

2.4.4 Preliminary Analyses on Associations between Demographic Variables and Infant Sharing and Helping

Table 2.17 presents associations between various demographic variables and the infants' sharing and helping behaviours towards an experimenter or their mother in the experimental sharing and helping tasks at 18 months. None of the demographic variables were significantly related to the infants' sharing behaviour. The infants' helping behaviour towards an experimenter, on the other hand, was negatively related to their mothers' age and positively related to the number of languages mothers spoke with their infants,

indicating that mother who had been younger at their infants' birth and mothers who spoke more languages with their infants, had infants who were more likely to help an experimenter in response to need. The infants' helping behaviour towards their mothers was positively related to the infants' age at the time of testing and to the number of languages mothers spoke with their infants. This suggests that infants who were older when participating in the Out of Reach Helping task and infants whose mothers who spoke more languages with them, were more likely to help their mothers in response to need.

Table 2.17

Associations between demographic variables and infant sharing and helping, by interaction partner

	Sharing[1]		Helping	
	Experimenter	Mother	Experimenter	Mother
Maternal age[2]	r_{pb} = -0.01, p = .936	r_{pb} = -0.04, p = .758	r_{pb} = -0.40, p < .001	r_{pb} = -0.03, p = .833
Infant age[3]	r_{pb} = -0.12, p = .297	r_{pb} = -0.13, p = .314	r_{pb} = 0.06, p = .589	r_{pb} = 0.32, p = .021
Household members[4]	r_{pb} = -0.04, p = .750	r_{pb} = -0.01, p = .969	r_{pb} = 0.01, p = .910	r_{pb} = 0.21, p = .134
Languages[5]	r_{pb} = -0.15, p = .192	r_{pb} = 0.03, p = .836	r_{pb} = 0.37, p < .001	r_{pb} = 0.37, p = .007
Relational goals scores	r_{pb} = -0.07, p = .557	r_{pb} = -0.06, p = .644	r_{pb} = 0.22, p = .051	r_{pb} = 0.19, p = .186

Note. [1] Sharing in the Request condition; [2] Maternal age at birth of the participating infant; [3] Infant age at the 18 month time point; [4] Household members ages 16 years or younger; [5] Number of different languages mothers reported speaking with the infant

2.4.5 Relationship between Sharing and Helping

Overall, the full model fitted the data significantly better than the null model (likelihood ratio test comparing full and null model: $\chi^2 = 10.93$, df = 3, p = 0.012, $R^2_{GLMM(m)} = 0.16$, $R^2_{GLMM(c)} = 0.29$; see Table 2.18 for details on the model estimates). As the interaction between culture and sharing in the Request condition was not significant, a reduced model was fitted without the interaction term (see "Statistical Analysis" section in Methods). The reduced model showed a better fit to the data than the null model (likelihood ratio test: $\chi2 = 10.89$, df = 2, p = .004, $R^2_{GLMM(m)} = 0.16$, $R^2_{GLMM(c)} = 0.29$; see Table 2.19 for details of the estimates of the reduced model). The reduced model did, however, only reveal a significant main effect of culture on helping. Infant sharing in the Request condition of the Toy Sharing task at 18 months, hence, did not significantly relate to helping at 18 months - neither as part of the interaction term with culture nor as a main effect. This indicates that infant sharing and helping were not significantly related in the present study.

Table 2.18

Results of model 1 investigating the association between infant sharing in the Request condition of the Toy Sharing task and infant helping in the Out of Reach Helping task

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.13	0.58	-1.28	1.84			[8]	-0.08	0.51
Sharing[4]: culture[5]	-0.20	1.03	-2.76	2.78	0.04	1	0.844	-1.06	0.21
Sharing[4]	0.70	0.71	-0.60	3.35			[8]	0.29	0.91
Culture[5]	-1.53	0.83	-19.65	0.06			[8]	-1.92	-1.21
Sex[6]	-0.23	0.53	-1.48	0.95	0.19	1	0.664	-0.40	-0.09
Int.partner[7]	0.56	0.50	-0.48	3.61	1.33	1	0.249	0.42	0.77

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Sharing a toy in the Request condition, dummy coded with 'No' being the reference

category

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] Interaction partner, dummy coded with experimenter being the reference category

[8] p-values not reported as they have very limited interpretation

Table 2.19

Results of the reduced model (model 1) investigating the association between infant sharing in the Request condition of the Toy Sharing task and infant helping in the Out of Reach Helping task

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*
Intercept	0.18	0.54	-0.98	8.81			[8]
Sharing[4]	0.61	0.53	-0.50	2.05	1.34	1	0.248
Culture[5]	-1.65	0.56	-34.18	-0.74	10.55	1	0.001
Sex[6]	-0.23	0.52	-1.47	0.81	0.19	1	0.663
Int. partner[7]	0.56	0. 50	-0.40	5.29	1.36	1	0.243

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Binary variable expressing whether or not the infant shared in the Request condition of the Toy Sharing task at 18 month

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] Interaction partner, dummy coded with experimenter being the reference category

[8] p-value not reported as they have very limited interpretation

2.4.6 Main Analyses

Sharing Task

Model 2: Experimenter Familiarity and Sharing. There was no significant effect of familiarity with an experimenter on the infants' sharing behaviour towards the experimenter in the Request condition (likelihood ratio test comparing full and null model: $\chi^2 = 0.51$, *df* = 2, p = .778, $R^2_{GLMM(m)} = 0.10$, $R^2_{GLMM(c)} = 0.18$). For UK and Ugandan infants, the likelihood of sharing with an experimenter in the Request condition appears to have been similar regardless of whether the experimenter was high, medium or low familiarity (see Table 2.20 for details on the model estimates).

Table 2.20

Results of model 2, investigating the association between familiarity with an experimenter and the infants' sharing behaviour towards the experimenter

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.27	0.718	-1.52	2.00			[7]	0.01	0.46
Familiarity[4]					0.51	2	0.777		
Familiarity (low)[4]	-0.35	0.81	-2.37	1.60			[7]	-0.74	0.16
Familiarity (medium)[4]	0.10	0.94	-2.10	2.53			[7]	-0.43	0.59
Culture[5]	0.82	0.61	-0.41	2.59	1.89	1	0.170	0.48	1.09
Sex[6]	-1.11	0.53	-2.66	-0.07	3.79	1	0.052	-1.51	-0.72

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates when excluding experimenters one at a time

[4] Dummy coded with high familiarity being the reference category; the indicated test refers to the overall effect of familiarity

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] p-values not reported as they have very limited interpretation

Model 3: Effect of Cultural Group and Interaction Partner on Sharing. Overall, there was no significant effect of culture or interaction partner on the sharing behaviour of the 18-month-old infants in the Request condition (likelihood ratio test comparing full and null model: χ^2 = 3.60, *df* = 3, p = 0.309, $R^2_{GLMM(m)}$ = 0.08, $R^2_{GLMM(c)}$ = 0.18). Infants from both the UK and Uganda appeared to be similarly likely to share with their mothers and with an experimenter in the Request condition (see Table 2.21 for details on the model estimates). Figure 5 shows the percentage of UK and Ugandan infants who shared with their mothers or an experimenter in the Request condition of the Toy Sharing task.

Table 2.21

Results of model 3, investigating the association between culture and interaction partner and the infants' sharing behaviour at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.24	0.42	-0.62	1.10			[7]	0.07	0.51
Int. partner: culture	-0.54	0.77	-2.15	0.95	0.49	1	0.486	-0.85	-0.20
Int. partner[4]	0.74	0.56	-0.36	2.00			[7]	0.531	0.96
Culture[5]	0.77	0.55	-0.26	2.00			[7]	0.44	1.11
Sex[6]	-1.07	0.44	-2.02	-0.26	6.84	1	0.009	-1.24	-0.89

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Interaction partner, dummy coded with experimenter being the reference category

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] p-values not reported as they have very limited interpretation

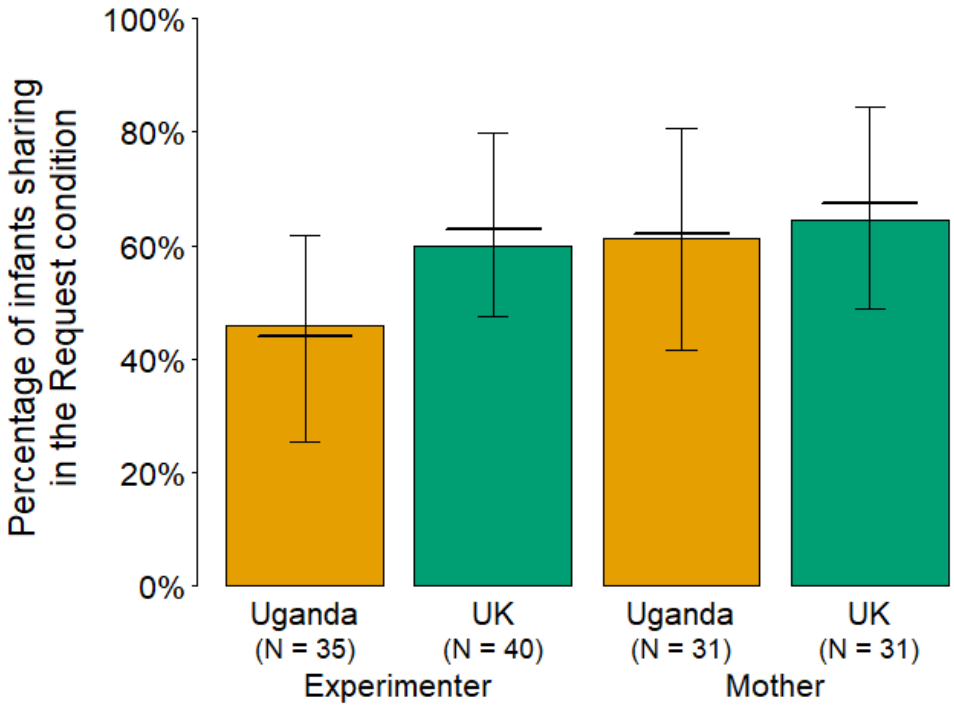

Figure 5. Percentage of infants who shared a toy in the Request condition per culture and interaction partner. The bars illustrate raw data, whilst the horizontal lines with error bars show the estimates from the fitted model and their 95% confidence intervals with infant sex being centred.

While model 3 did not find a significant effect of culture or interaction partner on the 18-month-old infants' likelihood of sharing a toy with the adult in the Request condition, it did reveal a significant effect of sex on infant sharing, with girls being overall more likely to share in the Request condition than boys (see Figure 6).

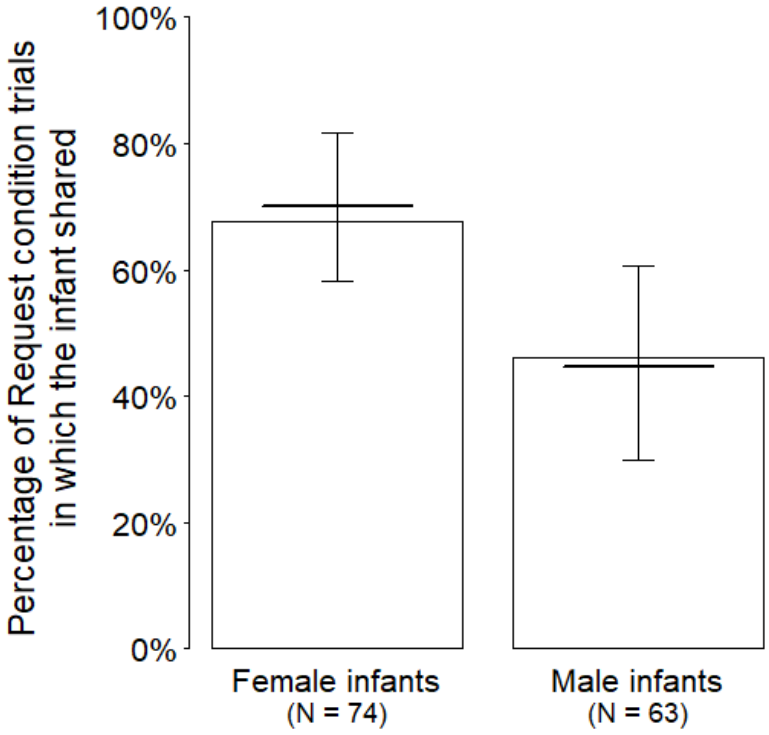

Figure 6. Percentage of Request condition trials (with mothers and experimenters) in which female and male infants gave a toy to their interaction partner. The bars illustrate raw data, whilst the horizontal lines with error bars show the estimates from the fitted model and their 95% confidence intervals while culture and interaction partner have been centred.

Behaviour of the Sharers. To understand more about the behaviour of the infants who shared a toy in the Request condition (called "sharers" in the following section), I looked at (i) which toy they shared with the adult and (ii) after which cue they gave the toy to the adult.

Shared Toy. First, I identified all sharers who had shown a clear preference for one of the two toys in the preference assessment of their Request condition and then I calculated the percentage of those sharers who gave their preferred toy to the adult (see Figure 7). Giving the preferred toy was defined as either only giving the preferred toy or giving both the preferred and the unpreferred toy to the adult at the same time.

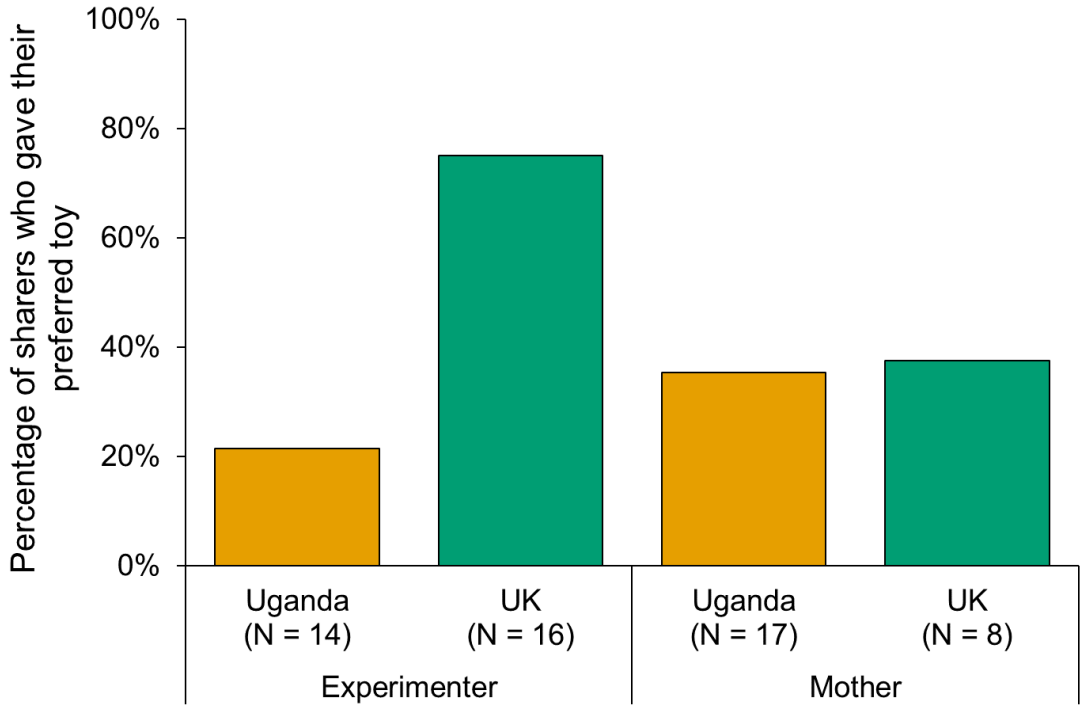

Figure 7. Percentage of sharers who had indicated a clear preference for a toy in the preference assessment and who then gave their preferred toy to the adult in the test phase of the Request condition

As the number of infants who shared a toy in the Request condition and gave a clear preference for one of the toys at the beginning of the Request condition trial was comparatively low, I could not run a GLMM to test whether cultural group or interaction partner was associated with this aspect of the infants' sharing behaviour. However, using a Fisher's exact test, I did find a significant difference between UK and Ugandan infants in their propensity to give the preferred toy to the experimenter (Fisher's exact test p = 0.009): Significantly more UK than Ugandan infants gave their preferred toy to the experimenter in the Request condition. From calculating the Odds Ratio as an indicator of effect size, it was found that UK infants had 11 times greater odds (95% CI: 2.00, 60.57) for giving their preferred toy to the experimenter than Ugandan infants.

Cue before Sharing. To see how much prompting the infants needed before they gave a toy to the adult, I calculated the percentage of sharers who shared at different points in the Request condition (see Table 2.22). Even though descriptively it looks like in trials with the experimenter, UK infants shared slightly later than Ugandan infants, there was no significant

difference in the distribution of Ugandan and UK infants who gave a toy to the experimenter before the first verbal cue (Uganda: 87.50% (14/16), UK: 62.50% (15/24); Fisher's exact test p = 0.148), nor in the distribution of Ugandan and UK infants who gave a toy to the experimenter before the direct request was given (Uganda: 93.75% (15/16), UK: 75.00% (18/24); Fisher's exact test p = 0.210). From calculating the Odds Ratio as an indicator of effect size, it was found that the odds of Ugandan infants sharing with the experimenter before the first verbal cue were increased by 0.24 compared to the UK infants (95% CI: 0.04, 1.30), while their odds of sharing with the experimenter before the direct request were increased by 0.20 as compared to the UK infants (95% CI: 0.02, 1.85).

Table 2.22

Cues the adult gave during the experimental condition and the percentage of sharers per group and interaction partner who gave a toy to the adult during/ after each cue

	Experimenter		Mother	
	Uganda (n = 16)	UK (n = 24)	Uganda (n = 19)	UK (n = 20)
Before the start of the first cue	0.00% (0/14)	0.00% (0/24)	0.00% (0/19)	10.00% (2/20)
During the non-verbal cues (Hand out + Look at toy or Hand out + Gaze alternation)	87.50% (14/16)	62.50% (15/24)	84.21% (16/19)	70.00% (14/20)
After cue 3 had been given (Hand out + "Look, I don't have any toys!")	6.25% (1/16)	12.50% (3/24)	10.53% (2/19)	10.00% (2/20)
After cue 4 had been given (Hand out + "Can I have one please?")	6.25% (1/16)	25.00% (6/24)	5.26% (1/19)	10.00% (2/20)

Sharing Behaviour across Conditions. Table 2.23 lists the different combinations of behaviours across conditions that the infants in this study showed as well as the percentage of the infants who behaved that way. Whenever an infant did not give the toy to the adult in any of the conditions they were tested in, I checked whether the infant had touched the

toys at all or not (as this could be an indicator for underlying reasons for not sharing, e.g., not sharing because the infant wanted to play with the toys themselves versus not sharing because the infant was uncertain about the objects or not interested in them).

Table 2.23

Percentage of the infants who showed different types of sharing behaviours across the conditions they participated in

	Experimenter		Mother	
	Uganda	UK	Uganda	UK
Gave a toy in Req but not in No Req	42.86% (15/35)	55.00% (22/40)	48.39% (15/31)	54.84% (17/31)
Gave a toy in Req and No Req but not in Con	2.86% (1/35)	5.00% (2/40)	6.45% (2/31)	6.45% (2/31)
Gave a toy in No Req but not in Req or Con	8.57% (3/35)	0.00% (0/40)	0.00% (0/31)	3.23% (1/31)
Gave a toy in all three conditions	0.00% (0/35)	0.00% (0/40)	6.45% (2/31)	3.23% (1/31)
Did not give a toy in Req and No Req (but touched a toy)	37.14% (13/35)	40.00% (16/40)	38.71% (12/31)	32.26% (10/31)
Did not give a toy in Req and No Req (never touched a toy)	8.57% (3/35)	0.00% (0/40)	0.00% (0/31)	0.00% (0/31)

Note. Req = Request condition, No Req = No Request condition, Con = control condition

The vast majority of infants either shared in the Request condition (and no other condition) or did not share in any of the conditions. There was a small number of infants who showed a different pattern of behaviour, for instance by sharing in both the Request and No Request condition or by sharing in the No Request condition only. All UK infants who did not give a toy in any condition touched a toy, while three Ugandan infants who did not give a toy in any condition never touched a toy when their interaction partner was the experimenter.

Uncooperative Behaviour in Request Trials. I also looked at whether the infants showed any uncooperative behaviours in the Request condition. Across both cultural groups and interaction partners, in only four out of the 79 Request trials in which the infant shared a toy did they show any type of uncooperative behaviour before giving a toy to the adult. In contrast, in 24 of the 58 Request trials in which the infants did not share a toy, infants showed at least one kind of uncooperative behaviour. The different kinds of uncooperative behaviours that were observed in both the sharers and non-sharers in the Request condition are listed in Table 2.24.

Table 2.24

Number of Request trials in which uncooperative behaviours of different kinds were shown by sharers and non-sharers (across both cultural groups and interaction partners)

Uncooperative behaviour	Sharers	Non-sharers
Infant moved away from the adult with their toys	3	14
Infant tried to hide their toys	1	4
Verbal rejection	0	3
Infant pushed or hit adult's hand	1	4
Infant took adult's tray	0	3

Note. Some infants showed multiple kinds of uncooperative behaviour meaning these data were generated by four sharers and 24 non-sharers who all showed at least one type of uncooperative behaviour. The remaining 75 sharers and 34 non-sharers showed no uncooperative behaviours in the Request condition.

Helping Task

Model 4: Experimenter Familiarity and Helping. There was no significant effect of familiarity with the experimenter on the infants' helping behaviour towards the experimenter (likelihood ratio test comparing full and null model: $\chi^2 = 1.64$, *df* = 2, p = .440, $R^2_{GLMM(m)} = 0.12$, $R^2_{GLMM(c)} = 0.12$). This indicates that the UK and Ugandan infants were similarly likely to help an experimenter regardless of whether that experimenter was high, medium or low familiarity (see Table 2.25 for details on the model estimates).

