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# Social understanding and self-regulation predict pre-schoolers' sharing with friends and disliked peers: A longitudinal study

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**Abstract**

This study examined longitudinal relations between early measures of prosocial action in infancy as well as cognitive and social-cognitive abilities, and the sharing behaviour of preschool children. The results reveal relations between delay-of-gratification at 24 months and inhibitory control at 30 months, and children's sharing at 5 years. Moreover, the analyses showed specific relations between distress understanding at 24 months and preschool children's sharing with friends, and a relation between goal encoding at 7 months and sharing with a disliked other at 5 years. Yet, there were no relations between early measures of prosociality in infancy and preschool children's sharing. The results support the view that inhibitory control competencies and social-cognitive abilities play an important role in the early development of prosocial action.

**Keywords**

infancy, infant cognition, moral reasoning, psychosocial development

Developmental science has recently experienced a growing interest in the early development of prosocial behavior. Extending previous research (e.g., Kienbaum, Volland, & Ulich, 2001; Rheingold, Hay, & West, 1976; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992; Zahn-Waxler, Robinson, & Emde, 1992), a number of recent studies have provided evidence that infants engage in a variety of prosocial actions such as helping, comforting and sharing already in the second year of life (Brownell, Iesue, Nichols, & Svetlova, 2012; Brownell, Svetlova, & Nichols, 2009; Dunfield & Kuhlmeier, 2010; Kärtner, Keller, & Chaudhary, 2009; Over & Carpenter, 2008; Paulus, Kühn-Popp, Licata, Sodian, & Meinhardt, 2013; Svetlova, Nichols, & Brownell, 2010; Vaish, Carpenter, & Tomasello, 2009; Warneken & Tomasello, 2006; for reviews see Eisenberg, Fabes, & Spinrad, 2006; Paulus & Moore, 2012).

For example, Warneken and Tomasello (2006) showed that already 1.5-year-old children engage in instrumental helping. They presented the infants with situations in which an adult needed help to accomplish an action (e.g., putting clothes on a washing line) by overcoming problems (e.g., a clothespin fell to the ground). The results showed that infants readily provided help (e.g., handing over the clothespin). Further cross-sectional studies suggested that children's prosocial behaviours become more differentiated and less dependent on communicative cues with increasing age (e.g., Blake & McAuliffe, 2011; Kenward & Dahl, 2011; Shaw & Olson, 2012; Svetlova et al., 2010). It has, for example, been demonstrated that 3-year-old children will usually share equally with a peer after they have collaborated with him to obtain resources (e.g., Hamann, Warneken, Greenberg, & Tomasello, 2011). In addition, studies have shown that children are less inclined to share when it is costly than when it is not (Paulus, 2014b; Thompson, Barresi, & Moore, 1997), and that altruistic (that is, costly) sharing is a later developmental outcome than non-costly prosocial behavior (e.g., Svetlova et al., 2010). Moreover, using sharing scenarios and dictator-games, it has been shown that 4- to 5-, but not 3-year-old preschoolers are more inclined to share with friends than with disliked peers (Moore, 2009; Paulus & Moore, 2013), and that school-aged children share more with in-group members than with out-group members (Fehr, Bernhard, & Rockenbach, 2008). This suggests that early sharing behavior becomes more selective in the course of the preschool years (cf. Hay & Cook, 2007).

From one theoretical point of view, it has been suggested that perceiving other people's distress first leads to self-distress by means of affect sharing (e.g., Preston & de Waal, 2002). With the increasing ability to differentiate between self and other, children become able 1) to understand that their perceived self-distress is caused by the other's distress and 2) to transform their own negative emotionality into constructive and solution-oriented behaviours such as comforting the other (Moore, 2007; see also Hoffman, 2000). Thus, the capacity to regulate one's own negative emotions plays an important role in the development of prosocial behavior (Decety & Svetlova, 2012). Accordingly, it has been suggested that the capacity to act prosocially is related to low impulsivity and high self-regulation capacities (Eisenberg & Fabes, 1998). Support for these notions comes from a number of studies that pointed to the impact of emotion-regulation capacities, in particular inhibitory control and attentional control, on young children's prosocial behavior (e.g., Eisenberg et al., 1996; Hastings, Rubin, & DeRose, 2005; Kestenbaum, Farber, & Sroufe, 1989; Kienbaum, 2001; Liew et al., 2011; Spinrad & Stifter, 2006).