Table 2.25

Results of model 4, investigating the association between familiarity with an experimenter and the infants' helping behaviour towards the experimenter

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.96	0.64	-0.22	2.79			[7]	0.84	1.28
Familiarity[4]					1.64	2	0.440		
Familiarity (low)[4]	-0.74	0.80	-2.75	0.92			[7]	-1.32	-0.02
Familiarity (medium)[4]	-0.97	0.77	-3.11	0.62			[7]	-1.48	-0.37
Culture[5]	-0.96	0.55	-2.42	0.10	3.05	1	0.081	-1.43	-0.60
Sex[6]	-0.37	0.50	-1.57	0.66	0.57	1	0.451	-0.66	-0.22

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates when excluding experimenters one at a time

[4] Dummy coded with high familiarity being the reference category; the indicated test refers to the overall effect of familiarity

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] p-values not reported as they have very limited interpretation

Model 5: Effect of Cultural Group and Interaction Partner on Helping. Overall, the full model fitted the data better than the null model (likelihood ratio test: $\chi2 = 12.15$, df = 3, p = .007, $R^2_{GLMM(m)} = 0.13$, $R^2_{GLMM(c)} = 0.22$; see Table 2.26 for details on the model estimates). As the culture*interaction partner interaction was found to not be significant, a reduced model was fitted (see "Statistical Analysis" section in Methods). The reduced model was a significantly better fit for the data than the null model (likelihood ratio test: $\chi2 = 12.12$, df = 2, p = .002, $R^2_{GLMM(m)} = 0.13$, $R^2_{GLMM(c)} = 0.22$) and examination of individual variables revealed a significant effect of culture on helping (Table 2.27). More specifically, more Ugandan than UK infants were identified as helpers in the Out of Reach Helping experiments

at 18 months (Figure 8). The identity of the interaction partner (mother vs. experimenter; Figure 8) and the sex of the infant, on the other hand, were not found to be significant predictors of the infants' helping behaviour (see Table 2.27).

Table 2.26

Results of the full model (model 5) investigating the association between culture and interaction partner and the infants' helping behaviour at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	Min[3]	Max[3]
Intercept	0.46	0.43	-0.42	1.49	0.35	0.65
Int. partner[4]: Culture[5]	-0.12	0.83	-1.91	1.47	-0.33	0.10
Int. partner[4]	0.47	0.57	-0.63	1.81	0.30	0.67
Culture[5]	-1.38	0.58	-2.76	-0.39	-1.59	-1.16
Sex[6]	-0.46	0.44	-1.45	0.34	-0.63	-0.34

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Interaction partner, dummy coded with experimenter being the reference category

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

Table 2.27

Results of the reduced model (model 5) investigating the association between culture and interaction partner and the infants' helping behaviour at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*
Intercept	0.48	0.40	-0.258	1.39			[6]
Int. partner[3]	0.41	0.42	-0.33	1.28	1.01	1	0.314
Culture[4]	-1.43	0.46	-2.58	-0.57	10.81	1	0.001

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*
Sex[5]	-0.46	0.44	-1.40	0.37	1.13	1	0.288

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Interaction partner, dummy coded with experimenter being the reference category

[4] Dummy coded with Uganda being the reference category

[5] Dummy coded with female being the reference category

[6] p-values not reported as they have very limited interpretation

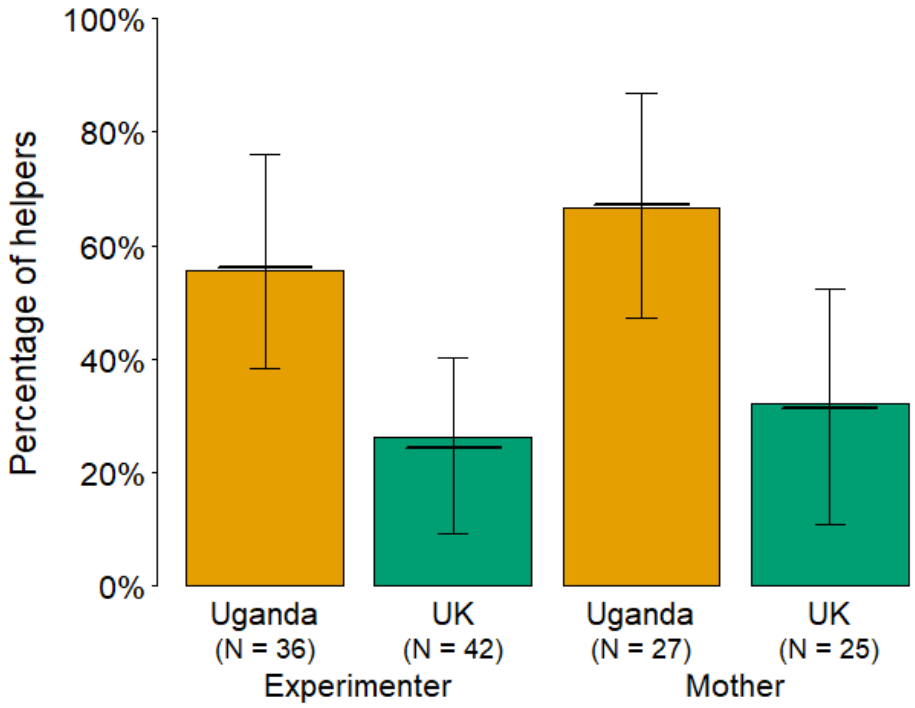

Figure 8. Percentage of infants who were identified as helpers per culture and interaction partner. The bars illustrate raw data, whilst the horizontal lines with error bars show the estimates from the fitted model and their 95% confidence intervals with infant sex being centred.

Behaviour of the Helpers. To understand more about the behaviour of the infants who had been identified as helpers, I looked at (i) which type of helping behaviour they showed, i.e., whether they helped by handing the object to the adult or by letting go of the object on the

table for at least 1 second, and (ii) after which cue they helped in the experimental condition. The behaviour of non-helpers is considered in the next section.

Type of Helping. In trials with an experimenter, all Ugandan and UK infants identified as helpers, helped by directly giving the object to the adult. In trials with their mothers, most UK and Ugandan infants behaved the same way, but some infants helped by placing the object on the table and letting go for at least 1 second (see Table 2.28).

Table 2.28

Percentage of helpers who showed different types of helping behaviours in the experimental condition per group and interaction partner

	Experimenter		Mother	
	Uganda (n = 20)	UK (n = 11)	Uganda (n = 18)	UK (n = 8)
Handed the object to the adult	100.00% (20/20)	100.00% (11/11)	83.33% (15/18)	62.50% (5/8)
Put the object on the table and let go	0.00% (0/20)	0.00% (0/11)	16.67% (3/18)	37.50% (3/8)

Latency of Helping. To see how much prompting the infants needed before they helped the adult, I calculated the percentage of helpers who helped at different points in the experimental condition (see Table 2.29). For two UK infants, their mothers waited until the very end of the trial to accept the object even though the infant very clearly tried to give the object to them much earlier in the trial. As the mothers' behaviour influenced the latency of the infants' helping, I excluded these trials from the calculations in this section.

In trials with the experimenter, there was a significant difference in the distribution of Ugandan and UK infants who helped before the first verbal cue (Uganda: 75% (15/20), UK: 18.18% (2/11); Fisher's exact test p = .007), with the Ugandan infants helping earlier in the trial than the UK infants. From calculating the Odds Ratio as an indicator of effect size, it was found that the odds of Ugandan infants helping the experimenter before the first verbal cue

were increased 13.50 times compared to the UK infants (95% CI: 2.15, 84.69). Descriptively, the latency of helping looked more similar across the two cultural groups for trials with the mother, but as the latency data of only six UK mother trials could be considered, this was not tested inferentially.

Table 2.29

Cues the adult gave during the experimental condition and the percentage of helpers per group and interaction partner who helped the adult during/ after each cue

	Experimenter		Mother	
	Uganda (n = 20)	UK (n = 11)	Uganda (n = 18)	UK (n = 6)
During the non-verbal cues (Reaching + Look at object or Reaching + Gaze alternation)	75.00% (15/20)	18.18% (2/11)	72.23% (13/18)	66.66% (4/6)
After cue 3 had been given (Reaching + "Look, I can't reach it!")	10.00% (2/20)	18.18% (2/11)	11.11% (2/18)	16.67% (1/6)
After cue 4 had been given (Reaching + "Can you get that please?")	15.00% (3/20)	63.64% (7/11)	16.67% (3/18)	16.67% (1/6)

Behaviour of the Non-Helpers. In order to be identified as a helper, an infant had to retrieve the toy in the experimental condition but not in the control condition. Any other combination of possible behaviours across the experimental and control condition resulted in an infant being classified as a non-helper. Table 2.30 lists the different combinations of behaviours across conditions that the non-helpers in this study showed as well as the percentage of the non-helpers who behaved that way. In trials with the experimenter, the majority of UK and Ugandan non-helpers did not retrieve the object in either of the two conditions. In trials with their mothers, Ugandan non-helpers showed a similar pattern of behaviour. Most UK non-helpers, on the other hand, retrieved the object in both the experimental and the control condition when tested with their mothers. There was a significant difference in the distribution of Ugandan and UK non-helping infants who did not

help their mothers in either condition (Uganda: 66.67% (6/9), UK: 17.65% (3/17); Fisher's exact test p = .028). The odds of Ugandan non-helper infants not helping their mothers in either condition were increased by 9.33 as compared to the UK non-helper infants (95% CI: 1.45, 60.22). The distribution of Ugandan and UK non-helpers who helped their mothers in both conditions did not differ significantly (Uganda: 22.22% (2/9), UK: 58.82% (10/17); Fisher's exact test p = .110). The odds of UK non-helper infants helping their mothers in both conditions was increased by 5.00 as compared to the Ugandan non-helper infants (95% CI: 0.79, 31.63).

Table 2.30

Percentage of non-helpers who showed different types of behaviours across the conditions they participated in

	Experimenter		Mother	
	Uganda (n = 16)	UK (n = 31)	Uganda (n = 9)	UK (n = 17)
Did not help in Exp and Con	75.00% (12/16)	67.74% (21/31)	66.67% (6/9)	17.65% (3/17)
Helped in Con but not in Exp	6.25% (1/16)	3.23% (1/31)	11.11% (1/9)	23.53% (4/17)
Helped in both conditions	18.75% (3/16)	29.03% (9/31)	22.22% (2/9)	58.82% (10/17)

Note. Exp = experimental condition, Con = control condition

2.5 Discussion

This study examined helping and sharing behaviour in 18-month-old infants with their mother and an experimenter in two different cultural samples. While a similar number of Ugandan and UK infants shared with an adult, Ugandan infants were significantly more likely to help retrieve an out-of-reach object for an adult than UK infants. Infants were equally likely to share with and help their mother and a less familiar experimenter. In line with previous research that found that performance on helping and sharing paradigms were not related in infancy (e.g., Dunfield et al., 2011) and that early sharing and helping might be

based on distinct psychological mechanisms and motivations (e.g., Dunfield, 2014; Paulus et al., 2013), I found no evidence that performance on the helping task was significantly associated with performance on the sharing task. I will first discuss the main sharing results in the context of previous research, before discussing the main helping results. I will then consider aspects of infant performance across these two tasks that were similar or can be directly compared, before finally considering limitations.

2.5.1 Sharing

The present study was, to my knowledge, the first study that examined sharing behaviour in infants from a Non-WEIRD cultural background and compared it to that of infants from a WEIRD society. The proportion of 18-month-old infants who shared a toy in this study was in line with the percentages of infants who shared as reported in previous experimental studies: Dunfield et al. (2011), for example, conducted a comparable study with 18-month-old Canadian infants, finding that 42% of them shared food with an experimenter. A similar proportion of Ugandan infants in the present study shared a toy in the Request condition of the Toy Sharing task, with 46% (16/35) of them sharing toys with an experimenter, while the UK infants descriptively were slightly more likely to share, with 60% (24/40) of them sharing with an experimenter. This indicates that the present study succeeded in measuring sharing behaviour in a comparable way to previous studies, with the infants from the UK sample showing slightly more sharing than expected.

The statistical models in this study indicated that at 18 months of age, Ugandan infants from a rural, subsistence farming background and infants from an urban UK middle-class setting were equally likely to share toys with an adult. Although the sample size of the present study was modest, it is comparable to some previous studies who found cross-cultural differences in various aspects of sharing in early childhood (e.g., n per cultural group = 15 - 56; Rochat et al., 2009; Schäfer et al., 2015; Scharpf et al., 2017). This indicates that the current study had comparable statistical power to find a similar sized effect if it had been there. In future research, it would, however, be useful to conduct a power analysis before conducting a similar study to specifically check the sample size that would be necessary to find an effect of culture on sharing. As the present study was part of a larger longitudinal project and the sample size was therefore fixed, it was not possible to select the sample size

based on a power analysis specifically focused on the sharing task, nor was it possible to increase the sample size.

In the future, it would also be helpful, to replicate the present study with a larger sample and to explore a Bayesian statistical approach to modelling the data as this may help us to better understand the confidence we can have in the null result of the current study. Some previous studies have revealed cross-cultural differences in sharing rates during early childhood (e.g., Rao & Stewart, 1999; Rochat et al., 2009), while others found these differences to only appear as children entered middle childhood (e.g., Cowell et al., 2017; House et al., 2013; Huppert et al., 2019). It would therefore be very interesting to test children from the communities tested in the present study at later ages, to see, for example, how their sharing behaviour develops during early childhood and at which ages potential differences in sharing might emerge. Finding no significant differences in the likelihood of sharing of UK and Ugandan children during early childhood would strengthen the argument made by House et al. (2013) that children only become sensitive to society-specific rules about resource distributions in middle childhood. Detecting significant differences in the sharing behaviours of UK and Ugandan during early childhood, on the other hand, would be more in line with findings by Rochat et al. (2009) who concluded that the cultural environment children grow up in already affects their sharing behaviour at the ages three to five. Another important avenue of future research would be to test infants from cultures for whom significant differences in sharing have been found during early childhood, in order to see whether these differences are already present during infancy or, else, at what age they emerge.

Descriptively, the likelihood for sharing was slightly higher in the UK infants than in the Ugandan infants. One possible explanation for this could be that the Ugandan infants might have been more neophobic towards the toys they were presented with. Three out of the 38 Ugandan infants whose data were included in the analyses did not touch a toy in any of the conditions they participated in, while this was the case for none of the 45 UK infants. Every effort had been made to find items that the infants in each cultural group were highly familiar with and that were considered toys in the local environment, by piloting different objects and consulting local research assistants who were themselves mothers. The fact that the vast majority of infants who participated in this study engaged with the study materials

suggests that, overall, they were provided with culturally appropriate toys. It is possible that some children are generally more reluctant to play with toys that they are unfamiliar with, as Rheingold et al. (1976) also reported that a small number of the 18-month-old US-American infants in their study (four out of 90 infants) did not interact with any of the toys they were provided with. Still, the fact that only Ugandan infants in the present study showed this reluctance to engage with the study toys could indicate that they were less used to unfamiliar adults giving them new objects. In future research, it could therefore be useful to have an object familiarisation session before the experimental task in order to try to avoid some infants feeling uncertain about the study materials.

When examining the behaviour of the infants more closely, I found that the majority of infants who gave a toy in the Request condition did not do so in the No Request condition, indicating that, in order to share with their mothers or an experimenter, they needed to be given a request (either gestural or both gestural and verbal) that made the adult's need and desire for a toy manifest. This finding is in line with previous research showing the necessity of making a recipient's material needs explicit for infants in order for them to share (e.g., Brownell, Iesue, et al., 2013; Brownell et al., 2009; e.g., Dunfield, 2014). Interestingly, the majority of infants who shared in the Request condition gave a toy to the adult before any verbal prompts were given, which indicates that they did not need the more explicit verbal cues, but rather that a gestural cue was sufficient. It is important to note, though, that we do not know whether the gestural cue was necessary because it helped the infants understand the situation or whether it simply elicited obedience rather than sharing out of a prosocial motivation. Further investigations are, therefore, necessary to examine the degree to which and the reasons why direct requests are necessary to elicit sharing in young infants from these cultural contexts. One possibility for examining this could be to replicate this study and to include additional conditions, for instance, one in which the infants' interaction partner points out their lack of toys but does not give any gestural or verbal requests for the infants' toys and/or a condition in which the interaction partner has low objective need for toys but still asks the infant to share toys with them. Prosocial sharing could then be operationalised as sharing in conditions in which the adult needs a toy but does not request it, while compliant sharing could be operationalised as only sharing in response to direct requests.

There was, however, also a small number of infants who gave a toy to their interaction partner in both the Request condition and the No Request condition but not in the control condition. Sharing in both conditions in which the adult had received no toys but not in the condition in which they had their own set of toys suggests that these infants might have been sharing based on observation of a very clear objective need for toys and not solely out of compliance with a direct request. This indicates that a small proportion of infants might already show a more sophisticated understanding of need at this age. Future studies could investigate which situational circumstances or characteristics of the infants might explain this elevated understanding of need.

Even though overall the likelihood of sharing did not significantly differ across cultural groups and interaction partners, I found that when the infants shared, significantly more UK than Ugandan infants gave their preferred rather than their unpreferred toy to the experimenter. Previous studies found that around 50% of the 12- and 15-month-old US-American infants who shared a toy with an experimenter gave their preferred toy (Schmidt & Sommerville, 2011; Sommerville et al., 2013). In the present study, 21% (3/14) of the Ugandan sharers and 75% (12/16) of the UK sharers who had indicated a preference for one of the two toys gave their preferred toy to an experimenter in the Request condition. As the infants were tested at 18 months, the findings of the present study extend the literature about the likelihood of sharing of preferred and unpreferred toys to a new age point and additionally reveal interesting cross-cultural differences. In their studies, Schmidt and Sommerville (2011) and Sommerville et al. (2013) found that the infants who shared their preferred toy with an experimenter also expected resources to be distributed equally between two other agents, which suggests that altruistically sharing a preferred toy might be related to possessing a greater sense of fairness. It is therefore possible that the fact that more UK than Ugandan infants in the present study shared their preferred toy with an experimenter is indicative of UK infants being more sensitive to fairness concerns. One could argue, however, that if this was the case, the UK infants should have also been more likely than Ugandan infants to share their preferred toy with their mothers. This was not the case, however; the likelihood of sharing the preferred toy with the mother was similar for UK and Ugandan infants. In general, the small number of infants who showed a clear preference for a toy in the preference assessment and then shared during the test phase of

the trial made it difficult to tease apart why I found these cross-cultural differences. Therefore, this finding needs to be replicated with a larger sample size, so that we can understand more about the reasons for the cross-cultural difference in the likelihood of sharing a preferred toy with an experimenter that I found. It might also be beneficial to adapt the preference assessment phase of this experiment in future research to try to ensure that more infants give a clear choice for one of the toys. Instead of an assisting experimenter holding out the toys to the infant, the toys could, for instance, be put on the floor in front of the infant so that shyness towards the experimenter prevents less infants from choosing a toy.

Additionally, I examined the latency at which infants gave a toy to their interaction partner in the Request condition. Across both cultural groups and both types of interaction partners, slightly more than half of the infants who shared gave a toy directly after the adult had put out their hand and looked at the unpreferred toy. Only a minority of infants who shared waited until after the adult had verbally expressed their need for a toy or after they had given an explicit verbal request for a toy. This indicates that the outstretched hand gesture alone was a strong enough signal to elicit sharing in the majority of infants (either by helping the infants understand that the adult wanted a toy or by representing a gestural request and therefore eliciting compliance). It also suggests that those infants who ended up sharing did so quite readily and quickly, apparently not needing to deliberate for a very long time. Descriptively it looks as though the UK infants needed to receive more cues in order to share with an experimenter than the Ugandan infants, but there was no statistically significant difference in the proportion of Ugandan and UK infants that shared before the verbal cues. Given the relatively small number of infants who shared, replicating this study with a bigger sample size may yet reveal factors which relate to how quickly infants choose to share with an adult.

The impression that the infants who ended up sharing did so readily and quickly is also supported by the fact that the infants who shared a toy in the Request condition showed very few uncooperative behaviours. The non-sharers, on the other hand, showed uncooperative behaviours in 41% of their Request condition trials (24/58). They attempted, for instance, to move the toys further away from the adult or to push the adult's outstretched hand away. This indicates that the non-sharers understood what the adult

wanted them to do and that they deliberately chose to not give any toys to them. It is possible that the infants who did not share might have possessed lower inhibitory control and were therefore less able to override egocentric desires to play with the toys themselves. Some studies have found associations between sharing and inhibitory control in early childhood (e.g., Aguilar-Pardo et al., 2013) while others have not (e.g., Smith et al., 2013), so further research in this area is necessary, especially during infancy, to understand more about why young children choose not to share with others.

In summary, the results on infant sharing add to a complex picture of previous results of both cross-cultural variation and similarities in sharing in early childhood, but critically offer the first cross-cultural comparison of sharing in infancy. In contrast to the stability seen in the likelihood of sharing with an adult at 18 months in UK and Ugandan infants, significant cultural variation was observed in the propensity to help an adult in the same populations of 18-month-old infants, which I will discuss in the following section.

2.5.2 Helping

Ugandan infants were significantly more likely than the UK infants to help an experimenter or their mother retrieve an out-of-reach object. Finding a significant cross-cultural difference in early instrumental helping is in line with the results of a study by Giner Torréns and Kärtner (2017), in which Indian 18-month-olds showed a higher propensity to help an experimenter than infants of the same age from Germany. The fact that the likelihood of helping an adult can vary significantly between different cultural contexts, even at this early age, suggests that instrumental helping might be more susceptible to early socialisation than some scholars had previously argued (e.g., Callaghan & Corbit, 2018; Warneken & Tomasello, 2009a).

Arguments for instrumental helping developing uniformly across cultures have been previously supported by two cross-cultural studies that found evidence for similar instrumental helping rates in 18- to 30-month infants from diverse cultural settings (Callaghan et al., 2011; Köster, Cavalcante, et al., 2016). It is difficult to say why some studies, like the present study, have found cross-cultural differences in early instrumental helping, while others have not. One potential reason might be that the few cross-cultural studies that have been conducted so far have all investigated early helping in different

communities and that helping might develop more uniformly across certain communities than others. It could be possible, for instance, that the early helping behaviour of German and Brazilian infants emerges and develops more similarly than that of German and Indian infants (Giner Torréns & Kärtner, 2017; Köster, Cavalcante, et al., 2016). Alternatively, the mixed results could be due to the fact that each cross-cultural study has, so far, operationalised helping in a slightly different way, which makes it difficult to directly compare results across these studies: Callaghan et al. (2011), for instance, tested Peruvian, Canadian, and Indian infants in five different instrumental helping tasks and compared in how many of these tasks the infants helped. Köster, Cavalcante, et al. (2016), on the other hand, administered three trials of the same out-of-reach task and scored German and Brazilian infants' helping behaviour for each trial on a scale that combined information on whether the infant helped or not and if so, how readily they helped. Then again, Giner Torréns and Kärtner (2017) reported the percentage of German and Indian infants who helped an experimenter in a single out-of-reach trial. The last approach resembles the way in which helping was operationalised in the present study most closely. The present study did, however, also include a control condition and, hence, reported the percentage of Ugandan and UK infants who helped in the experimental condition but not in the control condition. These methodological differences could mean that different cross-cultural studies have examined slightly different aspects of early instrumental helping and that this is the reason why they have differed in their conclusions as to whether or not early helping emerges uniformly across cultures. Infants' propensity to help an experimenter in a single out-of-reach trial might vary across cultures as found in the present study and by Giner Torréns and Kärtner (2017), while the number of different instrumental tasks in which they help, for example, might be less variable (Callaghan et al., 2011). However, in order to fully understand the extent to which instrumental helping or different aspects of instrumental helping might vary cross-culturally, further investigations are needed. Future studies could, for instance, report and compare infants' helping behaviours in multiple different ways, e.g., report both the likelihood of helping in each trial and the overall number of tasks in which infants helped, in order to get a more complete picture of early instrumental helping and to facilitate the comparison of results across different cross-cultural studies.

The many different ways in which helping in out-of-reach tasks has been measured and operationalised also makes it difficult to compare helping rates across individual studies that each examine infants from a single cultural background. To my knowledge, only one previous study has operationalised helping in the same way as the present study has: Paulus et al. (2013) reported the percentage of German 18-month-olds who helped an experimenter by retrieving an out-of-reach object in an experimental trial but did not do so in a control trial. They found that 41% of the tested infants behaved this way, while only 26% (11/42) of the UK infants in the present study did so. It is difficult to say whether this represents a genuine cultural difference between German and UK 18-month-olds or if this difference might be methodologically driven, as even though the operationalisation of helping was similar across the two studies, the out-of-reach tasks themselves varied slightly, for instance, in the number and type of cues that the experimenters gave in the experimental condition. Future research on single populations that directly replicates previous studies will generate data that can usefully contribute to our understanding of whether or not differences in helping rates are driven by characteristics of the populations.

In addition to the Ugandan infants being overall more likely to help an adult in the experimental but not in the control condition, the Ugandan infants who were identified as helpers also retrieved the object significantly faster than the UK infants, at least in trials with an experimenter. More specifically, the majority of Ugandan infants helped while the experimenter gave non-verbal cues (i.e., looked at the object or gaze alternated between the object and the infant's face), while the majority of the UK infants only retrieved the object after the experimenter had uttered an explicit statement of need or a direct request for help. Due to the low number of UK infants being identified as helpers in trials with their mothers, it was not possible to inferentially compare the type of cue after which UK and Ugandan infants retrieved the object for their mothers. Descriptively, it looked like there was no notable difference between the two groups, though, as the majority of infants from both cultural backgrounds helped their mothers during the non-verbal cues. Future replication of this study with larger samples that yield a larger number of helpers in mother trials is important for confirming this descriptive pattern. If future research does confirms the pattern, this would suggest that infants of both groups were relatively well attuned to the signals of their mothers but that the UK infants identified as helpers needed more

scaffolding from the experimenter than the Ugandan infants in order to retrieve the out-of-reach object for them. This might mean that the UK infants had more difficulties understanding the needs and wishes of a relatively unfamiliar adult than the Ugandan infants and were only able to react adequately after the experimenter had directly told them how they could assist. Alternatively, it could mean that the UK infants who only retrieved the object after the direct request did so because they were not particularly motivated to help the experimenter but were simply obedient when directly asked to help. It is generally difficult to say whether helping spontaneously and helping in response to a direct request should be grouped together as the same kind of instrumental helping or if they should be treated as different types of behaviours. It could be useful to more clearly distinguish between spontaneous and compliant instrumental helping in future research and to investigate different factors that might explain which type of helping specific infants engage in. Still, the fact that the Ugandan infants in this study helped an experimenter after less scaffolding than the UK infants adds another dimension of robustness to the finding that Ugandan 18-month-old infants appear to be more helpful than UK infants of the same age. They were found to not only be more likely to help but also to do so faster and with less prompting, at least when tested with an experimenter.

Many recent published studies on infant instrumental helping do not include a control condition (e.g., Giner Torréns & Kärtner, 2017; Grossmann et al., 2020; Köster, Cavalcante, et al., 2016), however the findings of the current study indicate that the inclusion of a control condition is crucial. The majority of the infants from the Ugandan group retrieved an out-of-reach object for an experimenter or their mothers in the experimental condition, in which the adult indicated their need for help, but they did not help in the control condition, in which the adult did not signal any need or desire for the object. This is in line with how 18-month-olds have behaved towards experimenters in experimental and control conditions in previous studies (e.g., Warneken & Tomasello, 2006). The UK infants in the present study, however, showed a very different pattern of behaviour towards their mothers. When considering the infants' propensity to help in the experimental condition only, it appeared as though UK and Ugandan infants were similarly likely to help their mothers. However, identifying the infants who only helped in response to need (i.e., who retrieved the object in the experimental but not in the control condition) revealed a much lower likelihood of

helping their mothers for the UK than the Ugandan infants. To understand what was driving this effect, the behaviour of infants who were not identified as helpers was examined. A total of 14/25 infants retrieved the object in a control condition with their mothers, a far higher proportion of infants than previous studies with control conditions have reported (e.g., Dunfield et al., 2011; Paulus et al., 2013). In summary, the majority of UK non-helpers retrieved the object for their mothers in both the experimental and the control condition. This suggests that the UK infants might have been less sensitive to the need of their mothers than the Ugandan infants as many of them retrieved the out-of-reach object regardless of whether or not their mothers signalled that they wanted or needed the object back. Without including a control condition, the present study would not have been able to find these interesting differences in the pattern of behaviours of UK and Ugandan 18-month-olds. This study challenges the assumption that control conditions are not necessary, based on previous findings that helping rates were very low in control conditions (e.g., Callaghan et al., 2011; Dunfield et al., 2011; Warneken & Tomasello, 2006, 2007). In light of the results of the present study, future research should consider including control trials more consistently again - especially when testing infants' early helping behaviours towards recipients other than unfamiliar experimenters. Otherwise, it might be difficult to determine whether infants help in response to the recipient's need or whether they simply find retrieving objects rewarding, regardless of the situation.

In summary, the helping task revealed a robust cultural difference between Ugandan and UK 18-month-old infants in their propensity to help an adult in need, with the Ugandan infants being more likely than the UK infants to help their mother or an experimenter in an Out of Reach Helping task. Moreover, the Ugandan infants helped experimenters faster than the UK infants, generally before explicit verbal cues of need or requests for the dropped object were uttered, indicating a greater sensitivity to the needs of adults than the UK infants.

2.5.3 Helping and Sharing: Similarities and Comparisons

Identity of the Partner Does Not Affect Infant's Likelihood of Helping or Sharing

A key finding of this study is that UK and Ugandan 18-month-olds showed similar likelihoods of sharing and helping with both types of interaction partners (mothers and experimenters).

Furthermore, the degree of familiarity between the infant and an experimenter, also appeared unrelated to the likelihood of sharing with or helping in response to need of the experimenter. More specifically, whether or not infants had interacted with their experimenter on previous experimental visits or outside of the larger longitudinal project did not appear to be related their helping or sharing behaviour towards those experimenters. This could indicate that degrees of familiarity with certain kinds of recipients only start to relate to children's sharing and helping at later ages, when they for example differentiate between peers they are friends with and unfamiliar peers (e.g., Vonk et al., 2018; Yu et al., 2016).

There are only a limited number of previous studies examining helping and sharing tendencies with different interaction partners during infancy, but my findings seem to contrast with these previous studies. For instance, Rheingold et al. (1976), found that 15- and 18-month-old US-American infants responded more to their mothers' outstretched hand by giving her a toy than to an unfamiliar person holding out their hand towards the infant. Further investigation is necessary to understand whether this difference between the present study and previous work is due to methodological differences or whether it might be explained by the specific cultural backgrounds of the participants in each study. In terms of helping, being familiar with an individual has been found to increase helping rates towards that individual (e.g., Allen et al., 2018; Schuhmacher et al., 2019). A closer look at how familiarity has been operationalised in previous studies might explain, however, why the present study did not reveal the same findings. In previous studies that found higher helping rates towards familiar experimenter, being familiar with an experimenter meant that the infants had played with them shortly before the helping task, while being unfamiliar meant never having met the experimenter before at all. In experimental set-ups in which the infants interacted very briefly with the unfamiliar experimenter or saw their parents interact with them, on the other hand, no differences between familiar and unfamiliar experimenters were observed (Allen et al., 2018; Hepach, Haberl, et al., 2017). Similarly, in the present study, in which all infants interacted with their Out of Reach Helping task experimenter at the beginning of the experimental visit and, therefore, none of the infants were tested by a completely new and unfamiliar person, no significant effect of familiarity on infants' helping was detected. This suggests that as long as infants do not encounter a

completely unknown person and therefore might be inhibited by shyness, different degrees of familiarity with a potential recipient of help might not be associated with infants' likelihood of helping at this young age.

Sex Differences in Sharing but Not Helping

Another interesting finding of the present study was that the Ugandan and UK 18-month-old girls were more likely to share toys with an adult compared to the boys, but no sex differences were detected in the likelihood to help an adult. While many experimental studies comparable to the present study did not find sex differences in the sharing rates of 18-month-old infants from WEIRD societies (e.g., Brownell, Iesue, et al., 2013; Dunfield et al., 2011; Svetlova et al., 2010), my result is in line with some previous work: Fabes and Eisenberg (1998) conducted a meta-analysis on sex differences in children's and adolescents' prosocial behaviour and found that across all ages, girls shared slightly more than boys. Ulber et al. (2015) also reported that 18- and 25-month-old German girls were more likely to share marbles with peers than the boys in their study. The lack of sex difference I found in helping, is in line with the findings of a large number of previous studies that, similarly, did not observe differences in the early instrumental helping behaviour of girls and boys (e.g., Gross et al., 2015; Kärtner et al., 2014; Köster, Cavalcante, et al., 2016; Svetlova et al., 2010; Warneken & Tomasello, 2008). There have been other studies, however, that have reported sex differences in infants' instrumental behaviour (e.g., Dahl et al., 2017; Rheingold, 1982; Schuhmacher et al., 2019). Further investigation is needed, to understand why sex differences in sharing and helping behaviours have only been observed in some studies and which methodological reasons or characteristics of certain samples might have driven these mixed findings. Whether there might be sex-specific differences in parental expectations or scaffolding for early sharing that could be associated with the sex differences in early sharing found in the present chapter will be investigated in the next chapter.

Sample Characteristics

When considering cross-cultural similarities and differences, it is important to note, that the Ugandan and UK infants included in the present study were likely not representative of all infants from their countries, let alone of all Non-WEIRD or WEIRD cultures respectively.

Previous research has, for instance, indicated that differences in the sharing behaviour of children from rural and urban populations within the same country can be bigger than differences in sharing rates across different countries (Cowell et al., 2017; Rochat et al., 2009). Indeed, it is clear that our two samples differed on several demographic characteristics, not simply country of residence, making it difficult to know which sample characteristics were driving the observed difference in infant helping. Ugandan infants had younger mothers who spoke more languages and aligned more with relational socialisation goals than UK infants, in addition to living in households with more children. Although not directly measured, our samples also likely differed in SES and in the rural/urban nature of their environment. As this represents a significant limitation of the present study, future research should aim to disambiguate the relationship between infant prosocial behaviour, culture and these demographic variables.

Indeed, previous research suggests that several of these demographic factors may be directly related to early prosocial behaviour. First, interactions with siblings can provide opportunities for observing and for practising different kinds of prosocial behaviours (e.g., Eisenberg et al., 2015; Grusec et al., 2002; Schuhmacher et al., 2017). In terms of sharing, previous research has revealed positive associations between children's prosociality and the quality of their relationship with their siblings during late childhood and adolescence (e.g., Lam et al., 2012; Padilla-Walker et al., 2010). It has also been found that whether or not young children have siblings can influence the ways in which they expect resources to be distributed: Ziv and Sommerville (2017), for instance, found that 12- and 15-month-old infants from the US who had siblings were more sensitive to unfair outcomes in a looking times paradigm than infants who did not have siblings. Moreover, a study by Xiao et al. (2020) revealed that 4- to 6-year-old Chinese children with siblings were more likely than only children to expect a story protagonist to share resources with a sibling rather than with a friend. This suggests that children's expectations about the prosocial behaviours of others can be associated with the presence or absence of siblings in their families, and this can translate into differences in early sharing behaviour. In terms of instrumental helping, Kärtner et al. (2021), for instance, found that 12- to 24-month-old German infants who had older siblings helped an experimenter significantly more than infants who were firstborns. Their study did, however, not reveal a significant relationship between having older siblings

and infants' helping behaviour towards their parents. Moreover, Hepach, Kante, et al. (2017) reported a positive association between growing up with at least one sibling and the frequency at which 18- and 30-month-old German infants' helped a peer. These findings indicate that having siblings might only impact helping behaviours directed at certain kinds of recipients: growing up with other children might positively influence infants' helping behaviour towards peers and unfamiliar adults, but not parents.

Although there is evidence suggesting positive relationships between living with siblings and being the only child in the household, in the present study, simple bivariate analyses found that the number of children in the household was not significantly associated with the infants' helping or sharing at 18 months. This is in line with several previous studies: In a study by Ensor et al. (2011), the number of siblings that UK 4-year-olds had was unrelated to their prosocial behaviour in peer interactions and at school. In terms of sharing, a study by Pilgrim and Rueda-Riedle (2002), found the sharing behaviour of 7-year-old Mexican and US-American children was not related to the number of siblings they had. In terms of helping, there are a number of studies that have not found any significant associations between infants' number of siblings and their instrumental helping behaviour towards experimenters (e.g., Kärtner et al., 2014; Köster, Cavalcante, et al., 2016; Schuhmacher et al., 2017). Taken together, my finding and previous research indicate that sharing a household with any children versus being first-born might be beneficial for the development of infant helping and sharing, but that the specific number of children an infant grows up with might matter less. Being able to observe prosocial behaviours in one or two older children might be sufficient for promoting infant helping and sharing but having more potential models might not increase helping propensities any further.

Second, maternal alignment with relational goals has been previously found to be positively associated with early prosocial behaviour. More specifically, previous studies have revealed maternal alignment with relational socialisation goals to be associated with individual variation in infant helping and comforting (Fonseca et al., 2018; Kärtner et al., 2010). Mothers who attribute more importance to relational socialisation goals, such as wanting their infants to learn to care for the well-being of others, might put a higher emphasis on supporting their infants to be attuned to the needs of others and might lead to mothers creating more opportunities for their infants to help and share in everyday life. In contrast

to previous studies, simple bivariate analyses in the present study failed to find any association between maternal alignment with relational goals when the infant was 11 months old and performance on the helping and sharing tasks at 18 months. Previous studies reporting positive associations between relational socialisation goals and prosocial behaviour have measured maternal and infant behaviour at the same time point, whereas the present study measured socialisation goals at an earlier time point than infant prosocial behaviour and focused on infants from different cultural backgrounds to the previous studies. Therefore, further investigations are necessary to better understand which kinds of prosociality might be associated with individual variation in maternal socialisation goals and in which cultural settings this might be the case.

In terms of the number of languages mothers spoke and maternal age, I could not find previous research examining the relationship between these factors and infant helping or sharing. In this study, infant sharing was not related to any of the demographic variables, however, infant helping of mothers and experimenters was positively related to the number of languages the mother spoke. Helping the experimenter (but not the mother) was positively associated with infants having younger mothers and helping the mother (but not the experimenter) was positively associated with infant age (Ugandan children were on average 1 week older than UK infants when tested). As already discussed, these variables varied systematically with cultural group, and mirror the finding that Ugandan infants were more likely to help than UK infants. Further research is needed with a larger number of populations who vary not only in culture, but also on these variables to ascertain which of these sample characteristics is driving the population difference in early helping observed in this study. In summary, despite previous research indicating that maternal relational socialisation goals and siblings might promote early prosocial behaviour, these factors did not vary with individual performance on the helping and sharing tasks in this study. It is clear, however, that the UK and Ugandan samples differed not only in culture, but also in a number of important demographic factors and further research is needed to understand which factors are driving the population differences in helping. Indeed, one of these factors could be maternal socialisation of prosocial behaviour: the next chapter will examine whether this can help us understand why the Ugandan infants in the present study were

more likely to spontaneously help an adult in response to need and why they helped an experimenter faster, compared to the UK infants.

2.5.4 Limitations

As highlighted above, one important avenue for future research should be to replicate this study with a bigger sample size. In this study, data from a number of infants had to be excluded from analyses because of experimenter errors and because some mothers misunderstood instructions and did not follow the protocol. As this study was part of a longitudinal project, it was not possible to replace these participants with new mother-infant-dyads. In future investigations, similar data could be collected with a sample of cross-sectional participants instead, which would probably make it easier to achieve a bigger sample size. At the same time, it would be useful to try different approaches of instructing the mothers to improve their performance and reduce exclusions. Showing mothers instructional videos that explain what they need to do in detail and making sure that all mothers get a chance to practice delivering the cues with an experimenter before they conduct the actual trial could be helpful in achieving this.

Due to time constraints on the experimental visits, a single trial format was chosen for the present study. In the previous literature, some studies have also used single trials to assess infant sharing and helping (e.g., Dunfield et al., 2011; Sommerville et al., 2013), while others have used a multiple trial format (e.g., Brownell, Iesue, et al., 2013; Ulber et al., 2015; Warneken et al., 2006). Conducting multiple trials per condition has the advantage of generating continuous data with the possibility for more variation, which can increase the likelihood of detecting interesting patterns of results. My reliance on a single trial design could be seen as a limitation. Future research might therefore consider replicating the present study while administering multiple trials for each of the three conditions of the Toy Sharing task and for both conditions of the Out of Reach Helping task.

As discussed above, the cultural setting of the UK and Ugandan participants was unfortunately confounded with a number of demographic factors that I measured (e.g. maternal age, number of languages spoken by the mother) as well as a number of unmeasured factors such as rurality and SES, which means that it is impossible to tell whether it was the infants' culture or one of the confounded demographic variables that

might explain the group-level difference in infant helping that were observed. Further research is therefore needed in order to disentangle whether it is the cultural context, SES, urban/rural living, or other demographic factors that are driving the observed difference in early helping between these samples. For instance, future work could examine the early instrumental helping and sharing behaviour of urban, middle-class Ugandan infants and UK infants living in a rural setting. Thus, in order to know how uniformly or differently infant prosociality might emerge or develop and what might explain cross-cultural differences in early prosocial behaviour, it needs to be examined in infants from a large variety of settings and cultural backgrounds.

2.5.5 Conclusion

In conclusion, the UK and Ugandan 18-month-old infants in the present study showed similar likelihoods of sharing with their mothers and local experimenters in an experimental setting. In contrast, the helping task revealed a robust difference between Ugandan and UK 18-month-old infants in their propensity to help an adult in need, with the Ugandan infants being more likely than the UK infants to help their mother or an experimenter in an Out of Reach Helping task. Moreover, the Ugandan infants helped experimenters faster than the UK infants, generally before explicit verbal cues of need or requests for the dropped object were uttered, indicating a greater sensitivity to the needs of adults than the UK infants. Infants at 18 months in these cultural settings exhibited no bias towards being more likely to share with or help a highly familiar family member than an unfamiliar experimenter. In the sharing task, the only cross-cultural difference that I observed was that UK infants were more likely to share their preferred toy with an experimenter than the Ugandan infants. This suggests that while there might be some differences in the type of object infants are willing to share with an experimenter across cultural settings, the overall likelihood of engaging in sharing with an adult appears to be relatively uniform across these two very different groups. The UK and Uganda sample varied on a number of demographic variables, so further research is required to disentangle what is driving the similarities and differences in early sharing and helping behaviours in these two populations.