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Building on findings that empathic concern and prosocial behavior increases with the ability to differentiate self from other, theories have claimed relations between prosocial behavior, and the abilities to take another person's perspective and to understand other's intentionality (Decety & Svetlova, 2012; Eisenberg & Eggum, 2009; Kagan, 1981; Moore, 2007). These theoretical considerations have been supported by findings on the relation between perspective taking as well as intention understanding and prosocial behavior (e.g., Carlo, Knight, Eisenberg, & Rotenberg, 1991; Eisenberg, Zhou, & Koller, 2001; Garner, Jones, & Miner, 1994; Guroglu, van den Bos, & Crone, 2009; Killen, Mulvey, Richardson, Jampol, & Woodward, 2011; Strayer & Roberts, 2004; but for different results see Astington & Jenkins, 1995; Peterson, 1983; for a comprehensive review see Eisenberg et al., 2006).

Yet, notwithstanding the insights gained by these cross-sectional studies, less is known about the longitudinal relations between measures of early prosocial action and prosocial behavior at preschool age, and the developmental precursors of preschool children's prosocial actions. Longitudinal studies with older children and adolescents have pointed to some consistency in children's prosocial dispositions and behaviors (e.g., Eisenberg, Carlo, Murphy, & van Court, 1995; Eisenberg et al., 1987, 1999). Evidence for a relation between early prosocial behavior and school-aged children's prosocial actions comes from studies by Knafo and Plomin (2006a, 2006b). Knafo and Plomin (2006a) conducted a longitudinal examination of genetic and environmental influences on the development of prosocial behavior from 2 to 7 years of age. Children's prosocial behavior was assessed by means of parental reports. The authors reported high correlations for 1-year lags of assessment (that is, between 2 and 3 years, or between 4 and 5 years) and some stability from 2 to 7 years of age (correlations ranging from $r = .13$ to $r = .21$). Yet, the assessment of prosocial behaviours was restricted to parents' reports and it would be desirable to have more evidence from direct measures of young children's prosocial behaviour. Directly examining infants' prosocial behaviour, Knafo and colleagues (Knafo, Zahn-Waxler, van Hulle, Robinson, & Rhee, 2008) provided evidence that empathic concern towards mothers and examiners simulating pain was a stable disposition between 14 and 36 months of age. Moreover, Hay and colleagues (Hay, Castle, Davies, Demetrious, & Stimson, 1999) examined children's sharing behaviour towards a friend in three age cohorts of children at age 18, 24 and 30 months as well as 6 months later. The results were mixed as they, on the one hand, pointed to some stability in the rate of sharing on the group level across the ages, but on the other hand also provided evidence for a decline of sharing behaviour in girls between 18 and 24 months of age, and a similar decline in sharing by boys between 30 and 36 months. Examining stability of individual differences, analyses showed a modest, though not significant stability in sharing in the two oldest age groups. Recently, Liew et al. (2011) investigated the relation between 18- and 30-month-old infants' physiological regulations as well as fearfulness and their sympathetic reactions to others' distress. The results showed that low fearfulness and the ability to cope with arousing situations at 18 months predicted comforting behaviour at 30 months, even when controlling for comforting at 18 months, suggesting a predictive relation between early temperamental and self-control abilities and the development of prosocial behaviour. Taken together, the overall picture is rather mixed. The studies suggest some stability in the early development of prosocial behaviour, but sometimes the effects are rather small or fail to reach conventional levels of significance.

Given that previous studies have focused on stability, employing the same measure across ages, it would be interesting to examine in greater detail whether there is developmental stability between the different tasks that have been applied to examine prosocial behaviour at different ages, e.g. instrumental helping in infancy (Warneken & Tomasello, 2006) and sharing in preschoolers (Fehr et al., 2008; Moore, 2009). From a theoretical point of view, such an examination not only would reveal whether the age-typical forms of prosocial behaviour relate to each other; such an investigation would also reveal whether all of these tasks are subserved by the same underlying prosocial motivation or whether they may be subserved by different psychological processes (for discussions see Decety & Svetlova, 2012; Hay, 2009; Paulus, 2014; Warneken & Tomasello, 2009).

In particular, recent theoretical models of early prosocial development have suggested that early forms of prosocial action (that is, helping, sharing, comforting) are conceptually distinct. For example, Dunfield and colleagues have pointed out that these behaviours are based on different evaluations of the other's situation (Dunfield, Kuhlmeier, O'Connell, & Kelley, 2011; Dunfield & Kuhlmeier, 2013). Svetlova and colleagues (2010) differentiated the variety of prosocial actions based on the costs involved for the prospective helpee. Moreover, Paulus (2014) suggested that, besides different evaluations and social-cognitive abilities, also varied types of motivation might underlie the different forms of prosocial action: some could be based on a sympathetic motivation to reduce the other's pain, some could be motivated by normative considerations, and others could be motivated by a wish to socially interact with the other. Yet, on the other hand, it has been argued that all prosocial behaviours are subserved by the same psychological mechanisms (e.g., Hauser, 2006). Knowledge about longitudinal relations between different prosocial behaviours would be informative for the recent theoretical debate on the psychological mechanisms underlying early prosocial action.