Chapter 3: Socialisation of Early Sharing and Helping

3.1 Abstract

In chapter 2, I found that UK and Ugandan 18-month-old infants were equally likely to share with an adult in an experimental task and that Ugandan infants were more likely to help an adult than UK infants. The aim of the present chapter is to investigate whether the cross-cultural stability of early sharing that I observed was a product of similar maternal socialisation of early prosocial behaviour across these two cultural settings or whether early sharing emerged robustly, despite cross-cultural variation in maternal socialisation. Moreover, I aimed to understand whether maternal socialisation of prosocial behaviour might relate to the cross-cultural variation in 18-month instrumental helping performance found in the previous chapter. Therefore, 39 mothers from rural Uganda and 46 mothers from a medium-sized city in the UK were asked about their parenting practices related to early everyday sharing and helping when their infants were 14 months old. First, I characterised group level differences in maternal socialisation of prosociality and found that at 14 months, the UK mothers reported using a higher number of different strategies to socialise early sharing and helping than the Ugandan mothers. This indicates that the Ugandan and UK infants included in this study experienced significant differences in maternal socialisation practices related to early prosociality. On an individual level, however, maternal socialisation at 14 months did not relate to the infants' sharing behaviour in the experimental Toy Sharing task nor to their helping behaviour in the experimental Out of Reach Helping task at 18 months. These findings suggest that early sharing might be relatively impervious to environmental variation in socialisation practices. Infant helping, on the other hand, might be more sensitive to early socialisation, but it appears that maternal socialisation of early prosociality might not relate to instrumental helping in the ways one might expect.

3.2 Introduction

Socialisation has been found to influence a diverse range of developmental aspects in infancy and early childhood, including children's physical development (e.g., Hopkins & Westra, 1990; Super, 2008), emotional regulation skills (e.g., Garner, 2006; Mathis & Bierman, 2015), cognitive development (e.g., Narvaez et al., 2013), and social skills (e.g., Pinquart & Kauser, 2018; Wong et al., 2020; Zimmer-Gembeck & Thomas, 2010). It is important to understand how different socialisation processes might relate to children's development as this knowledge can inform policies, successful interventions and advice to parents.

As mentioned in chapter 1, a core aim of this thesis is to examine how familial socialisation might relate to the development of different types of prosociality in infancy, as prosocial behaviours are an important feature of our everyday interactions and essential for the functioning of our societies. Chapter 1 details how different parenting styles, parenting practices, and parental socialisation goals can relate to prosocial behaviour in general, for instance describing the positive associations that have been found between prosociality and authoritative parenting practices (Eisenberg et al., 2015; Wong et al., 2020) and between prosocial behaviours and maternal alignment with relational socialisation goals (Fonseca et al., 2018; Kärtner et al., 2010). In the present chapter, I will now focus more specifically on the influence of socialisation on two types of early prosociality: infant sharing and infant helping.

3.2.1 Associations between Early Sharing and Parental Socialisation and Other Familial Factors

The majority of previous studies that have examined how familial socialisation might relate to the development of infant prosociality have considered composite measures of prosociality (e.g., Brownell & Drummond, 2020; Garner, 2006) or focused on other types of prosocial behaviours, such as helping or comforting (e.g., Dahl, 2015; Giner Torréns & Kärtner, 2017; Kärtner et al., 2010). Studies specifically examining associations between familial socialisation and infant sharing, however, have been relatively rare to date. Here I will give an overview over the studies that have previously investigated how early sharing might be affected by different socialisation factors.

Parental Behaviours

Parenting practices aimed at promoting prosocial behaviours in general, such as asking infants to help in everyday tasks or discussing other people's feelings with them, have not been found to relate to 18- to 30-month-olds infants' sharing with an experimenter (Gross et al., 2015). Moreover, parental behaviours in a clean-up task do not seem to be associated with infant sharing behaviours towards an experimenter either: Pettygrove et al. (2013) observed how often parents used various techniques like praise, negotiations, explanations, or directives when trying to encourage their 18- and 30-month-old infants to assist them in cleaning up toys. Most of these parenting practices did not relate to the infants' behaviour in a separate sharing task with an experimenter, indicating that parental scaffolding of helping might not have a large impact on infant sharing. Pettygrove et al. (2013) did, however, find a negative association between maternal explanations of why their toddlers should help them and the children's sharing behaviour. This could either indicate that giving these kinds of explanations might decrease children's sharing rates or that parents of children who are less prone to behave prosocially might try to counteract this tendency by more frequently explaining why prosocial behaviour is important. The results of these two studies suggest that parenting practices related to helping or prosocial behaviour in general might not be very effective in increasing young children's sharing behaviour. How parenting practices that directly relate to children's sharing behaviour might influence early sharing behaviour still requires empirical investigation.

The two studies mentioned above were conducted cross-sectionally, but parental behaviours might also relate to children's sharing behaviour over time. Therefore, research which examines how certain parents' behaviours might be associated with later sharing behaviours in their children is also needed. In one longitudinal study, Ensor and Hughes (2009) found that young UK mothers' negative control and negative affect during mother-child interactions when children were 2 years old predicted a reduced willingness to share in the children at age four. Whether similar effects would be found in infancy is currently unknown and more studies are needed that examine how different parental behaviours and practices might relate to infant sharing over time.

A few other parental behaviours have been observed to impact sharing in infancy and early childhood: Brownell, Svetlova, et al. (2013) found that parents who asked their 18- and 24-month-old infants to label and explain emotions during a joint book reading task had infants who shared more quickly and more often with an experimenter in an experimental task. Thus, parental elicitation of emotional talk in infants appears to be linked to early sharing behaviour. Another influence on children's sharing might be the sharing behaviour that they observe in their parents. In a study by Blake et al. (2016), 3- to 8-year-old children from India and the US watched their parents either model generous or stingy sharing. Compared to children who did not see their parent's choice, children from both communities shared less after watching their parent be stingy. Moreover, children from India also shared more after having seen their parent behave generously. This suggests that parents' own sharing behaviour may act as a model for young children. Whether this experimental data translates to everyday parental behaviour influencing children's sharing behaviour and whether infants are sensitive to the sharing styles of others still needs to be investigated though.

Siblings

As discussed in the previous chapter, experiences with siblings are another familial factor besides parental behaviour that might influence children's early sharing behaviours. Previous research on this subject has revealed mixed results, however, (e.g., Fehr et al., 2008; Schuhmacher et al., 2017) and my results in chapter 2 indicate that for the two populations of infants tested in the present thesis, the number of children whom they shared a household with does not significantly relate to their sharing behaviour.

To sum up, previous research has revealed that familial factors like parenting behaviours or the presence or absence of siblings can relate to young children's prosocial behaviour and - more specifically - their sharing behaviour (e.g., Eisenberg et al., 2015). To what extent specific parenting practices such as expecting or modelling in everyday life might be associated with infants' sharing behaviour remains unclear however. Studies on associations between early parental behaviour and later sharing in infancy are also notably lacking. Moreover, the majority of research that has been done on the relationship between parenting and infants' sharing behaviour so far has been conducted in WEIRD societies. It has been shown, though, that in different cultural settings different parenting practices can

be more or less effective in promoting prosocial behaviours (e.g., Blake et al., 2016; Giner Torréns & Kärtner, 2017; Yagmurlu & Sanson, 2009). It is, thus, crucial to examine the relationship between parental socialisation and sharing in infancy in both WEIRD and Non-WEIRD communities, as it is currently unknown whether there is cross-cultural variability in how parents might impact sharing behaviour during infancy.

3.2.2 Associations between Early Instrumental Helping and Parental Socialisation and Other Familial Factors

After having focused on associations between parental socialisation and early sharing behaviours in the section above, I will now turn to what previous research has revealed in terms of associations between different parenting practices and children's early instrumental helping behaviour.

Maternal Interactions

A number of different parenting behaviours have been found to be associated with instrumental helping in infancy: In line with the finding that authoritative parenting can promote prosocial behaviour in general (e.g., Brownell & Drummond, 2020), positive associations have also been found between maternal sensitivity - a parenting practice related to authoritative parenting - and the instrumental helping behaviour of 18-month-old US-American infants (Newton et al., 2016). Another maternal behaviour that might be related to early instrumental helping is drawing the infants' attention to other people's mental states and emotional experiences. Newton et al. (2016) found that the frequency at which US-American mothers labelled the mental states (e.g., emotions, thoughts, desires) of protagonists in a picture book were positively linked to their 18-month-olds' instrumental helping behaviour. Drummond et al. (2014), on the other hand, did not find any positive associations between the instrumental helping behaviour of 18- and 30-month old US-American infants and their parents' emotion and mental state talk during joint play or book reading. Moreover, asking infants to label and explain emotions or scaffolding emotion understanding during a joint book reading task, which has been found to be positively related to early sharing behaviour and empathic helping, does not appear to be related to action-based, instrumental helping in 18- to 30-month-old North American infants (Brownell, Svetlova, et al., 2013; Hammond & Carpendale, 2015). These findings suggest

that infants' understanding of others' emotions might not be as crucial for instrumental helping as it appears to be for other types of prosocial behaviour. Understanding other mental states, such as the goals and needs of others, on the other hand, might be more relevant for early helping behaviour. Further investigations are necessary, however, to understand why previous research on the associations between parents' mental state talk and instrumental helping has revealed mixed results and to identify which types of mental state talk might be related to early instrumental helping.

Parenting Practices and Goals Aimed at Increasing Prosociality

Besides the more general parenting practices described above, instrumental helping in infancy can also be impacted by parental behaviours that are more specifically related to prosocial behaviour. For instance, maternal alignment with relational socialisation goals, which include valuing supportive and prosocial behaviours towards members of one's community, has been found to directly and indirectly influence the instrumental helping behaviour of 18- to 30-month old infants from Germany and Brazil (Fonseca et al., 2018; Köster, Cavalcante, et al., 2016; see chapter 1 for more details). Future studies with infants from a larger variety of cultural backgrounds are necessary, however, to get a more robust understanding of how and when maternal alignment with relational socialisation goals might directly promote instrumental helping and when it might only have an indirect influence.

Parents who hold socialisation goals related to their infants learning to behave prosocially may engage in parenting practices aimed at promoting prosocial behaviours. To date, it remains unclear, however, to what extent parenting practices related to prosociality in general might specifically affect infants' instrumental helping: Waugh and Brownell (2017), for example, found that US-American parents who reported frequently using parenting practices aimed at promoting prosocial behaviours in general, such as asking the child to help or talking about other people's feelings with the child, had children who were significantly more likely to help an experimenter at 18 months. Gross et al. (2015), on the other hand, found that the use of these parenting practices did not predict the likelihood of helping an experimenter in 18- to 30-month old North-American infants. Further investigations are needed, thus, to understand under which circumstances parenting

practices aimed at increasing a variety of prosocial behaviours might be related to infants' specific performance on an instrumental helping task.

Encouragement and Scaffolding of Early Helping

Although it is currently unclear how parenting practices aimed at increasing general prosociality influence early instrumental helping, it is important to examine how parenting practices that specifically scaffold helping behaviour might relate to children's early instrumental helping. In fact, the ways in which parents behave in naturalistic situations in which they want their infants to assist them have been found to be associated with their infants' helping behaviour. Kärtner et al. (2021), for instance, found that the more German parents encouraged their 12- to 24-month-old infants to assist them in chore-like tasks, the more time the infants spent helping the parent in the specific tasks, at least when infants were 12, 18, and 21 months old. Moreover, Dahl (2015) conducted a longitudinal study with US-American families and found that parental encouragement of everyday helping at 13- to 15-months was positively associated with the infants' everyday helping rates at 19 and 24 months. Parental encouragement at the age of 19 months, on the other hand, did not predict the frequency of infant helping at 24 months. These findings indicate that encouraging infants to help in everyday situations might be an effective strategy to promote helping in that specific situation and also in similar everyday interactions later on. However, the effectiveness of this parenting practice appears to vary with the infants' age.

Moreover, parental behaviours aimed at increasing helping in naturalistic interactions have been found to not only be associated with infants' behaviour in the specific situation itself or in similar parent-child interactions, but have also been found to generalise to other helping contexts and other partners. For instance, Hammond and Carpendale (2015) observed that Canadian mothers who provided more consistent and appropriate scaffolding for their 18- to 24-month-old infants' involvement in a joint clean-up task had infants who were faster and more likely to help an experimenter in a variety of different instrumental helping tasks. In a similar study by Pettygrove et al. (2013) with US-American mother-infant dyads, it was not maternal scaffolding but instead the frequency of commands or requests for assistance that the mothers uttered during a joint clean-up task which positively correlated with the speed and spontaneity at which their 18-month-old infants

instrumentally helped an experimenter in a separate standardised out-of-reach task. Associations between maternal requests for assistance and infants' instrumental helping have also been found in a study by Köster, Cavalcante, et al. (2016). They investigated how mothers from three different cultural settings (urban Germany, urban Brazil, and rural Brazil) behaved in a naturalistic helping task, in which the mothers asked their 18- to 30-month-old infants to assist them by picking up objects and placing them on a table. In all three cultural settings, maternal use of assertive scaffolding, i.e., being serious and insistent about the requests for help, predicted the infants' compliance with the maternal requests in the naturalistic helping task itself. It was additionally examined how the mothers' scaffolding behaviour in the naturalistic helping task related to their infants' performance in a separate out-of-reach helping task with an experimenter: In rural Brazil, it was, again, assertive scaffolding that predicted how readily the infants helped an experimenter. In the German sample, on the other hand, it was deliberate scaffolding, i.e., politely asking the child for help and explaining why their help was needed, that predicted instrumental helping behaviour towards the experimenter. For the sample from urban Brazil, neither type of maternal scaffolding was related to the infants' helping behaviour in the standardised task. These findings indicate that the ways in which mothers scaffold and request help from their infants can influence both how infants behave in the specific situation itself and also in other situations and contexts in which help is needed, even towards other potential recipients of help. There have, however, also been studies in which maternal encouragement or scaffolding of help was not found to be related to infants' instrumental helping behaviour towards an experimenter (e.g., Kärtner et al., 2021; Pettygrove et al., 2013; Warneken & Tomasello, 2013b). Hence, whether or not maternal scaffolding might affect instrumental helping in new situations appears to vary across studies and across different cultural contexts. Future studies are needed to investigate the circumstances under which early instrumental helping is influenced by the ways mothers scaffold and request help from their infants. Interestingly, when scaffolding does affect instrumental helping, there appear to be cross-cultural differences in the type of scaffolding that effectively increases early instrumental helping. Research in a larger variety of different cultural settings would therefore be useful. Moreover, given that the majority of the studies described above examined associations between maternal scaffolding and infants' instrumental helping behaviour in a cross-sectional manner, more longitudinal studies are

needed to investigate longer term influences of parental scaffolding of helping on infants' instrumental helping.

Positive Reinforcement

Another parenting practice that has received considerable research effort is positive reinforcement, with numerous studies examining its relationship with early instrumental helping behaviour. However, as mentioned in chapter 1, so far, the extent and direction of the relationship between positive reinforcement and early instrumental helping behaviour is mixed: On the one hand, a study by Warneken and Tomasello (2008) found that receiving material rewards for helping made 20-month-old German infants less likely to help an experimenter in future trials compared to peers who had not been rewarded. This suggests that rewards might not only be unnecessary for instrumental helping behaviour to emerge but that they could even have adverse consequences. Warneken and Tomasello (2008), therefore, proposed that infants might start out by being intrinsically motivated to help others but that extrinsic reinforcements can undermine this motivation, leading to less helping behaviours as soon as external rewards disappear ('overjustification effect', Deci, 1971; Lepper, 1981). In line with this view, Giner Torréns and Kärtner (2017) observed negative associations between maternal report of using material rewards in response to their 18-month-old infants' everyday helping behaviour and the infants' performance in an out-of-reach helping task with an experimenter. The negative relationship between material rewards and instrumental helping behaviour was, however, only found in a sample of German participants and not in a sample of Indian mother-infant dyads, which suggests that there might be cross-cultural variation in how positive reinforcement might affect infant helping.

However, further studies have suggested that the relationship between reinforcement and helping behaviour might be more complicated and might additionally vary depending on the infants' age. For instance, when observing US-American middle-class families with young children in naturalistic interactions at home, Dahl (2015) found that parents frequently reinforced infants for their helping behaviour, but that the frequency of thanking or praising generally decreased with the infants' age. Interestingly, the amount of positive reinforcement that the parents gave their infants for helping them in everyday interactions

when they were 13 to 15 months old correlated positively with the infants' everyday helping behaviour at 19 and 24 months. Positive reinforcement at 19 months, however, was negatively related to everyday helping behaviour at 24 months. Similarly, Kärtner et al. (2021) found that higher frequencies of parental praise in chore-like tasks at 15 months were associated with higher helping rates towards a parent in German infants 3 months later. Parental praise at 18 or 21 months, on the other hand, did not significantly predict subsequent helping. Moreover, in an experimental study by Dahl et al. (2017), 13- to 18-month old US-American infants were either encouraged to help an experimenter in need and subsequently praised for helping or were left to react spontaneously and were not praised for helping. Encouragement and praise led younger infants (13 to 14 months) to double their helping rates while it was present but also in later trials when it had stopped. It did not, by contrast, affect older children's helping behaviour (15 to 18 months). Based on these observations, it has been proposed that praise might facilitate helping in infants' early development but that it becomes less important as children get older and more proficient at helping (e.g., Dahl, 2015; Dahl et al., 2017). This notion is supported by a number of studies with German, US-American, and Indian infants aged 18 to 30 months, which have found infants' instrumental helping behaviours at these ages to be unaffected by praise or material rewards (Giner Torréns & Kärtner, 2017; Pettygrove et al., 2013; Warneken et al., 2007). Some children, however, might be less able or prone to helping in general and therefore might continuously be praised by their parents for helping even as they get older. This has been offered as an alternative explanation for the negative correlation between reinforcement and older infants' everyday helping that has appeared in some longitudinal studies (e.g., Dahl, 2015; Eisenberg et al., 1992). Hence, the exact nature and direction of causality in the relationship between reinforcement and helping behaviour in infancy is still open to debate. Some evidence indicates that rewards can undermine and decrease rates of helping in older children, while other studies suggest that reinforcement can be beneficial for young infants' helping behaviour, at least early in the second year of life.

Punitive Practices

A few other parenting practices have been found to influence instrumental helping in infancy: As already mentioned in chapter 1, previous work has revealed that punitive practices can impact young children's helping behaviour but that the extent and direction of

this effect can vary cross-culturally. For instance, in a study by Giner Torréns and Kärtner (2017), German and Indian mothers of 18-month-old infants were asked about their use of punitive practices in everyday life. The Indian mothers reported showing punitive behaviours significantly more frequently than the German mothers. In the German sample, maternal use of punitive practices was negatively related to the infants' instrumental helping behaviour towards an experimenter, while there was a positive association between the use of punitive practices and infant helping in the Indian sample. Future research should investigate the relationship between punitive practices and early instrumental helping in a larger variety of cultural settings, in order to understand more about the circumstances under which punitive practices might promote or decrease infant helping.

Modelling Helping

Giving infants the chance to observe how to help in a specific situation has also been found to increase their helping rates. Kärtner et al. (2021) found that when German parents spent more time demonstrating to their 12-month-old infants how to complete different chore-like tasks, while making sure that the infants paid attention to the demonstration, the infants' frequency of helping in these tasks increased. This was not the case for the 15 to 24-month-old infants in their study though. Parental demonstrations of how to complete chore-like tasks when their infants were 18 months old did, however, predict higher helping rates towards an experimenter in a different set of chore-like tasks at 21 months. In a study by Schuhmacher et al. (2019), 16-month-olds German infants who repeatedly observed an adult help another individual access an object were more likely to subsequently help in a similar situation than infants who had observed the adult be passive and not provide any help to the individual in need. These findings indicate that modelling helping behaviours in naturalistic interactions as well as in more standardised experimental settings can promote infant helping, but that the effectiveness of this behaviour might depend on the infant's age.

Siblings

Besides parenting practices, another familial factor that might also influence infants' early instrumental helping behaviour is the number of other children that infants grow up with. As mentioned in chapter 2, there are a number of studies that have not found any

significant associations between infants' number of siblings and their instrumental helping behaviour towards experimenters (e.g., Kärtner et al., 2014; Köster, Cavalcante, et al., 2016; Schuhmacher et al., 2017), but there also is some evidence that supports the notion that having siblings might positively influence instrumental helping (Hepach, Kante, et al., 2017; Kärtner et al., 2021). The results of chapter 2 suggest, however, that the helping behaviour of the infants tested in the present thesis was not significantly associated with the number of children they shared a household with.

To sum up, previous research indicates that a variety of familial factors, such as parenting practices or the presence or absence of siblings can affect instrumental helping behaviour in infancy. However, further investigations are necessary in order to understand more about the exact nature of the relationship between early helping and these factors, especially because associations between early parenting practices and infant helping at a later age have only received minimal research effort to date. Moreover, the vast majority of previous research on this subject has been conducted in WEIRD societies, even though the cultural setting in which parent-infant-interactions take place has been found to be associated with how different parenting practices might affect early instrumental helping (e.g., Giner Torréns & Kärtner, 2017; Köster, Cavalcante, et al., 2016). It is currently unknown how much cross-cultural variability there might be in the ways in which parental behaviours might be related to infants' instrumental helping behaviour. Therefore, it is essential to investigate the relationship between different familial factors and early instrumental helping in both WEIRD and Non-WEIRD communities.

3.2.3 Current Study

The present study aimed at addressing these gaps in the literature by examining (i) whether the use of parenting practices related to early sharing and helping might differ for infants from different cultural settings and (ii) whether the use of these parenting practices might be associated with the infants' sharing and helping behaviours at 18 months. Therefore, I conducted a study with mother-infant dyads from two different cultural settings, the UK and Uganda, in which the participants were visited at multiple time points: When infants were 9, 11, and 14 months old, their mothers were asked about how they socialised everyday helping and sharing and whether or not their infants showed helping and sharing behaviours in their everyday life. Moreover, the infants' sharing and helping behaviours were

experimentally assessed when infants were 18 months old. Demographic information on the participating mothers and infants was collected at 12, 15, and 18 months.

As detailed in chapter 2, the infants' sharing behaviour at 18 months was measured in an experimental Toy Sharing task, once with an experimenter and once with the infants' mothers. To briefly summarise, the Toy Sharing task consisted of two experimental conditions: In the Request condition, the infant received two toys while their interaction partner (the experimenter or the mother) received none. The interaction partner then gave a series of cue aimed at prompting the infant to share a toy with them. In the No Request condition, the infant received two toys while their interaction partner did not, but this time the interaction partner did not indicate any need or desire for the infant's toys. Sharing in each condition was defined as giving a toy to the interaction partner. As sharing rates were very low in the No Request condition, in the present study, infant sharing behaviour was only considered in the Request condition.

The infants' instrumental helping behaviour was measured in an experimental Out of Reach Helping task at 18 months, as detailed in chapter 2. To briefly summarise, the infants participated in the task twice, once with their mothers and once with a local experimenter. Each time they completed the task, they participated in two conditions: In an experimental condition in which the adult (the mother or experimenter) pretended to accidentally drop an object on the floor and then unsuccessfully reached for it while giving a series of cues aimed at prompting the infant to retrieve the object for them. And in a control condition in which the adult purposefully dropped the object on the floor and then did not reach for it. Infants were identified as helpers when they retrieved the object (i.e., either handed it to the adult or let go of it on the table for at least 1 second) in the experimental condition but not in the control condition.

In the present study, I first sought to understand variation in parenting practices related to infant sharing and helping behaviours in everyday life at 14 months and how these parenting practices might relate to the experimental measures of infant sharing and helping at 18 months. When infants were 9, 11, and 14 months old, mothers reported in a questionnaire whether they expected their infants to share and help in everyday life, whether they showed their infants how to share and help, and whether they encouraged sharing and helping. Due to changes in the format questions were asked in during the 9

month and 11 month time points (see Methods for details), I focussed on the data from 14 months and I created a composite score across these three items, which indicated the number of different strategies mothers engaged in (0-3). Miller and colleagues found that participants from a Non-WEIRD background were more likely to view acting prosocially as a moral obligation than European Americans who tended to view prosocial behaviour as more of a personal choice (e.g., Baron, 2000; Miller & Bersoff, 1992; Miller et al., 1990). If this distinction persists in other Non-WEIRD and WEIRD contexts, Ugandan mothers might view sharing and helping as an obligation rather than a personal choice, while UK mothers, on the other hand, might regard sharing and helping more as a personal choice than an obligation. This could mean that UK mothers might encourage and demonstrate these behaviours more than Ugandan mothers and, thus, might use a greater number of strategies than the Ugandan mothers.

In terms of associations between the number of maternal parenting practices used when infants were 14 months old and the infants' sharing and helping behaviours in the experimental tasks at 18 months, I took an exploratory approach. Previous research indicates that parenting practices related to prosocial behaviour in general might not be significantly associated with sharing behaviours measured at the same age (Gross et al., 2015; Pettygrove et al., 2013) but research looking at associations over time has so far been lacking. Previous studies examining cross-sectional associations between parenting practices related to prosocial behaviour in general and instrumental helping have so far revealed mixed results (Gross et al., 2015; Pettygrove et al., 2013). Therefore, I did not have directional hypotheses on whether the use of a larger number of maternal parenting practices would significantly relate to infant sharing and helping four months later.

I also examined whether demographic factors, such as infant age, maternal age, household composition, and maternal socialisation goals, were associated with maternal use of socialisation practices in order to generate potential directions for future research.

Lastly, I focussed on whether very precocious sharing and helping in everyday life (which could either be an indicator of infants' prosocial disposition and/or the result of very early maternal socialisation practices) would vary between the UK sample and the Ugandan sample and whether these early prosocial behaviours would be related to sharing and helping at 18 months. At the 9, 11, and 14 months visits, the mothers were asked in an

interview whether their infants shared with them and whether they helped them in everyday life. Limited variation in the 9 months and 14 months data meant that data from the 11 month time point was deemed as the most suitable measure of an early onset of sharing and helping and, thus, used in the analyses of the present chapter. I first examined whether there were any cross-cultural differences in the rates of early sharing and helping reported by the mothers at 11 months. As previous research on very early sharing and helping behaviours in infants from Non-WEIRD communities is lacking, I took an exploratory approach to whether there would be cross-cultural differences in the maternal reports of early sharing and early helping. Then, I examined whether on an individual level, helping at 11 months would relate to helping at 18 months and whether sharing at 11 months would relate to sharing at 18 months. There has been some evidence for consistency over time in infant prosocial behaviour (e.g., Eisenberg et al., 1992; Kärtner et al., 2021; Newton, Laible, et al., 2014; Scrimgeour et al., 2013). Eisenberg et al. (1992), for instance, reported that spontaneous sharing and helping behaviour towards their mothers at 19 to 27 months predicted US-American boys', but not girls', sharing and helping behaviour 6 months later. Consistency of early instrumental helping over time has also been observed in German infants aged 12 to 24 months (Giner Torréns et al., 2021; Kärtner et al., 2021). Therefore, I expected maternal reports of everyday helping at 11 months to positively relate to infants' instrumental helping behaviour at 18 months. My hypothesis regarding whether early everyday sharing at 11 months might be associated with infants' sharing at 18 months, on the other hand, was exploratory, because most previous studies have not focus solely on sharing behaviour and have been conducted with older children than the ones in the present study.

3.3 Methods

3.3.1 Participants

This chapter aimed to analyse data from the sample of 45 UK and 38 Ugandan infants who had valid Toy Sharing task data for at least one interaction partner as described in the previous chapter (see section "Participants of the Toy Sharing Study "in Methods of chapter 2) and the sample of 43 UK and 39 Ugandan infants who had valid Out of Reach Helping task data for at least one interaction partner as described in the previous chapter (see section

"Participants of the Out of Reach Helping Study" in Methods of chapter 2). Some of these participants had to be excluded from certain analyses in this chapter, however, because their mothers did not complete the questionnaire or interview (see section "Administration Error and Attrition" in the Results section). Table 3.1 shows the number of infants who were included in the analyses for the questionnaire and the interview.

Table 3.1

Number of participants who contributed data for the interview/questionnaire and who had valid Toy Sharing task data for at least one interaction partner and/or valid Out of Reach Helping data for at least one interaction partner, with number of girls in each sample shown in brackets

	UK	Uganda
Prosocial Behaviour Interview at 11 months	46 (22)	38 (20)
Socialisation Practices Questionnaire at 14 months	44 (21)	35 (18)
Demographic information (from Background Questionnaire)	45 (22)	38 (21)

A Prosocial Behaviour Interview and a Socialisation Practices Questionnaire were administered during data collection sessions when infants were 9, 11, and 14 months old. In the present study, I only considered the mothers' responses from the Prosocial Behaviour Questionnaires from the 11 month time point (see section "Reported Sharing and Helping Behaviour at 11 Months" in section 3.3.3 for explanation). Infants were on average 11.17 months old (*SD* = 0.31) when their mothers completed this interview. Moreover, I only considered the mothers' answers to the Socialisation Practices Questionnaire from the 14 month time point (see section "Socialisation Practices Questionnaires" in section 3.3.2 for explanation). Infants were on average 13.98 months old (*SD* = 0.28) when their mothers completed this questionnaire. Finally, demographic information was obtained through a Background Questionnaire that the mothers completed when their infants were on average 12.13 months (*SD* = 0.33), 14.96 months (*SD* = 0.31), and 17.95 months old (*SD* = 0.28).

3.3.2 Measures

Toy Sharing Task

As described in chapter 2, at 18 months, infants participated in a Toy Sharing task with their mothers and a local experimenter. Each time they completed the task, they participated in two experimental conditions. Both conditions started with the infant being asked to indicate a preference for one of two toys and then receiving both of these toys. In the Request condition, their interaction partner (either their mother or the experimenter) received no toys and gave a series of cues that made their need and desire for a toy increasingly explicit. In the No Request condition, the interaction partner did not receive any toys either, but they did not give any cues indicating a desire for a toy. Sharing in each condition was defined as giving a toy to the interaction partner. As sharing rates were very low in the No Request condition, in the present study, I only considered the infants' sharing behaviour in the Request condition.

Out of Reach Helping Task

As described in chapter 2, infants participated in an Out of Reach Helping task when they were 18 months old. They completed the task once with their mothers and once with a local experimenter, each time participating in an experimental and a control condition. In the experimental condition, the adult (the mother or experimenter) pretended to drop an object on the floor by accident and then unsuccessfully reached for it while giving a series of cues aimed at prompting the infant to hand them the object. In the control condition, the adult purposefully dropped the object on the floor and then did not reach for it. Infants were identified as helpers when they retrieved the object (i.e., either handed it to the adult or let go of it on the table for at least 1 second) in the experimental condition but not in the control condition.

Questionnaires and Interviews

The following questionnaires and interview were used in the present study: a Prosocial Behaviour Interview, a Background Questionnaire and two subsections of a Socialisation Practices Questionnaire.

Prosocial Behaviour Interview. When the infants were 9, 11, and 14 months old, their mothers were interviewed about their infants' everyday prosocial behaviour and the mothers' behaviour in relation to it in the last 3 months. In the interview section about sharing, mothers were first given a brief definition of what was meant by sharing in this study: "When we talk about sharing, we mean times when your child is in control of some things, like toys or food, and passes some or all of them to someone else. For example, if he/she had something to eat and gave some of it to a friend or if he/she let someone else play with one of his/her toys." Mothers were then asked the following question relevant for this study: "Does your child share things with you?" In the interview section about helping, mothers were first given a brief definition of what was meant by helping in this study: "When we talk about helping, we mean instances in which your child aims at making it easier for you to accomplish something. For example, if you want to tidy up a room and [child's name] tries to help you by picking up some items. It isn't necessarily important that he/she succeeds at being helpful. So he/she could for example help you sweep the floor without really managing to get rid of any dust". Subsequently, mothers were asked the following interview question relevant for this study: "Does your child help you with everyday activities, for example with cooking, tidying, cleaning, shopping, or washing?"

Background Questionnaire. As mentioned in chapter 2, demographic information on the participants were collected when infants were 12, 15, and 18 months old. Mothers completed a Background Questionnaire that consisted of 50 items but for the present study, I focused on the information that the mothers provided about the infant's date of birth, their own age at the infant's birth, the number of different languages they spoke with their infant, and the number of children who stayed in the same household as them and their infant. See chapter 2 for more information on this questionnaire.

Socialisation Practices Questionnaires. When the infants were 9, 11, and 14 months old, mothers were also asked to complete a Socialisation Practices Questionnaire that included questions adapted from the "Maternal Socialization Practices Questionnaire " by Giner Torréns and Kärtner (2017). The questionnaire was split into nine subsections, two of which were relevant for this study: (i) the "Sharing" subsection asked mothers about their general attitudes and behaviours related to their infants' everyday sharing behaviours; and (ii) the

"Helping" subsection asked mothers about their general attitudes and behaviours related to their infants' everyday helping behaviours (see Table 3.2).

At first, UK mothers were asked to rate their agreement with the statements of the questionnaire on a 5-point Likert scale ("strongly agree" to "strongly disagree") but because subsequent piloting in Uganda showed that the Ugandan mothers only used the extremes of the Likert scale, the format of the questionnaire was changed halfway through data collection, to ensure the task demands were comparable across UK and Ugandan mothers. Mothers were from then on asked whether they agreed with each statement or not. This change in the answer format occurred after approximately half of the UK mothers had already filled in the Socialisation Practices Questionnaire at 9 months and after a third of the UK mothers had filled in the questionnaire at 11 months using the 5-point Likert scale format. As their answers were therefore not comparable to those of the Ugandan mothers nor to those of the other UK mothers, I decided to solely consider maternal responses on the Socialisation Practices Questionnaire at 14 months in the present study (where all mothers were given the same "Agree/Disagree" answer format").

Table 3.2

Socialisation Practices Questionnaire statements and their corresponding subsections

Item	Subsection
I expect my child to share with me or others.	Sharing
I show my child how he/she can share with me or others.	Sharing
When I or somebody else needs or wants something that my child has, I encourage my child to share.	Sharing
I expect my child to help me or others.	Helping
I show my child how he/she can help me or others.	Helping
When something needs to be done I encourage my child to participate.	Helping

Socialisation Goals. As mentioned in chapter 2, I obtained relational goal scores for the mothers in the present study from Holden et al. (in review). More information on this measure can be found in chapter 2.

Translation of the Questionnaires in Uganda

Four local research assistants were trained to deliver the Background Questionnaire and the Prosocial Behaviour Interview. After discussing the content of these questionnaires with each other and a researcher from the University of York, they reached consensus on the most appropriate ways to translate them to the mothers in Alur, Lugbara, and Swahili. On visits, the research assistant who delivered the Background Questionnaire and the Prosocial Behaviour Interview verbally translated the questions into the preferred language of the mother in real time.

For the Socialisation Practices Questionnaire, consistency in the exact phrasing of the statements was deemed critical because even slight differences could have potentially influenced their interpretation. Therefore, voice recordings of the statements were played to the mothers in their preferred language. The recorded statements had previously been translated using the following procedure: First, the questionnaires were translated into Alur, Lugbara, and Swahili by local research assistants fluent in the respective language and in English. Then, these translations were back-translated into English by a different research assistant and checked by a native English speaker. If the original meaning of a statement was not fully retained, this process was repeated until a satisfactory translation was secured. Once all statements had been adequately translated, they were recorded in Alur, Lugbara, and Swahili by fluent speakers. The recordings were stored on a smartphone and presented to the mothers via a small portable Bluetooth speaker.

Procedure of Questionnaire Data Collection

The questionnaires and interview were administered during research sessions at the participants' homes. In the UK, these sessions usually lasted 1.5 to two hours and were run by two researchers from the University of York. In Uganda, the research sessions lasted two to four hours and were conducted by teams of one or two local research assistants together with one or two researchers from the University of York. In Uganda, it was made sure that

there was always at least one research assistants present who had at least one language in common with the mother.

UK mothers were asked to fill in hard copies of the questionnaires at convenient points during the visits. In Uganda, due to the low literacy rate in the sample of mothers who participated in the present study, the questionnaires were presented verbally or via pre-recorded questions. Ugandan mothers responded verbally and their answers were recorded on hard copies of the questionnaires by a research assistant.

3.3.3 Statistical Analyses

Overview

Similar to chapter 1, I first looked at different demographic factors of the participants included in this study and examined whether there were cross-cultural differences in these demographic variables. Then, I examined maternal parenting practices related to early sharing and helping and tested (i) whether these were similar or different for the infants across the two cultural groups, (ii) whether they were similar or different for female and male infants, and (iii) how they related to different demographic variables in the two samples. Moreover, I tested whether maternal socialisation of sharing was associated with maternal socialising of helping. These analyses were run in IBM SPSS Statistics (Version 26). For all data sets that required between group comparisons of means, I tested whether a between-subjects t-test was suitable for analysis, specifically by examining whether the dependent variable was normally distributed for each group using Kolmogorov-Smirnov tests and by checking homogeneity of variances using Levene's tests (Levene, 1960). If any of these assumptions were not met I conducted non-parametric tests instead. For all categorical data sets, I conducted Pearson's chi-square tests (Fisher, 1922; Pearson, 1900), after checking that the assumption of all expected frequencies being greater than 5 was met (Howell, 2006). I considered two-tailed p-values in all inferential analyses.

In the next part of my analyses, I tested (i) whether individual differences in early maternal parenting practices were related to individual differences in the infants' behaviour in the Toy Sharing task and (ii) whether individual differences in early maternal parenting practices were related to individual differences in the infants' behaviour in the Out of Reach Helping task. Finally, I tested whether early sharing behaviour in everyday life as reported by the

mothers was associated with sharing behaviour in the Toy Sharing task and whether early helping behaviour in everyday life as reported by the mothers would was associated with helping behaviour in the Out of Reach Helping task.

Demographic Variables

In order to test if the two cultural groups differed in important demographic variables, I ran an independent samples t-test on maternal age at the infant's birth. Data were not normal and therefore violated the assumptions of parametric tests for the remaining variables. Instead I conducted Mann-Whitney U tests (Mann & Whitney, 1947) to examine if Ugandan and UK infants differed in age when their mothers filled in the Socialisation Practices Questionnaire, if the Ugandan and UK infants differed in the number of children they shared a household with, and if Ugandan and UK mothers differed in their relational goal scores. Finally, UK mothers only spoke one language with their children (zero variation). Therefore, I conducted a one sample Wilcoxon signed rank test (Wilcoxon, 1945) to test if the median number of languages spoken in Ugandan was significantly higher than one. Appropriate effect sizes are reported for all tests (for parametric tests Cohen's D and for non-parametric tests an r value where $r = z/\sqrt{N}$).

Maternal Socialisation Practices Related to Sharing and Helping

In this section of the analyses, I examined what the UK and Ugandan mothers who participated in the current study reported about their socialisation practices related to everyday sharing and helping behaviours when their infants were 14 months old.

Scoring the Socialisation Practices Questionnaire. The items of the Socialisation Practices Questionnaire were scored in the following way: For each item that a mother reported agreeing with, she received a score of 1 and for each item that a mother reported disagreeing with, she received a score of 0. Afterwards, I added up the scores for the three items of the "Sharing" subscale and the scores for the three items of the "Helping" subscale separately, which resulted in a total Sharing Socialisation score ranging between 0 and 3 and a total Helping Socialisation score ranging between 0 and 3 for each mother.

Subsequently, I examined whether total Sharing Socialisation scores and total Helping Socialisation scores were correlated, using a Kendall's tau correlation. As I found total

Sharing scores to be significantly correlated with the total Helping scores (see Results section), I combined the two scores into a composite Prosocial Socialisation score for each mother by taking the mean of her total Sharing Socialisation score and her total Helping Socialisation score.

Internal Consistency of the Socialisation Practices Questionnaire. Cronbach's alpha was calculated in SPSS to assess internal reliability of the Socialisation Practices Questionnaire.

Group Differences in Socialisation Scores. In order to examine whether UK and Ugandan mothers differed in how many different strategies they used to socialise sharing and helping behaviours in their infants at 14 months, I conducted three t-tests to compare total Sharing Socialisation scores, total Helping Socialisation scores, and composite Prosocial Socialisation scores between the UK and the Ugandan mothers. Moreover, I wanted to see if mothers of female and male infants differed in their socialisation of early sharing and helping behaviours. Therefore, I conducted another three t-tests to compare total Sharing Socialisation scores, total Helping Socialisation scores, and composite Prosocial Socialisation scores for mothers of girls and boys. Cohen's d effect sizes are reported for all six t-tests.

Preliminary Analyses on Associations between Socialisation Scores and Demographic Variables. In order to understand how the questionnaire scores related to different demographic variables, I used Kendall's tau to examine correlations between five demographic variables (maternal age at birth, infant age at the 14 month time point, number of household members aged 16 years or younger, languages spoken with the infant, and maternal relational goal scores) and the mothers' composite Prosocial Socialisation scores, their total Sharing Socialisation scores, and their total Helping Socialisation scores respectively. These analyses were done separately for the two cultural groups.

Reported Sharing and Helping Behaviour at 11 Months

I also examined the proportion of Ugandan and UK mothers who reported in their 11-month Prosocial Behaviour Interview that their infants shared with them and helped them in everyday life. To test if there was an effect of cultural group on whether or not infants were reported to (i) share or (ii) help in everyday life at 11 months old, I conducted two chi-square tests using IBM SPSS Statistics (Version 26). Odds Ratios were calculated as indicators of effect size.

Mothers had also been asked about their infants' everyday helping and sharing behaviour at 9 and 14 months. Variation in the data was most interesting at 11 months (reported sharing and helping rates were very low at 9 months and almost at ceiling at 14 months), and therefore the data from the 11 month time point was chosen for the analyses in the present study.

Predictors of Sharing and Helping Behaviour

In order to investigate predictors of individual variation in infant sharing and helping, I ran four Generalised Linear Mixed Models (GLMM; Baayen, 2008) with binomial error structures and logit link function. One GLMM each aimed at seeing whether the composite Prosocial Socialisation score significantly related to (1) infant sharing behaviour in the Toy Sharing task at 18 months and (2) infant helping behaviour in the Out of Reach Helping task at 18 months. The two remaining GLMMS were conducted to test (3) if early sharing behaviour at 11 months significantly predicted infants' sharing behaviour in the Toy Sharing task at 18 months and (4) if early helping behaviour at 11 months significantly predicted infants' helping behaviour in the Out of Reach Helping task at 18 months.

The models were fitted in R Studio (version 4.0.2) using the function glmer of the R package lme4 (version 1. 1-21; Bates et al., 2015) with the optimiser "bobyqa". Table 3.3 shows the dependent variables, and the fixed and random effects included in each of the four models. To rule out collinearity, Variance Inflation Factors (VIF, Field, 2005) were determined for a standard linear version of each model, which indicated that no predictors were distorted by collinearity (see Table 3.3).

Table 3.3

Dependent variables, fixed effects, random effects, and variation inflation factors for each of the four Generalised Linear Mixed Models

Model	Dependent variable	Fixed effects: Predictor variables	Fixed effects: Control variables	Random effects	Variance Inflation Factors
(1)	Sharing in the Request condition of the Toy Sharing task at 18m (Yes/No)	Composite Prosocial Socialisation score + Culture + Relational goal scores + Composite Prosocial Socialisation score*Culture	Interaction partner + Infant sex	Infant ID + Adult ID	Composite score: 1.27 Culture: 1.57 Relational goal scores: 1.35 Interaction partner: 1.01 Infant sex: 1.05
(2)	Being identified as a helper in the Out of Reach task at 18m (Yes/No)	Composite Prosocial Socialisation score + Culture + Relational goal scores + Composite Prosocial Socialisation score*Culture	Interaction partner + Infant sex	Infant ID + Adult ID	Composite score: 1.18 Culture: 1.43 Relational goal scores: 1.26 Interaction partner: 1.00 Infant sex: 1.01
(3)	Sharing in the Request condition of the Toy	Sharing at 11m (yes/no) + Culture + Sharing at 11m*Culture	Interaction partner + Infant sex	Infant ID + Adult ID	Sharing at 11m: 1.06 Culture: 1.05

Model	Dependent variable	Fixed effects: Predictor variables	Fixed effects: Control variables	Random effects	Variance Inflation Factors
(4)	Sharing task at 18m (Yes/No) Being identified as a helper in the Out of Reach task at 18m (Yes/No)	Helping at 11m (yes/no) + Culture + Helping at 11m*Culture	Interaction partner + Infant sex	Infant ID + Adult ID	Interaction partner: 1.00 Infant sex: 1.01 Helping at 11m: 1.01 Culture: 1.01 Interaction partner: 1.00 Infant sex: 1.02

Additionally, all models were checked for model stability by comparing the estimates from the full model based on all data with the estimates from models that lacked one level of the random effects at a time (Nieuwenhuis et al., 2012). This revealed that all four models were fairly stable (see Results).