In conclusion, the reviewed literature showed that prosocial behaviour becomes more differentiated in the course of the preschool period and provided some (limited) evidence that the tendency to act prosocially is a stable disposition. Furthermore, theories suggested an impact of self-control abilities and social competencies on prosocial action. Building on these previous findings and theoretical considerations, the aim of the present study was threefold.

First, we wanted to investigate longitudinal relations between early forms of prosocial action in infancy, such as instrumental helping and comforting, and prosocial behaviour at preschool age to examine whether there was developmental stability between the tasks that have typically been applied in infancy and preschool age. We hypothesized that, if the tasks tapped into the same underlying psychological process, we should find interrelations between the tasks. Yet, if prosocial behaviour has qualitatively distinct roots (Radke-Yarrow et al., 1976) and is conceptually distinct (e.g., Dunfield & Kuhlmeier, 2013; Paulus, 2014), we should not find interrelations between children's performances in these tasks. That is, the current study aim at informing the debate whether a single or a multiplicity of mechanisms subserves early prosocial behaviour.

Second, given the theoretical claims and empirical findings about the relation between early self-regulation as well as social-cognitive abilities and prosocial behaviour, we assessed the predictive relations between early forms of these competencies and

preschool children's prosocial action. More concretely speaking, based on theoretical considerations about relations between prosocial action and self-regulation (Eisenberg & Fabes, 1998) as well as social understanding (Moore, 2007), we hypothesized that early developments in these abilities would be predictive for later prosocial behaviour.

In addition, we were particularly interested whether children's increasingly differentiated prosocial behaviour as evident in their recipient-dependent sharing with friends and disliked peers (Moore, 2009; Paulus & Moore, 2013) as well as their sharing in costly and non-costly situations (Svetlova et al., 2010; Thompson et al., 1997) would be predicted by the same measures, or whether different abilities and mechanisms support the emergence of these different forms of sharing. On the one hand, one could argue that the same psychological mechanisms support the development of sharing in general, and that purely situational factors subserve differentiated sharing in concrete situations (cf. Penner, Dovidio, Piliavin, & Schroeder, 2005). Given that, for example, all forms of costly sharing require an inhibition of the tendency to keep all valuable resources for oneself, one could hypothesize that sharing behaviour is predicted by young children's developing self-control abilities—independent from whether they share with a friend or a disliked peer.

Yet, on the other hand, it is possible that different psychological processes might be involved in the emergence of differentiated prosocial behaviour. Research has shown that interpersonal understanding between peers who dislike each other is considerably lower than interpersonal understanding between friends (Kurdek & Krile, 1982). At the same time, concurrent measures of social understanding and prosocial actions in children and adolescents demonstrated positive relations between an understanding of intentionality and resource distribution decisions (e.g., Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003; Guroglu et al., 2009; Killen et al., 2011; Moore, Barresi, & Thompson, 1998). Based on these findings, one could hypothesize that early precursors of social understanding predict children's sharing behaviour; and that—given that interpersonal understanding is anyhow high between friends—the relation between social understanding and sharing might be particularly high for sharing with disliked others.

In addition, given the findings that preschoolers allocate more resources to friends than to disliked others and even expect others to do so (Moore, 2009; Olson & Spelke, 2008; Paulus & Moore, 2013), preschoolers may understand sharing with friends as normative. As a consequence, inferences about the friend's intentionality may not be necessary to make a distribution decision. In contrast, in the case of other recipients the decision to share will depend on a careful consideration of the others' wants and needs. Thus, the relation between social understanding and sharing may be closer for sharing with disliked peers than with friends.

Thus, as outcome variable at preschool age, we assessed children's sharing behaviour by adapting a task following Moore (2009) and Fehr and colleagues (2008). In this task, children are presented with either a friend or a disliked peer as potential sharing partners. Furthermore, children are presented with different trial types in which their sharing of resources with the other is either costly for themselves or not. Given that this differentiation between friends and disliked peers seems to emerge between 4 and 5 years of age, but not before (Paulus & Moore, 2013), we assessed sharing at 5 years.