Likelihood ratio tests (Dobson, 2002) were used to compare each full model (including all fixed and random effects) with a null model (only including the control variables interaction partner and infant sex, as well as the random effects) to test whether variance in the data was better explained by the full model. The individual fixed effects for each model were tested using likelihood ratio tests (Barr et al., 2013; R function drop1 with argument “test” set to “Chisq”). Whenever the full-null model comparison revealed a better fit of the full model than the null model and a significant interaction with culture was found, I explored this interaction further by running a model for each culture separately, which included the same fixed effect control variables and random effects as the full model but only included the relevant predictor variable as a main effect. The model fit for each of these models was then compared to the fit of the null model using likelihood ratio tests (Dobson, 2002).

I derived confidence intervals for all models using the function bootMer of the package lme4, using 1000 parametric bootstraps and bootstrapping over the random effects (argument use.u set to TRUE). I determined the effect sizes suggested by Nakagawa et al. (2017) using the R function r.squaredGLMM of the package MuMIn (version 1.43.6; Barton, 2018), which returns R^2-like effect sizes for the entirety of the fixed effects (marginal R^2, $R^2_{GLMM(m)}$) and for the entirety of the fixed and random effects (conditional R^2, $R^2_{GLMM(c)}$).

Models 1 and 3 included Toy Sharing task data for experiments with the mother and with the experimenter, while models 2 and 4 included Out of Reach Helping task data for experiments with the mother and the experimenter. The number of experimenter and mother trials included in each model along with the number of participants that contributed one or two trials to each model can be found in Table 3.4.

Table 3.4

Number of experimenter and mother trials included in each model and number of participants who contributed one or two trials to each model

Model	Number of experimenter trials		Number of mother trials		Number of participants[1]	
	UK	Uganda	UK	Uganda	UK	Uganda
(1) Socialisation of Infant Sharing	38	29	31	26	43	32
(2) Socialisation of Infant Helping	40	30	25	21	41	32
(3) Sharing at 11m	40	33	31	29	45	36
(4) Helping at 11m	42	34	25	25	43	37

Note. [1] Number of participants who contributed at least one trial to the data set

3.4 Results

3.4.1 Administration Error and Attrition

Table 3.5 shows the number of participants whose data had to be excluded from the analyses in this chapter either because mothers did not complete the interview or

questionnaire or because the infants did not have valid data for the prosocial tasks at 18 months. There were no administration errors with the interview or questionnaire.

Table 3.5

Number of UK and Ugandan mothers who did not contribute data to the analyses of the Prosocial Interview at 11 months and/or analyses of the Socialisation Practices Questionnaire at 14 months for different reasons

Questionnaire	Reason	UK	Uganda
11 month Prosocial Behaviour Interview	Attrition (had left the project)	2	2
	Missed the interview at 11 months	0	3
	No Sharing data at 18 months	6	5
	No Helping data at 18 months	8	4
14 month Socialisation Practices Questionnaires	Attrition (had left the project)	4	3
	Missed the questionnaire at 14 months	2	6
	Children without both Sharing and Helping data at 18 months	3	2

Note. All participants who appear in the attrition row at 11 months also appear in the attrition row at 14 months. Participants who did not have valid prosocial data at 18 months appear both in the rows for 11 months and in the rows for 14 months.

3.4.2 Demographic Variables

Demographic information for the UK and the Ugandan participants of the current study is presented in Table 3.6. Similar to the sample used in Chapter 2, inferential statistics revealed that UK mothers were significantly older than the Ugandan mothers when their infant was born, that the Ugandan infants were significantly older than the UK infants at the 14 month time point, that the Ugandan infants shared their households with a significantly greater number of children than the UK infants, that the Ugandan mothers spoke a significantly larger number of languages with their infants than the UK mothers, and that

the Ugandan mothers aligned significantly more with relational socialisation goals than the UK mothers.

Table 3.6

Demographic information for the UK and Ugandan participants

	UK	Uganda	Significance test			Effect size
			Test statistic	df	*P*	
Maternal age[1]	*M* = 32.77, *SD* = 3.49 (N = 43)	*M* = 27.89, *SD* = 7.10 (N = 35)	t = -3.72	47	<0.001	d = -0.90
Infant age[2]	*Mdn* = 13.87, *IQR* = 0.45 (N = 44)	*Mdn* = 14.07, *IQR* = 0.36 (N = 35)	U = 532.00		0.019	r = 0.26
Siblings/ Household members[3]	*Mdn* = 1.00, *IQR* = 1.00 (N = 44)	*Mdn* = 3.17, *IQR* = 3.50 (N = 35)	U = 532.00		<0.001	r = 0.61
Languages mother speaks with child[4]	*Mdn* = 1.00, *IQR* = 0.00 (N = 44)	*Mdn* = 2.00, *IQR* = 1.00 (N = 35)	W = 595.00		<0.001	r = 0.59
Relational goals score[5]	*Mdn* = -0.11, *IQR* = 0.67 (N = 44)	*Mdn* = 0.33, *IQR* = 0.67 (N = 33)	U = 336.50		<0.001	r = 0.46

Note. [1] Maternal age at birth of the participating infant; [2] Infant age at the 14 month time point; [3] Household members ages 16 years or younger; [4] Number of different languages mothers reported speaking with the infant; [5] Relational goal scores obtained from (Holden et al., in review)

3.4.3 Socialisation of Prosocial Behaviour

Table 3.7 presents the socialisation scores mothers received for their answers on the Socialisation Practices Questionnaire at 14 months: their total Sharing Socialisation scores, their total Helping Socialisation scores and their composite Prosocial Socialisation Scores (the creation of the composite score is explained in the section “Associations between the

Socialisation of Sharing and the Socialisation of Helping" below). On the left side of the table, the scores are presented by culture, and on the right side of the table, the three scores are presented by the infants' gender. I found that UK mothers had significantly higher total Sharing Socialisation scores, total Helping Socialisation scores and composite Prosocial Socialisation scores than the Ugandan mothers, which suggests that UK mothers used a greater number of strategies to socialise early sharing and helping in their infants at 14 months than the Ugandan mothers.

Moreover, I also found that mothers of girls had significantly higher total Sharing Socialisation scores than mothers of boys, which suggests that mothers used a greater number of strategies to socialise sharing with their 14-month-old girls than with their 14-month-old boys. Total Helping Socialisation Scores did not differ across mothers of female and male infants, however, nor were there any gender differences for the composite Prosocial Socialisation score.

Table 3.7

Mean scores for the three measures of maternal socialisation of prosocial behaviour (sharing, helping and composite score) as a function of cultural groups, and infant sex. Standard Deviations are reported in parentheses under the mean scores.

	UG (N = 35)	UK (N = 44)	t-test	F[1] (N = 39)	M[2] (N = 40)	t-test
Total Sharing Scores	1.91 (1.04)	2.41 (0.58)	$t(50.66) = -2.52$, $p = .015$, $d = -.61$	2.38 (0.78)	2.00 (0.88)	$t(77) = 2.06$, $p = .043$, $d = .46$
Total Helping Scores	1.63 (1.09)	2.14 (0.70)	$t(55.47) = -2.34$, $p = .020$, $d = -.57$	1.92 (0.87)	1.90 (0.98)	$t(77) = 0.11$, $p = .912$, $d = .03$
Composite Prosocial Socialisation Scores	1.77 (0.91)	2.27 (0.49)	$t(49.27) = -2.94$, $p = .002$, $d = -.71$	2.15 (0.63)	1.95 (0.84)	$t(77) = 1.22$, $p = .226$, $d = -.27$

Note. [1] Mothers of female infants; [2] Mothers of male infants

3.4.4 Preliminary Analyses on Associations between Demographic Variables and Socialisation of Prosocial Behaviour

Table 3.8 shows associations between various demographic variables and the composite Prosocial Socialisation scores, total Sharing Socialisation scores, and total Helping Socialisation scores that mothers from Uganda and the UK received for their answers on the Socialisation Practices Questionnaire when their infants were 14 months old. The creation of the composite Prosocial Socialisation score is explained in the section "Associations between the Socialisation of Sharing and the Socialisation of Helping" below.

Table 3.8

Associations between demographic variables and maternal prosocial socialisation scores, reported by culture

	Composite Prosocial Socialisation Scores		Total Sharing Scores		Total Helping Scores	
	Uganda	UK	Uganda	UK	Uganda	UK
Maternal Age[1]	τ = -.20	τ = .03	τ = -.21	τ = .16	τ = -.14	τ = -.03
	p = .114	*p* = .790	*p* = .120	*p* = .213	*p* = .280	*p* = .830
Infant Age[2]	τ = -.09	τ = .08	τ = -.21	τ = .04	τ = .07	τ = .11
	p = .495	*p* = .534	*p* = .120	*p* = .747	*p* = .594	*p* = .378
Household	τ = -.17	τ = -.01	τ = -.16	τ = -.17	τ = -.12	τ = -.10
members[3]	*p* = .186	*p* = .971	*p* = .237	*p* = .230	*p* = .350	*p* = .469
Languages[4]	τ = .09	[5]	τ = .10	[5]	τ = .08	[5]
	p = .542		*p* = .519		*p* = .611	
Relational	τ = -.05	τ = .15	τ = -.06	τ = .313	τ = -.04	τ = -.01
goals scores[6]	*p* = .700	*p* = .247	*p* = .692	*p* = .019	*p* = .806	*p* = .916

Note. [1] Maternal age at birth of the participating infant; [2] Infant age at the 14 month time point; [3] Household members ages 16 years or younger; [4] Number of different languages mothers reported speaking with the infant; [5] not possible to calculate as there was no variation in the UK data (all infants were monolingual); [6] Relational goal scores obtained from (Holden et al., in review)

The composite measure that is included in the main analyses below was not significantly related to any of the demographic variables. In terms of the components of the composite measure, socialisation of helping was not significantly related to any of the demographic variables either, and socialisation of sharing was only significantly related to relational goal scores in the UK sample, where a stronger alignment with relational goals was associated with higher sharing socialisation scores.

3.4.5 Associations between the Socialisation of Sharing and the Socialisation of Helping

A Kendall's tau-b correlation indicated a statistically significant positive relationship between the mothers' total Sharing Socialisation scores and their total Helping Socialisation scores across all participants (N = 79, $\tau = 0.33$, $p < 0.001$). Therefore, a composite measure ("composite Prosocial Socialisation scores") was created (see "Scoring the Socialisation Practices Questionnaire" section of the Methods). The composite Prosocial Socialisation score was used in all subsequent analyses.

3.4.6 Internal Consistency

A reliability analysis was carried out on the six items of the Socialisation Practices Questionnaire that contributed to the mothers' composite Prosocial Socialisation scores. Cronbach's alpha showed these 6 items to reach poor reliability, $\alpha = 0.52$.

3.4.7 Associations between Maternal Socialisation of Prosocial Behaviour and Infant Sharing and Helping Behaviour

Model 1: Socialisation of Sharing

Overall, there appeared to be no significant effect of maternal socialisation of prosocial behaviour, maternal socialisation goals, nor the interaction of maternal socialisation of prosocial behaviour with culture on the infants' sharing behaviour in the Request condition at 18 months (likelihood ratio test comparing full and null model: $\chi2 = 2.60$, df = 4, $p = 0.627$, $R^2_{GLMM(m)} = 0.09$, $R^2_{GLMM(c)} = 0.18$; see Table 3.9 for details on the model estimates). This indicates that infant sharing behaviour in the Request condition of the Toy Sharing task at 18 months was neither associated with the number of prosocial socialisation practices mothers used in everyday life at 14 months nor with the mothers' alignment with relational socialisation goals at 11 months.

Table 3.9

Results of model 1, investigating the influence of maternal socialisation on the infants' sharing behaviour at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.56	0.85	-1.18	2.47			[9]	0.25	0.80
Soc_composite[4]: culture[5]	-0.52	0.72	-2.16	0.80	0.53	1	0.467	-0.80	-0.16
Soc_composite[4]	-0.14	0.38	-0.95	0.66			[9]	-0.30	-0.01
Culture[5]	1.81	1.69	-1.21	5.75			[9]	1.00	2.55
Rel_goals[6]	0.14	0.62	-1.19	1.58	0.05	1	0.818	-0.14	0.47
Sex[7]	-1.13	0.47	-2.34	-0.30	6.79	1	0.009	-1.30	-0.96
Int.partner[8]	0.48	0.41	-0.30	0.80	1.41	1	0.236	0.33	0.69

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Composite socialisation score; z-transformed to a mean of zero and standard deviation of one

[5] Dummy coded with Uganda being the reference category

[6] Relational score; z-transformed to a mean of zero and standard deviation of one

[7] Dummy coded with female being the reference category

[8] Interaction partner; dummy coded with experimenter being the reference category

[9] p-values not reported as they have very limited interpretation

Model 2: Socialisation of Helping

Overall, there appeared to be no significant effect of maternal socialisation of prosocial behaviour, maternal socialisation goals, nor the interaction of maternal socialisation of prosocial behaviour with culture on the infants' helping behaviour at 18 months (likelihood ratio test comparing full and null model: $\chi2 = 8.52$, df = 4, $p = 0.074$, $R^2_{GLMM(m)} = 0.10$,

$R^2_{GLMM(c)}$ = 0.18; see Table 3.10 for details on the model estimates). This indicates that infant helping behaviour in the Out of Reach Helping task at 18 months was neither associated with the number of prosocial socialisation practices mothers used in everyday life at 14 months nor with the mothers' alignment with relational socialisation goals at 11 months.

Table 3.10

Results of model 2, investigating the influence of maternal socialisation on the infants' helping behaviour at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.61	0.85	-1.13	2.74			[9]	0.07	1.69
Soc_composite[4]: culture[5]	0.75	0.76	-0.77	2.46	1.00	1	0.317	0.32	1.29
Soc_composite[4]	-0.34	0.38	-1.33	0.43			[9]	-0.79	-0.03
Culture[5]	-2.49	1.76	-6.49	0.93			[9]	-3.72	-1.42
Rel_goals[6]	0.44	0.61	-0.78	1.78	0.54	1	0.463	0.08	0.96
Sex[7]	-0.47	0.47	-1.53	0.44	1.04	1	0.308	-0.60	-0.33
Int.partner[8]	0.34	0.43	-0.58	1.30	0.62	1	0.430	0.23	0.46

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Composite socialisation score; z-transformed to a mean of zero and standard deviation of one

[5] Dummy coded with Uganda being the reference category

[6] Relational score; z-transformed to a mean of zero and standard deviation of one

[7] Dummy coded with female being the reference category

[8] Interaction partner; dummy coded with experimenter being the reference category

[9] p-values not reported as they have very limited interpretation

3.4.8 Consistency over Time in Infant Sharing and Helping

Model 3: Reported Sharing Behaviour at 11 Months

During the Prosocial Behaviour Interview at 11 months, a significantly greater percentage of UK mothers (77.78% (35/45)) compared to Ugandan mothers (55.56% (20/36)) reported that their infants shared with them in everyday life (χ^2 (1) = 4.53, p = .033). From calculating the Odds Ratio as an indicator of effect size, I found that, according to their mothers' report, the UK infants had 2.80 times greater odds (95% CI: 1.07, 7.33) to share in everyday life at 11 months than the Ugandan infants.

The infants' reported sharing behaviour with their mothers at 11 months did, however, not significantly predict their sharing behaviour in the Request condition of the experimental Toy Sharing task at 18 months (likelihood ratio test comparing full and null model: χ^2 = 3.16, df = 3, p = .368, $R^2_{GLMM(m)}$ = 0.10, $R^2_{GLMM(c)}$ = 0.18; see Table 3.11 for details of the model estimates).

Table 3.11

Results of model 3 investigating the influence of infants' early sharing behaviour with their mothers in everyday life at 11 months on the infants' sharing behaviour in the Request condition of the Toy Sharing task at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	0.34	0.51	-0.76	1.32			[8]	0.13	0.59
Early sharing[4]: Culture[5]	0.46	0.91	-1.46	2.38	0.26	1	0.609	0.02	0.73
Early sharing[4]	0.41	0.61	-0.79	1.77			[8]	0.18	0.63
Culture[5]	-0.01	0.74	-1.60	1.68			[8]	-0.40	0.42
Sex[6]	-1.21	0.45	-2.23	-0.39	8.59	1	0.003	-1.38	-1.03
Int. partner[7]	0.41	0.40	-0.40	1.26	1.12	1	0.291	0.29	0.60

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Binary variable expressing whether mothers reported that their 11-month-old infant shared with them in everyday life or not

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] Interaction partner, dummy coded with experimenter being the reference category

[8] p-values not reported as they have very limited interpretation

Model 4: Reported Helping Behaviour at 11 Months

In the Prosocial Behaviour Interview at 11 months, a similar percentage of UK mothers (30.23%, 13/43) and Ugandan mothers (35.14%, 13/37) reported that their infants helped them or tried to help them in everyday life (χ^2 (1) = 0.22, *p* = .640). From calculating the Odds Ratio as an indicator of effect size, I found that, according to their mothers' report, the odds of the Ugandan infants helping in everyday life at 11 months were increased by 1.25 compared to the UK infants (95% CI: 0.49, 3.19).

Overall, the full model investigating the effect of everyday helping behaviour at 11 months on helping in the Out of Reach Helping task at 18 months fitted the data significantly better than the null model (likelihood ratio test: χ^2 = 18.05, *df* = 3, p < .001, $R^2_{GLMM(m)}$ = 0.17, $R^2_{GLMM(c)}$ = 0.20; see Table 3.12 for details of the model estimates). The interaction between culture and everyday helping at 11 months was significant. Posthoc models to explore this interaction revealed that, in the Ugandan sample, not helping in everyday life at 11 months was associated with a higher likelihood of helping in the Out of Reach Helping task at 18 months (likelihood ratio test: χ^2 = 8.17, *df* = 1, p = .004, $R^2_{GLMM(m)}$ = 0.15, $R^2_{GLMM(c)}$ = 0.17; see Figure 9). For the UK sample, there was no significant main effect of everyday helping at 11 months on helping in the Out of Reach Helping task at 18 months (likelihood ratio test: χ^2 = 0.011, *df* = 1, p = .916, , $R^2_{GLMM(m)}$ = 0.04, $R^2_{GLMM(c)}$ = 0.07).

Table 3.12

Results of model 4 investigating the influence of infants' early helping behaviour towards their mothers in everyday life at 11 months on the infants' helping behaviour in the Out of Reach Helping task at 18 months

Term	Estimate	SE[1]	Lower CI[2]	Upper CI[2]	χ^2	*df*	*P*	Min[3]	Max[3]
Intercept	1.12	0.48-	0.18	2.63			[8]	1.03	1.39
Early helping[4]: Culture[5]	1.74	0.90	-0.10	4.26	3.95	1	0.047	0.95	1.97
Early helping[4]	-1.75	0.65	-3.80	-0.75			[8]	-1.97	-1.55
Culture[5]	-1.97	0.56	-3.85	-1.06			[8]	-2.19	-1.77
Sex[6]	-0.40	0.42	-1.44	0.53	0.91	1	0.339	-0.52	-0.29
Int. partner[7]	0.28	0.42	-0.64	1.22	0.45	1	0.500	0.17	0.39

[1] Standard Error

[2] Lower and upper limit of 95% confidence intervals

[3] Minimum and maximum of model estimates obtained from dropping levels of random effect one at a time

[4] Binary variable expressing whether mothers reported that their 11-month-old infant helped them in everyday life or not

[5] Dummy coded with Uganda being the reference category

[6] Dummy coded with female being the reference category

[7] Interaction partner, dummy coded with experimenter being the reference category

[8] p-values not reported as they have very limited interpretation

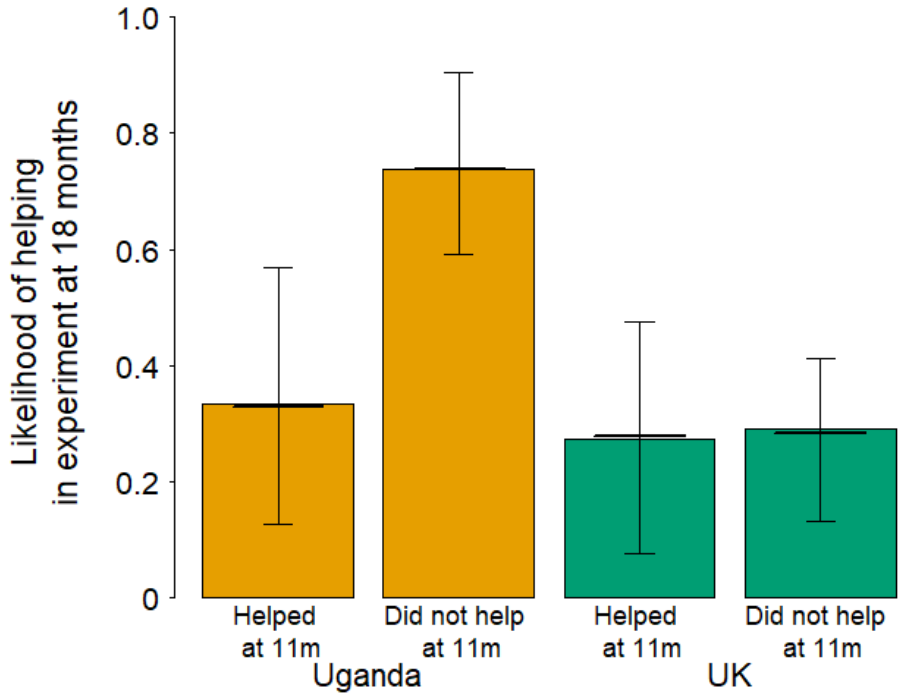

Figure 9. Likelihood of helping the interaction partner (experimenter or mother) in the Out of Reach Helping task at 18 months as a function of the infants' everyday helping behaviour at 11 months as reported by their mothers. The bars illustrate raw data, whilst the horizontal lines with error bars show the estimates from the fitted model and their 95% confidence intervals with infant sex being centred.

3.5 Discussion

This study revealed significant differences in the number of socialisation practices mothers from the UK and Uganda used to scaffold early sharing and helping in their 14-month-old infants, indicating that infants from different cultural backgrounds can experience quite varied parenting practices. The literature-driven prediction that I made about potential cross-cultural differences between the UK and Ugandan sample in maternal socialisation of early sharing and helping were supported by the data: Specifically, I found cross-cultural differences in maternal reports of expecting, asking for, and encouraging sharing in their 14-month-old infants in the expected directions, with the UK mothers reporting the use of a greater number of these strategies to socialise early sharing and helping than the Ugandan mothers. These findings support the notion proposed by Miller et al. (1990) that prosocial behaviour might be regarded as a moral obligation in Non-WEIRD communities while it might be viewed as more of a personal choice in WEIRD settings. Future investigations are

necessary, however, to directly study how mothers from a larger variety of cultural settings view prosocial behaviour and how those views might translate into specific expectations and parenting practices related to sharing, helping, and also other forms of prosocial behaviour. This is especially important because, in the present study, cultural group was confounded with demographic factors such as rurality and SES. Although maternal socialisation of early sharing and helping, as measured by the composite Prosocial Socialisation score, did not seem to vary systematically with any of the demographic variables that I considered in the present study, the two samples differed significantly in these demographic variables – meaning that demographic variables, such as maternal age or the number of languages spoken with the infant, were confounded with culture. As discussed in the previous chapter, this constitutes a weakness of the present study and future investigations with a larger variety of cultural settings is therefore needed.

Apart from comparing maternal use of different socialisation practices related to early sharing and helping across two cultural contexts, the present study also aimed at examining whether the use of these socialisation practices might relate to infants' later sharing and helping behaviour. On an individual level, I did not find any significant associations between familial factors and infant prosociality, however. Neither the number of prosocial socialisation practices that mothers used in everyday life at 14 months nor the mothers' alignment with relational socialisation goals at 11 months explained individual variation in the infants' sharing and helping behaviours at 18 months. These null results could, however, be attributed to this study not having enough power to detect existing effects due to the relatively small number of participants that were included in this study. My small sample size also resulted in relatively low model stability for the GLMMs that I ran and it meant that I was not able to run analyses that included a larger number of predictors within the same model. It is therefore difficult to know whether I detected genuine null results or if further research using larger sample sizes might indicate that the familial factors that I examined might actually relate to infants' later sharing and helping behaviour. Future research should therefore aim to replicate this research with a larger sample size.

While I did not find individual variation in early sharing and helping to be related to maternal socialisation of prosociality, on a group level, the findings of the present study and the previous chapter form an interesting pattern of results: On the one hand, despite there

being cross-cultural differences in maternal socialisation practices, UK and Ugandan infants were found to be similarly likely to share toys with an adult. This indicates that early sharing might be relatively impervious to variation in maternal socialisation of prosociality. For instrumental helping, on the other hand, I found both group-level differences in the UK and Ugandan infants' likelihood of helping an adult in chapter 2 and group-level differences in maternal use of socialisation practices in the present chapter. Interestingly, these two group-level differences were in opposite directions: While the UK mothers reported using a significantly larger number of socialisation practices than the Ugandan mothers, their infants were actually significantly less likely to help an adult than the Ugandan infants. This suggests that the socialisation techniques the UK mothers used might not be very effective at promoting infants' later instrumental helping or that they might even decrease infants' propensity to help. This is surprising because a number of previous studies have revealed positive associations between instrumental helping in infancy and parenting practices such as encouragement and modelling (e.g., Dahl, 2015; Pettygrove et al., 2013; Schuhmacher et al., 2019). One possible explanation for the findings of the present study could be that, while these parenting practices might in fact be predictive of instrumental helping within a certain culture as found in previous studies, they might simply not be useful for explaining the cross-cultural variation in helping revealed in chapter 2. For instance, the UK infants might have already been less likely than the Ugandan infants to help others at 14 months, which might have resulted in the UK mothers trying harder to foster early helping and therefore engaging in a larger number of different scaffolding techniques. In future work, it would, therefore, be good to also assess instrumental helping at 14 months and to examine how helping at 14 months might relate to maternal use of parenting practices at the same age. Another reason why the findings of the present study differ from those of previous work could be that in the present study, mothers were asked to report which parenting practices they used in everyday life, while in previous work, maternal behaviours were often directly observed during naturalistic mother-infant interactions (e.g., Dahl, 2015; Kärtner et al., 2021; Köster, Cavalcante, et al., 2016). As mothers might be affected by social desirability biases and their reports might therefore not very accurately reflect their actual behaviours, it could be useful for future studies to include both questionnaires that ask mothers about their everyday use of different parenting practices and tasks in which maternal scaffolding of early helping is directly observed.

Another important difference between the present study and previous research is that I considered helping in response to need, operationalised as retrieving an object in the experimental but not in the control condition. Previous studies, on the other hand, have mostly examined helping frequencies in experimental conditions or naturalistic interactions without any control conditions. Interestingly, when focussing on the infants' behaviour in the experimental condition only, UK and Ugandan infants in the present study appeared to be similarly likely to help an adult. However, many of the UK infants also retrieved the object for their mothers in the control condition. The tendency of these UK infants to retrieve an object irrespective of whether or not their mothers signalled a need or desire for the object suggests that they might not have been very sensitive to their mothers' needs. Thus, the higher levels of maternal scaffolding of helping at 14 months that we observed in the UK might have trained the UK infants to show "helpful" behaviours like retrieving objects regardless of the current circumstances but might not necessarily have scaffolded learning about or sensitivity to the needs of others. Further investigations of which parenting practices might lead to infant helping regardless of need and which parenting practices might promote a more sophisticated understanding of need in young children are necessary. One potential avenue for future work could be to examine how parents react in everyday situations in which their infants want to help them but their help is not needed or might even be disruptive. It would be interesting to see how maternal reactions in these circumstances might relate to the extent to which infants help in response to need or regardless of need.

Another finding of the present study was that, on a group-level, sex differences in maternal socialisation of sharing corresponded to sex differences in the infants' sharing behaviour. As mentioned in the previous chapter, across both cultures and types of interaction partners, girls were more likely to share in the Request condition of the Toy Sharing task at 18 months than boys. In the present chapter, I found that at the 14 month time point, mothers of girls reported using a higher number of parenting practices aimed at socialising sharing than mothers of boys. There were no sex differences in the number of socialisation practices aimed at helping that the mothers used nor were there sex differences in the infants' helping behaviour at 18 months. Further investigations are necessary to understand

whether greater maternal socialisation efforts had a positive causal effect on girls' later sharing rates.

In the present chapter, I did not only examine how maternal socialisation practices might relate to infant helping and sharing but I also looked at the association between infant prosociality and maternal socialisation goals. However, similar to the simple bivariate analyses in the previous chapter which showed no positive correlation between maternal alignment with relational socialisation goals and the infants' later sharing and helping behaviour, the analyses in the present chapter did not find significant associations between maternal socialisation goals and infant prosociality on an individual level either. When the mothers' relational goal scores were entered as a predictor variable into the models looking at the relationship between maternal socialisation of prosociality and sharing and helping respectively, the overall models failed to account for a significant amount of variation. Based on the small sample size and the variation in relational and autonomous socialisation goals within the samples of the present study, there is, hence, no indication that maternal socialisation goals significantly relate to infant sharing and helping on an individual level– despite there being theoretical expectations for there to have been a relationship (Fonseca et al., 2018; Kärtner et al., 2010; Keller, 2007). On a group level, on the other hand, this relationship might be worth further investigation: In a previous study, which included the same UK and Ugandan mothers as the present study, Holden et al. (in review) found Ugandan mothers to align more with relational socialisation goals than UK mothers. Moreover, in the previous chapter, I found Ugandan infants to be more likely to help an adult than UK infants. Thus, while maternal socialisation goals might not explain variation in helping and sharing on an individual level, on a group level, there might be associations between maternal socialisation goals and infant prosociality that should be examined more in future research.

While maternal alignment with relational socialisation goals was not related to infant sharing or helping, it was significantly correlated with the mothers' socialisation of sharing, in the UK sample only. This indicates that culturally specific explorations of relational socialisation goals and the socialisation of sharing are warranted. Maternal socialisation of helping and the composite Prosocial Socialisation score were not related to maternal socialisation goals. This result combined with the poor internal validity of the composite

score suggests that - despite the decision to make a composite Prosocial Socialisation score being supported by the positive relationship between the total Sharing Socialisation scores and the total Helping Socialisation scores – in future research, it might also be useful to investigate maternal socialisation of sharing and helping separately.

In addition to maternal socialisation of sharing and helping, I also tested whether precocious sharing and helping in everyday life might predict infants' later sharing and helping behaviour. First, when considering sharing, I did not find any significant associations between maternal reports of sharing at 11 months and the infants' sharing behaviour in an experimental task at 18 months. It is possible that this was due to the mothers possibly having been subject to demand characteristics and, as prosocial behaviour is regarded as positive, mothers possibly having over-exaggerated their infant's propensities to engage in sharing at 11 months, which may have made it a poor predictor of later sharing. On the other hand, it might also be the case that sharing at 11 months is actually not very predictive of later sharing behaviour. Indeed, previous research has found limited consistency over time for early helping and sharing behaviours in slightly older infants (e.g., Eisenberg et al., 1992). Researcher-led objective behavioural assessment of sharing at multiple time points would be an ideal way to robustly test the developmental trajectory of early sharing behaviour.

For instrumental helping, on the other hand, I did find a significant association between helping in everyday life at 11 months and helping in the experimental task at 18 months. I had expected there to be a positive association between precocious helping at 11 months and instrumental helping task at 18 months, but this was not supported by the data. Instead, I found a significant interaction between maternal reports of everyday helping at 11 months and the cultural settings the infants grew up in, with posthoc models revealing that in the UK sample, helping at 11 month was not associated with helping at 18 months, while in the Ugandan sample not helping in everyday life at 11 month was associated with a higher likelihood of helping at 18 month. The finding that Ugandan infants were more likely to help at 18 months when their mothers had reported that they did not help at 11 months appears to be at odds with previous research which has observed consistency of early instrumental helping over time (Giner Torréns et al., 2021; Kärtner et al., 2021). The studies that have found consistency over time for instrumental helping did, however, assess

instrumental helping in similar ways over multiple time points, while the present study relied on maternal report at 11 months and then tested helping in an experimental task at 18 months. It is possible that in the present study, the use of two different methodologies made it more difficult to understand the relationship between instrumental helping at an earlier and at a later age. It is also possible that the tasks that the Ugandan infants helped with in everyday life at 11 months were very different from the experimental Out of Reach Helping task at 18 months and that precocious helping behaviour therefore did not generalise to the experimental set-up. The Ugandan infants' early helping experiences could have even set them up to need certain conditions to engage in helping, for instance modelling behaviour from older siblings, that were not present in the experimental task, which might have resulted in a lower likelihood to help for these infants. In future studies, it would be interesting to ask the mothers in which kinds of situations and under which circumstances their infants help them at 11 months. This would enable us to see whether or not everyday helping might include situations in which infants in Uganda retrieve out-of-reach objects and, thus, to what extent helping contexts in everyday life might be comparable to the standardised instrumental helping tasks. Additionally, it would be good to measure early helping experimentally at 11 months and to ask mothers about everyday helping at 18 months, as this would enable us to get a better understanding of the developmental trajectory of early instrumental helping in both experimental settings and in everyday life.

While examining maternal reports of the infants' everyday sharing behaviours, I also found that significantly more UK than Ugandan mothers reported that their 11-month-old infants shared with them in everyday life. This was surprising because I did not find any cross-cultural differences in the infants' behaviour in the Toy Sharing task at 18 months (see chapter 2). It might be possible that the very first instances of sharing behaviour emerge at slightly different ages across different cultures but that by 18 months, sharing rates are similar for infants from different cultural backgrounds. The fact that the elevated reports of early sharing in UK mothers did not translate into significantly better performance on experimentally measured sharing behaviour at 18 months could, however, also indicate reliability issues with measures reliant on maternal report of socially desirable behaviours. Overall, the UK mothers in this sample reported using more parenting practices aimed at

scaffolding sharing in their infants than the Ugandan mothers, which could indicate that they might value early sharing more than the mothers from Uganda. If the UK mothers considered early sharing to be a more important and desirable than the Ugandan mothers, they might have been more susceptible to providing a socially desirable response than Ugandan mothers. Understanding whether the cross-cultural difference in reports of infants' sharing behaviour at 11 months was caused by actual differences in the infants' everyday sharing behaviours or whether it was caused by characteristics of the mothers who reported their infants' behaviours requires further investigation.

Interestingly, while the likelihood of helping an adult in an experimental setting was higher in the Ugandan than the UK sample when the infants were 18 months old, there were no cross-cultural differences in the number of mothers who reported everyday helping behaviours at 11 months. Only a minority of mothers in both cultural settings reported that their 11-month-old infants helped them or others in everyday life, which is in line with previous research indicating that, before their first birthday, infants' helping rates are generally quite low and that they only start to increase during the second year of life (e.g., Dahl, 2015; Köster et al., 2019; Köster, Ohmer, et al., 2016). Finding that infants from both cultural settings appear to be equally likely to help others in everyday life at 11 months means that the cross-cultural difference in the likelihood of helping that we saw in chapter 2 emerges sometime between the ages of 11 and 18 months. Future research should, therefore, investigate Ugandan and UK infants' helping behaviour at several time points between the ages of 11 and 18 months, in order to identify the age at which differences in instrumental helping behaviour emerge.

Overall, the findings of the present study indicate that sharing at 18 months might be a fairly robust phenomenon which appears to be relatively impervious to pronounced differences in infants' early life environment. The maternal socialisation practices that I examined in the present chapter did not appear to significantly relate to infant sharing. They were also not significantly associated with the infants' instrumental helping behaviour (which was found to vary cross-culturally in the previous chapters). It is possible that other familial factors which I was unable to test or other early characteristics of the infants themselves might explain individual variation in their sharing and helping behaviours, but the aspects of the infants' early life environment that I examined in the present study did not appear to be

related to the infants' later sharing and helping behaviour. Moreover, the more general cross-cultural variation in parenting practices related to sharing and helping that I revealed in this study did not match the cross-cultural stability in propensity to share at 18 months (see chapter 2). Indeed, when the findings from this study are taken together with the findings from chapter 2, they suggest that sharing resources with others might be a fundamental feature of human nature that emerges relatively independent of socialisation and cultural influences. The cross-cultural variation in parenting practices revealed in this study also did not match the cross-cultural variation in instrumental helping found in the previous chapter but instead went in the opposite direction: UK mothers used a higher number of socialisation practices than the Ugandan mothers but their infants were found to help significantly less than the Ugandan infants. It is possible that the higher level of scaffolding that infants in the UK appear to receive for helping may inadvertently condition these infants to pay less attention to the needs of others.

To conclude, I found that early life experiences related to early sharing and helping differed considerably between the UK and Ugandan infants included in the present study. From the infants' perspective this means that the scaffolding for engaging in sharing and helping at 14 months was likely different in the two study populations. However, these cross-cultural differences in maternal practices did not explain group-level similarities in sharing behaviour shown by infants at 18 months, or group-level differences in helping at 18 months. Moreover, they also failed to account for a significant amount of individual variation in propensity to share and help at 18 months. Taken together, these findings indicate that early sharing might be relatively impervious to environmental variation and appears to emerge similarly across different cultural settings. Instrumental helping, on the other hand, appears to be more sensitive to the cultural environment and parental socialisation during infancy, although not always in the ways one might expect.

Chapter 4: General Discussion

In this chapter, I will focus on the main findings of this thesis, their wider implications, and, where possible, I will draw comparisons between the findings I made on infant sharing and infant helping. More comprehensive discussions of the individual results of each study can be found in the respective empirical chapters.

4.1 Main Findings of the Current Thesis

4.1.1 Cross-Cultural Differences in Infant Sharing and Helping at 18 Months

One main aim of the present thesis was to understand to what extent sharing and instrumental helping might develop uniformly or differently in infants from different cultural backgrounds. Therefore, I examined these two key forms of early prosociality in 18-month-old infants from the UK and from Uganda. As reported in chapter 2, there were no cross-cultural differences in the likelihood of sharing a toy with an adult between Ugandan infants from a rural, subsistence farming background and infants from an urban UK middle-class setting. The likelihood of helping an adult by retrieving an out-of-reach object, on the other hand, differed between the two samples of infants, with the Ugandan infants being overall more likely to help an adult and also being faster to help an experimenter than the UK infants, generally before explicit verbal cues of need or direct requests for help were uttered (see chapter 2).

To my knowledge, the study presented in chapter 2 was the first to investigate cross-cultural differences in sharing behaviour in infancy. As discussed in chapter 2, previous research with slightly older children has revealed mixed results with regards to cross-cultural variability of early sharing: Some studies have revealed cross-cultural differences in sharing rates during early childhood (e.g., Rao & Stewart, 1999; Rochat et al., 2009), while others have found these differences to only emerge in middle childhood (e.g., Cowell et al., 2017; House et al., 2013; Huppert et al., 2019). The finding of the present thesis, that infants from Uganda and the UK appear to be similarly likely to share with an adult, supports the notion that cross-cultural differences in sharing might only emerge later in development when children become sensitive to society-specific rules about resource distributions (e.g., House et al.,

2013). However, further investigations are necessary to understand at what age exactly and under which circumstances cross-cultural differences in sharing develop.

Previous findings on cross-cultural differences in infants' instrumental helping have also been mixed: The results presented in chapter 2, where I found Ugandan infants to be more likely to help than UK infants, are in line with findings by Giner Torréns and Kärtner (2017) who also observed cross-cultural variability in infant helping. They are in contrast, however, to other previous work which observed similar rates of infant helping across different cultural backgrounds (Callaghan et al., 2011; Köster, Cavalcante, et al., 2016). More research is needed to understand whether these mixed findings might be due to methodological differences of the different studies or due to specific characteristics of the respective study populations.

It is important to note that investigating sharing and helping behaviours in infants from two different cultural backgrounds, as I did in the present thesis, is not sufficient to comprehensively answer the question of whether or not the emergence of early prosocial behaviour might be culturally invariant. However, it is a good starting point for exploring this question, as the results of the present thesis indicate that prosociality can be associated with cross-cultural differences in early socialisation. Interestingly, this relationship appears to vary depending on which type of prosocial behaviour we are considering: Early instrumental helping may be more related to cross-cultural variation in early life environment than sharing. This not only expands our current knowledge of sharing and helping behaviour in infancy but, together with the fact that I did not find infant sharing and helping to be associated with each other, also highlights the importance of examining different types of prosociality separately rather than considering prosociality as one undifferentiated class of behaviours (e.g., Dunfield et al., 2011; Paulus, 2018). It also indicates that we cannot necessarily generalise findings about one type of prosociality to other forms of prosocial behaviours.

The results of this thesis, particularly the cross-cultural differences found in infant helping, also emphasize the need to shift away from predominantly conducting research with Western Educated Industrial Rich Democratic (WEIRD; Henrich et al., 2010) samples, and from assuming that their behaviour is representative of that of all humans. Instead, we need to study early prosocial behaviour in a larger variety of different cultural settings. It appears

that in order to fully understand how infants might react when faced with someone's instrumental need, we need to tests infants whose early life experiences show more variation than we can usually find within a single cultural setting.

Despite the theoretical importance of conducting research in diverse cultural settings, working in Non-WEIRD countries can be extremely challenging, particularly for researchers with no experience in working in that country. These challenges might be overcome with more intensive collaboration across different sites, following the model of the ManyBabies project (Frank et al., 2017) and successful large-scale collaboration in other areas of infant research, such as gaze following or infant-directed speech (e.g., Byers-Heinlein et al., 2021; Byers-Heinlein et al., 2020). Conducting multi-lab projects on infant prosociality would be an important step in improving our understanding of this aspect of infant development. It would potentially also allow us to not only broadly compare infants from WEIRD settings to infants from Non-WEIRD settings, but to recruit multiple samples within these broader contexts that vary on dimensions like SES or living in urban versus rural settlements (see Köster, Cavalcante, et al., 2016; Rochat et al., 2009 for examples of this), as this could help us understand which demographic variables might relate to cross-cultural differences in prosociality. In the present thesis, the infants' cultural group systematically varied with several demographic characteristics, such as maternal age, household size, and the number of languages spoken with the infant. As mentioned in chapter 2, it would therefore be beneficial for future research to include populations who vary not only in culture, but also on these variables, in order to ascertain which of these sample characteristics might drive the population difference in early helping that I observed. When selecting cultures to include in future studies of infant prosociality, it would also be particularly interesting to include cultures where adults differ in their prosocial norms and are therefore likely to scaffold the development of prosocial behaviour in young infants differently. Alternatively, if this information is not available, collecting data on adult prosocial behaviour in the study community alongside that of infants might help us understand differences or similarities in the infants' behaviours that we might observe.