As early forms of prosocial behaviour, we assessed infants' helping behaviour at 18 months in an instrumental helping paradigm (Warneken & Tomasello, 2006), and their prosocial responding at 24 months in a comforting task following Zahn-Waxler and colleagues (1992). We decided to employ these measures at these (but not later) ages as they have often been conceptually replicated in the literature and provide some variation at the respective age (e.g., Dunfield & Kuhlmeier, 2011; Paulus et al., 2013; Young, Fox, & Zahn-Waxler, 1999), whereas ceiling effects have been reported for some of these tasks at later ages (Dunfield & Kuhlmeier, 2013).

In order to examine the impact of self-control abilities, we assessed 1) children's ability to tolerate a delay of gratification (cf. Mischel, Shoda, & Rodriguez, 1989), building on a task by Kochanska and colleagues (Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; see also Kochanska, Murray, & Harlan, 2000) that has been successfully employed with toddlers and preschool children. Furthermore, we assessed 2) children's inhibitory control and attentional control by means of parent's reports on the Early Childhood Behavior Questionnaire (Putnam, Gartstein, & Rothbart, 2006). As theories have suggested relations between the understanding of other's intentionality and perspective on the one hand, and prosocial behavior on the other hand (Decety & Svetlova, 2012; Eisenberg & Eggum, 2009; Kagan, 1981; Moore, 2007), we administered two further tasks. First, as an early measure of social-cognitive development, we administered a looking-time task on infants' goal-encoding abilities following the design of Woodward (1998, 1999). In this task, infants are presented with an actor reaching and grasping one of two objects. In the test trials, the position of both objects is switched. Infants are presented either with the actor grasping the same object (at the novel position) or following the old movement path (and hence grasping the other object). Infants' dishabituation (e.g., longer looking) to the trial in which the actor grasps the novel object (compared to the grasping of the same object in the habituation trials) is interpreted as evidence for their encoding of the other's action goal. It has been argued that the ability to encode others' goals is the earliest developmental precursor for an understanding of others as intentional agents (Woodward, 2013). Supporting this claim studies have provided evidence for a link between children's ability to understand others' goals in infancy and their theory-of-mind competencies at preschool age (Aschersleben, Hofer, & Jovanovic, 2008; Wellman & Brandone, 2009; Wellman, Lopez-Duran, LaBounty, & Hamilton, 2008; Wellman & Philips, 2001). Second, we included a perspective-taking task following McGuigan and Doherty (2002), who extended on a classical task by Flavell and colleagues (Flavell, Shipstead, & Croft, 1978).

Finally, we included children's gender as further variable as some studies have pointed to an impact of gender (e.g., Birch & Billman, 1986; but for different findings see, for example, Moore, 2009). It is important to control for children's general cognitive capacities to ensure that possible relations between the tasks are not due to increased cognitive abilities. Thus, we included measures of infants' working memory and children's verbal intelligence to control for the impact of domain-general cognitive abilities.

## Method

### *Participants*

The final sample for the outcome measure at 5 years of age, the sharing task, consisted of 72 healthy children with a mean age of 60.8 months ($SD = 0.71$; 35 girls) at the sixth appointment. Four

further children initially started, but did not complete, the longitudinal study (e.g., due to having moved to another city). All those children were also invited at earlier points in their development. From these children who contributed data to the last measurement point, data at the following earlier measure points were also obtained: At the first appointment, data from 65 children (mean age = 7.0 months, *SD* = 0.26; 32 female) could be obtained in the working memory task, and data from 34 children (mean age = 7.0 months, *SD* = 0.26; 21 female) could be obtained in the goal encoding task.[1] At the second appointment, data from 61 children (mean age = 18.1 months, *SD* = 0.24; 31 female) could be obtained in the instrumental helping task. At the third appointment, data from 62 children (mean age = 24.0 months, *SD* = 0.25; 32 female) could be obtained in the empathy task. At the fourth appointment, data from 58 children (mean age = 29.9 months, *SD* = 0.36; 29 female) could be obtained in the Early Childhood Behavior Questionnaire (ECBQ) and data from 64 children (mean age = 30.1 months, *SD* = 0.36; 33 female) could be obtained in the perspective taking task. At the fifth appointment, data from 50 children (mean age = 48.3 months, *SD* = 0.25; 26 female) could be obtained in the intelligence measure. Please note that the lower number of participants in the earlier task is due to the fact that for some children, the tasks were unusable at these time points due to experimenter errors, equipment failure, or children's unwillingness to participate in or finish the respective task.

Children came from predominantly white middle-class families in an urban area in Germany. They were part of a larger longitudinal study on the development of theory-of-mind (e.g., Licata et al., 2013; Thoermer, Sodian, Vuori, Perst, & Kristen, 2012). From the 72 mothers, 18 had attended 10 years of schooling (based on a non-college-bound track in the German school system), 15 had a high-school degree (13 years), 32 had a bachelor or master's degree, and 7 had a PhD degree. Addresses were obtained through local birth records. Families received a travel reimbursement and a small gift for their participation.