Another important avenue for future cross-cultural research could be to track the development of sharing and helping more closely across infancy. Previous cross-cultural studies on infant instrumental helping have so far only tested this behaviour at 18 and 24

months (e.g., Callaghan et al., 2011; Giner Torréns & Kärtner, 2017). In future research, earlier time points should be included too in order to investigate at what age differences in instrumental helping might emerge. In addition, later time points should be included in order to understand whether these difference are sustained or if they might disappear as infants get older. The present thesis indicates that sharing behaviours at 18 months might be relatively stable across different cultures but we need to examine this behaviour at additional time points in infancy too, in order to investigate whether this stability is present throughout infancy, or if not, at what point in development cross-cultural variability in sharing might emerge.

4.1.2 Familiarity with the Recipient of Sharing and Helping at 18 Months

In the present thesis, I also sought to assess to what extent familiarity with a potential recipient of resources or help might relate to infants' sharing or helping behaviours towards that individual. Therefore, the experimental tasks that tested infant sharing and helping were conducted both by experimenters and by the infants' mothers. Mothers and experimenters were trained to behave according to standardised experimental protocols and were given instructions through Bluetooth earpieces while performing the experimental tasks in order to ensure that they each gave the same set of standardised cues. This meant that I was able to directly compare the infants' behaviours towards both types of recipients. Previously, comparing sharing and helping towards caregivers and experimenters has been difficult as most studies with caregivers assessed sharing and helping in naturalistic interactions (e.g., Boundy et al., 2016; Dahl, 2015) while most studies with experimenters have been conducted in experimental settings (Gross et al., 2015; Sommerville et al., 2013). The limited number of studies that have included both types of recipients have mostly tested infant sharing in naturalistic contexts and have found North American infants to share more frequently with their caregivers than with unfamiliar adults (e.g., Bretherton et al., 1981; Rheingold et al., 1976). The present thesis, on the other hand, revealed that, in an experimental setting, UK and Ugandan infants' likelihood of sharing or helping in response to need did not differ across the two types of recipients (see chapter 2). This indicates that while in naturalistic contexts infants might exhibit more spontaneous sharing towards their caregivers than unfamiliar adults, they appear to not differentiate between the two types of recipients when sharing or helping in an experimental set-up. Possible reasons for this

difference could be that in naturalistic interactions, caregivers and experimenters might give different kinds of prompts for sharing or helping, while in the present thesis, both types of recipients used the exact same cues indicating their need for resources or help. In some of the previous studies, caregivers and experimenters were instructed to not initiate interactions with the infants, so that spontaneous sharing could be observed (e.g., Bretherton et al., 1981). This could mean that the infants shared more with their caregiver than an unfamiliar experimenter because they might have been uncertain about whether the experimenter needed or wanted a toy, while they probably knew from previous experience that their caregiver would react positively to being given toys. In the present thesis, both the caregivers and experimenters made their need and desire for resources and help very explicit. This suggests that when infants are given similar, explicit cues indicating that someone needs a toy or requires help reaching an object, their likelihood of sharing or helping is unrelated to who the individual is. It is important to note though that while the identity of the recipient did not appear to be associated with the infants' overall likelihood of sharing or helping, it did relate to some more specific aspects of the situations, for instance, which kind of toy they shared or how likely they were to retrieve an object in the control condition. However, further research with a larger sample size is necessary to better understand these specific aspects of the infants' behaviour as they were only shown by a small number of infants.

Another aspect of the association between familiarity and infant sharing and helping that I examined was the degree of familiarity between the infants and their respective experimenters. I found that how often an infant had previously seen their experimenter or whether they had interacted with them outside of the context of this project did not significantly relate to the infants' likelihood of sharing or helping. This can be seen as further evidence for the notion that familiarity with an individual does not seem to be associated with 18-month-old infants' general likelihood of sharing with or helping that individual. Overall, the results of this thesis support the view proposed by Warneken and Tomasello (2009a) that early prosocial behaviour starts out as rather indiscriminate and that children's prosociality only becomes more selective as they grow older. It is important, however, to assess how familiarity might relate to infant prosociality in a larger variety of cultural backgrounds, since the present thesis is, to my knowledge, the first one to examine this

question in a Non-WEIRD setting. Testing groups of infants that might differ in relevant characteristics, such as how frequently they interact with unfamiliar adults in everyday life, could be a useful next step in understanding cross-cultural variability or stability in the associations between familiarity with a recipient and infant sharing and helping.

4.1.3 Cross-Cultural Differences in the Infants' Early Life Environment

Another core aim of the present project was to investigate how infant sharing and helping might be associated with familial socialisation. Therefore, as a first step, I examined the extent to which familial socialisation of prosociality might differ across the UK and Uganda. As detailed in chapters 3, I found significant cross-cultural differences in the number of strategies that Ugandan and UK mothers used to socialise early sharing and helping behaviours in their 14-month-old infants, with the UK mothers reporting the use of more socialisation practices than the Ugandan mothers. Across the two samples, maternal socialisation of sharing was significantly correlated with maternal socialisation of helping which indicates that mothers socialise these two types of prosociality in similar ways.

The cross-cultural differences that I found in maternal socialisation of infant prosociality indicate that there can be variation in the parenting practices that infants from different cultural backgrounds experience. In future studies, it would be interesting to investigate the extent to which these cross-cultural differences in maternal parenting practices might vary over time or remain stable as children get older. It would also be useful to study maternal practices related to other types of prosociality in order to examine whether the ways in which mothers scaffold sharing and helping might also extend to comforting or cooperation.

4.1.4 Associations between Socialisation and Infant Sharing and Helping

After establishing that the Ugandan and UK infants included in this thesis experienced significant differences in the use of maternal parenting practices related to early sharing and helping at 14 months, I investigated how maternal socialisation of early prosociality might relate to infant sharing and helping at 18 months. Chapter 3 revealed that neither the number of strategies mothers used to scaffold sharing and helping at 14 months nor maternal socialisation goals at 11 months significantly related to individual variation in the infants' sharing and helping behaviours at 18 months. This is in line with a study by Gross et al. (2015) in which parental use of various socialisation practices aimed at increasing

prosociality did not relate to infant sharing and helping either. A study by Pettygrove et al. (2013), on the other hand, had found a positive relationship between parental scaffolding of prosociality and infant helping at the same age. Further investigations are necessary to understand the reasons for these mixed results. Finding no significant association between infant prosociality and maternal socialisation goals on an individual level was surprising as previous studies have revealed positive associations between maternal emphasis on relational socialisation goals and individual variation in infant helping and comforting (Fonseca et al., 2018; Kärtner et al., 2010). Further investigations will be necessary to understand if the differences in findings between the present study and previous work might be due to methodological differences (e.g., previous studies having assessed maternal socialisation goals and infant prosociality concurrently) or whether they might be due to characteristics of the specific populations included in these studies.

While on an individual level maternal socialisation did not significantly relate to infant sharing and helping, on a group level the findings of chapters 2 and 3 form an interesting pattern of results: UK and Ugandan infants were similarly likely to share with an adult, even though UK mothers reported using more strategies to scaffold sharing and helping behaviours in everyday life than the Ugandan mothers. Moreover, while UK mothers reported using more socialisation strategies than the Ugandan mothers, the UK infants were in fact less likely to engage in instrumental helping in response to need than the Ugandan infants. This suggests that maternal scaffolding aimed at increasing sharing and helping might not be very effective at promoting these prosocial behaviours. Moreover, it is possible that the strong maternal scaffolding of prosociality in the UK might have even resulted in the UK infants being less sensitive to their mothers' instrumental needs. A considerable number of UK infants were found to retrieve objects for their mothers both in the experimental and control condition, which indicates that their mothers' socialisation practices might have reinforced them for retrieving or tidying objects, rather than paying attention to the need or desire of the adult. Future investigations on which specific parenting practices might simply promote certain behaviours like retrieving or handing over objects and which parenting practices might promote an actual understanding of need in infants are necessary.

As mentioned in previous chapters, the sample size of the current study was unfortunately relatively low which limited the types of analyses I was able to conduct. Therefore, this research should be replicated with a larger sample size, which should ideally be informed by a power analysis. , For future research, it is also crucial to investigate the association between different parenting practices and various types of prosocial behaviour in a larger variety of cultural settings to further increase the range of maternal behaviours and infant prosociality to be examined. Moreover, as the associations between certain parenting practices and prosocial behaviours have been found to vary across infant ages (e.g., Dahl, 2015; Dahl et al., 2017; Kärtner et al., 2021), it would also be important to extend the cross-cultural research presented in this thesis to other time points during infancy.

4.2 Future Directions in Infancy Prosocial Behaviour Research

In the present thesis, I not only aimed to contribute to a better understand of cross-cultural variability in early sharing and helping and the associations between familial socialisation and early prosociality, but I also sought to address a number of methodological limitations found in previous research. Some of my findings and observations might help to inform methodological decisions in the design of future studies on infant prosociality.

4.2.1 Longitudinal Research

Even though many scholars have pointed out the need to conduct longitudinal research in order to understand how the emergence of prosocial behaviour might be influenced by environmental factors (e.g., Callaghan & Corbit, 2018; de Guzman et al., 2014; Eisenberg et al., 2015), longitudinal studies on the development of sharing and helping in infancy have so far been rare (but see Dahl, 2015; Eisenberg et al., 1992; Kärtner et al., 2021). The limited number of studies that have been conducted have, to my knowledge, only included WEIRD samples, which means that cross-cultural longitudinal work on environmental influences on infant prosociality is still missing from the literature. The present thesis was part of a larger longitudinal project, which enabled me to look at how early parenting practices at 14 months might relate to later infant prosociality at 18 months. Future studies that actually study prosocial behaviour at multiple time points are desperately needed, however, in order to improve our understanding of the developmental trajectory of early prosocial behaviour

and longitudinal relationships between different environmental factors and infant prosociality.

The general lack of longitudinal studies in the literature is probably partly a product of the challenges associated with conducting longitudinal research. For instance, even though we succeeded in retaining a very high percentage of mother-infant dyads throughout the duration of the overall longitudinal project (UK: 91%; Uganda: 93%), the final sample sizes included in this thesis were still relatively low. In the prosocial tasks presented in this thesis, a considerable number of trials had to be excluded from analyses because they were deemed invalid for reasons such as the infants being distracted or fussy or mothers deviating from experimental protocols. In a cross-sectional study, these participants could have easily been replaced by additionally recruited mother-infant dyads but in a longitudinal project such as this thesis was part of, this was not possible. In future research, even more attention should therefore be paid to ensuring that infants are ready and happy to be tested before each individual trial and that enough time for breaks is budgeted into each experimental visit. Moreover, it is crucial to further improve the ways in which mothers are trained to follow experimental protocols. Instead of being giving verbal instructions mothers could, for instance, be shown videos that demonstrate what they need to do in an upcoming trial. Moreover, it would be useful to arrange for another caregiver to be present during the experimental sessions, so that all mothers can practice delivering the standardised cues while their infants leave the room and play with someone they are familiar with.

4.2.2 Control Conditions

As discussed in chapter 2, the findings of the current thesis also indicate how important it is to include control conditions in the design of experimental tasks that aim to measure early prosociality. In the study on instrumental helping presented in chapter 2, a considerable number of UK infants retrieved an out-of-reach object for their mothers in both the experimental and the control condition, while most of the Ugandan infants retrieved the object exclusively in the experimental condition. This suggests that the UK infants might have been less sensitive to the need of their mothers than the Ugandan infants as they appeared to pay less attention to whether or not their mothers signalled a need or desire for the out-of-reach object. The inclusion of a control trial was crucial for identifying this cross-cultural difference.

A number of recent studies on early instrumental helping have, however, not included control conditions, arguing that it has been sufficiently established in previous work that infants retrieve objects in experimental conditions but that they very rarely do so in control conditions (e.g., Giner Torréns & Kärtner, 2017; Gross et al., 2015; Grossmann et al., 2020). Previous work on infant sharing has also very rarely used control trials aimed at ruling out low-level alternative explanations for sharing, such as enjoyment of or prior reinforcement for handing over objects (but see Dunfield et al., 2011; Hay & Murray, 1982 for notable exceptions). This might be due to the fact that devising a control condition that eliminates need is very difficult as receiving more resources can always be seen as beneficial. Future research should, however, try to design control conditions for studies examining infant sharing as well. In light of the results of the present thesis, including control trials more consistently might be especially important when experimentally measuring infant prosociality towards recipients other than unfamiliar experimenters or when testing infants from cultural backgrounds that have not received much research attention in the past.

4.2.3 Maternal Report

In the present thesis, I assessed infants sharing and helping behaviours at 18 months experimentally, while all other measures relied on maternal report. Mothers were asked about their parenting practices at 14 months as well as about their infants' everyday sharing and helping behaviours at 11 months. Interestingly, what the mothers reported about the infants' precocious sharing and helping at 11 months did not match the pattern of behaviours that I observed in the experimental tasks at 18 months. In chapter 3, significantly more UK than Ugandan mothers reported that their 11-month-old infants shared in everyday life, but in chapter 2, at 18 months, both groups of infants were found to be similarly likely to share with an adult. In terms of instrumental helping, on the other hand, no cross-cultural differences in were revealed at 11 months (see chapter 3) while, at 18 months, the Ugandan infants were more likely to help an adult than the UK infants (see chapter 2). These differences in the patterns of cross-cultural variation across the two time points could be due to a number of different reasons.

First, these results could be reflective of the likelihood of engaging in prosocial behaviour changing dynamically across infancy, meaning that behaviour at 11 months is a poor predictor of behaviour at 18 months, with the additional possibility that cultural variables

relate to infant behaviour dynamically as infants age. However, before we can be confident in this possibility it is important to rule out alternative explanations. Methodological issues may also explain this pattern of results. It is possible that slightly different behaviours were assessed at the two time points, due to the different methodologies and slightly different operationalisations that were used: At 11 months, mothers were asked about their infants' everyday sharing and helping behaviours which naturally did not include any control conditions, while at 18 months, sharing and helping were assessed using experimental tasks that included a control condition in the helping task. As mentioned in chapter 3, future studies should therefore consider including both types of measures at both time points in order to investigate to what extent maternal reports and experimental assessment of infant sharing and helping might align.

Another possibility is that maternal report might simply not be a very reliable measure as mothers might be prone to social desirability biases. However, only a minority of mothers included in this thesis reported everyday helping behaviours for their 11-month-old infants, which indicates that the mothers did not always and indiscriminately report that their infants behaved prosocially. The fact that a large number of UK mothers reported early sharing behaviour but then did not report early helping behaviour also suggests that the mothers were able to differentiate between the different kinds of prosocial behaviours and that they felt comfortable saying that their infants did not engage in certain prosocial behaviours yet. This indicated that we can at least have some confidence in maternal report as a measure used in this thesis, but it would still be interesting to observe natural interactions between mothers and infants in future work as a more objective way of assessing infant sharing and helping in everyday life (see Dahl, 2015 for an example).

Given that maternal report of infant behaviours might not necessarily match experimentally assessed infant behaviours, it could also be important to examine to what extent maternal reports of their own behaviours relate to how mothers actually behave. In this thesis, I asked the Ugandan and UK mothers about their parenting practices assuming that they would accurately describe how they behave in everyday interactions with their infants. However, previous work has shown that holding specific maternal goals does not necessarily lead to mothers executing the expected and corresponding behaviours (Holden et al., in review). Therefore, future studies should consider not only relying on maternal self-report

but maybe to also assess maternal parenting practices through observations of naturalistic mother-infant interactions (e.g., Köster, Cavalcante, et al., 2016; Pettygrove et al., 2013).

4.3 Additional Factors to Be Considered in Future Research

In the present thesis, I aimed to understand how Ugandan and UK mothers' parenting practices might relate to their infants' sharing and helping behaviours. I focused on parenting practices, but there are of course a large number of other factors that might be associated with the emergence and development of sharing and helping in infancy. While it was out of the scope of the present thesis to investigate more factors, it might be useful to consider their relationship with early prosociality in future cross-cultural work.

4.3.1 Caregiver-Infant Interactions

The maternal parenting behaviours that I focused on in this thesis were related to the specific prosocial behaviours that I was interested in, such as maternal encouragement or expectations of infant sharing and helping. There is, however, also evidence for broader aspects of caregivers' interaction styles being associated with prosociality: For instance, maternal responsiveness and sensitivity have been found to be positively related to infant cooperation and composite measures of children's prosociality (e.g., Brownell & Drummond, 2020; Narvaez et al., 2013; Newton, Goodman, et al., 2014; Newton et al., 2016). In early and middle childhood, different forms of prosociality have also been found to be associated with children's attachment styles, with a more secure attachment generally being related to an increase in prosocial behaviours (e.g., Beier et al., 2019; Panfile & Laible, 2012; Waters et al., 1979). Positive associations have also been revealed between mind-mindedness, i.e., a caregiver's tendency to treat their child as an individual with a mind of their own (Meins, 1997), and children's prosocial judgments or behaviours in early to late childhood (Colonnesi et al., 2021; Goffin et al., 2020). It remains unclear to date, however, how these various aspects of caregiver-child interactions might relate to sharing and helping in infancy and whether these associations might vary across different cultural settings.

Another avenue for future research could be to not only focus on the behaviour of mothers but also to include other caregivers. In both the UK and the Ugandan sample, mothers were the infants' primary caregivers but the infants were also cared for by other individuals: A study by Holden et al. (in review) which included the participants of the present thesis found

that the Ugandan infants were significantly more frequently cared for by individuals who were not their mothers, such as older siblings or other relatives, than the UK infants. In future work, it would therefore be interesting to examine how other caregivers' interaction styles might relate to infant sharing and helping, expecting that this association might be more pronounced in samples of infants who experience more non-mother caregiving.

4.3.2 Characteristics of the Infants

The main focus of the present thesis lay on how different environmental variables might relate to infant prosociality. Previous work has, however, also shown that characteristics of the children themselves can also be associated with their helping and sharing behaviours. For instance, instrumental helping has been found to be positively associated with infants' motor development (Schuhmacher et al., 2019; Sommerville et al., 2018) and their joint attention skills (Kärtner et al., 2014). Higher rates of sharing have been found in in infants who possess a better understanding of ownership and who start to use possessive pronouns earlier in their development (Brownell, Iesue, et al., 2013; Hay, 2006). Moreover, some studies indicate that more advanced theory of mind skills can be associated with higher generosity in early and middle childhood (e.g., Cowell et al., 2017; Kogut et al., 2015; Robbins et al., 2016; Vonk et al., 2018; Yu et al., 2016), but further investigations are necessary to understand why this association has not been revealed in all studies examining this relationship (e.g., Rochat et al., 2009; Yu et al., 2016). Early sharing and helping have mostly been found to be associated with distinct aspects of development but there are also factors that appear to be linked to both types of behaviours. Emotional responsiveness, for example, measured as the amount of attention children pay to fearful faces, has been found to be positively associated both with instrumental helping in infancy and generosity in early childhood (e.g., Grossmann et al., 2018; Rajhans et al., 2016).

The majority of studies investigating the influence of individual characteristics on young children's sharing and helping behaviours have been conducted in WEIRD societies (e.g., Brownell, Iesue, et al., 2013; Grossmann et al., 2018; Kärtner et al., 2014). There is a limited number of cross-cultural studies on this topic but these have mostly tested children during early or middle childhood (e.g., Rajhans et al., 2016; Rochat et al., 2009). Hence, cross-cultural research on how individual characteristics might relate to sharing and helping in infancy is currently lacking from the literature. We know that there can be cross-cultural

variability in relevant factors, such as children's ownership attribution (e.g., Kanngiesser et al., 2015; Rochat et al., 2014) or infants' motor development (e.g., Kolling et al., 2014; Lohaus et al., 2014) and it would therefore be important to assess how this cross-cultural variability in relevant factors might relate to infants' prosocial development.

4.4 Final Conclusion

In summary, the present thesis revealed that infants from a rural Ugandan setting and infants from an urban UK background experienced significant differences in their mothers' use of socialisation practices related to sharing and helping. Mothers from the UK reported using a higher number of different strategies aimed at scaffolding their infants' early sharing and helping behaviours. Nonetheless, at 18 months, the two groups of infants were found to be similarly likely to engage in costly sharing with their mothers and an experimenter in an experimental setting. This suggests that early sharing might be a fairly robust phenomenon, impervious to pronounced differences in early familial socialisation. In line with this, I did not find maternal socialisation of prosociality to be related to individual variation in the infants' sharing behaviour. The results of the present thesis can, thus, be seen as support for the idea that cross-cultural differences in sharing might only emerge relatively late in development, when children become sensitive to society-specific rules about resource distributions (e.g., House et al., 2013). Infants' instrumental helping behaviour at 18 months, on the other hand, differed across the two cultural groups: The Ugandan infants were more likely help their mothers or an experimenter than the UK infants, and the Ugandan infants were also faster to help an experimenter than the UK infants. This indicates that instrumental helping, in contrast to sharing, might be more susceptible to parental socialisation and environmental variation during infancy, which challenges the notion that early instrumental helping emerges at similar levels across different cultural settings (e.g., Callaghan & Corbit, 2018).. The relationship between socialisation and infant helping might not always follow the direction we expect, however, as the UK infants in the present thesis were found to experience more encouragement for everyday sharing and helping but were less likely to help than the Ugandan infants.

Thus, the present thesis demonstrates that cross-cultural work is essential for understanding the full range of infant sharing and helping and it emphasises that different

types of prosociality need to be considered separately as they do not appear to be associated with each other at 18 months and they appear to be sensitive to early socialisation to different degrees. Moreover, the present thesis also highlights the importance of conducting experimental studies which enable us to directly compare prosocial behaviours that are directed towards different types of recipients and the importance of including control conditions in experimental designs in order to understand whether or not infants share or help in response to need.

To conclude, by taking a cross-cultural approach, I found both cross-cultural stability and variability in different forms of early prosocial behaviour across two cultural contexts in which maternal socialisation and parenting practices were found to be different.

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