## Procedure

### Measures

*Goal encoding.* At the first appointment (7 months), we assessed infants' goal-encoding abilities. Testing setup and procedure were closely modelled following the infant-controlled habituation-based procedure employed by Woodward (1998). Participants were seated in a high chair in front of a puppet-stage opening. Infants were first presented with a minimum of six and a maximum of 14 habituation trials, followed by six test trials (in order to maximize sample size, results will be reported only for the first pair of test trials). In the habituation trials, a human hand and arm slowly moved into the stage from the side and grasped one of the two available objects. The hand remained in this position until the infant had looked away for two consecutive seconds. Subsequently, the curtain closed. After 3 seconds, a novel habituation trial was administered. In all habituation trials, the two possible target objects were at the same position and the hand always grasped the same target. When the looking times over three consecutive trials was less than half the looking time of the first three trials (which had to sum up to at least 12 seconds), habituation was terminated.

For the test phase, the object locations were switched. First, infants were familiarized with the novel display. Subsequently, the test trials started. In the test trials the hand alternately reached to the new location (preserving the goal object; new path trial) or to the old location (preserving the movement path; new goal trial). Whether the test phase started with the new path or new goal trials was balanced between participants. Two independent observers who were blind towards the condition, coded the looking times off-line from the videotapes. Inter-rater reliability was $r > .90$ (cf. Woodward, 1998).

To assess whether the infants preferentially encoded the goal-object of the actor's reach and to allow for an investigation of inter-individual differences, we first summed up the total looking time for both events (new path trial, new goal trial) for every participant. We then built an individual percentage score by dividing the individual's looking time to the new path trial by the total looking time to both events, reflecting how much more time infants spent looking at a change in target object (which would be indicative for having encoded the goal of the other's action).

*Working memory.* Furthermore, at the first appointment, infants' working memory was assessed by a task modelled after Reznick, Morrow, Goldman, and Snyder (2004). Infants sat on their caregiver's lap facing a frame with two openings. The openings were side to side and 42 cm apart from centre to centre. To cover the windows, two curtains were attached to the back of the frame. At the beginning of each of the six trials, the experimenter (E) pulled aside two curtains, put her face in one of the windows, and engaged the infant's attention. E then withdrew her face, replaced the two curtains, and wiggled her fingers at the top centre of the frame. As soon as the infant looked toward the fingers, E reopened the curtains, and after a 2- to 3-s pause, she reappeared in her previous location. The curtains were then closed again. After a short pause, E reopened the curtains to initiate the next trial. E's location of appearance was counterbalanced between the left and right windows, and the procedure lasted for six trials (for further description of the apparatus and procedure, see Reznick et al., 2004).

To assess the direction of the infant's first gaze in each trial after the reopening of the curtain, a research assistant coded the videotapes in the following manner. A score of 1 was given if the infants looked towards the cued direction, and a score of 0 was given if infants' looked towards another location. Participants' scores were averaged over the test trials. A second person coded a random sample of 25% children. Cohen's Kappa was .72.

*Instrumental helping.* At the second appointment (18 months), infants' instrumental helping behaviour was assessed following a procedure of Warneken and Tomasello (2006). The assessment included two trials, an experimental trial and a control trial, which were always administered in this order to keep the situation comparable for all children. In both trials, the child was seated on a child-sized chair at a small table. In the experimental trial, the experimenter fixed a piece of cloth on a washing line and accidentally dropped a clothespin on the floor. She tried to reach for it while looking at the clothespin, but was not able to reach it. In the control trial, children were presented with the experimenter sitting on the other side of the table with a pen in front of her. The experimenter took the pen, looked at it, and intentionally threw it away. Subsequently, she looked in a bored fashion in the other direction, without paying any attention to the pen. In both trials, infants were given 30 seconds to respond.

For each trial, a first experimenter coded from video recordings whether the child showed helping behaviour or not. Helping behaviour was defined as returning the object (that is, clothespin, pen) to

the experimenter. To allow an analysis of inter-individual differences, a competence score was calculated following Paulus and colleagues (2013). Infants who helped in the experimental condition, but not in the control condition (that is, where the adult deliberately threw the pen away) were classified as competent. Infants who showed no helping behaviour or infants who helped in the control condition, were classified as not competent. Although infants who helped in both conditions or just in the control condition returned the object as well, we have no evidence to assume that the returning of the object was based on a motivation to help as it (also) appeared in a situation in which the adult clearly indicated no interest in the respective object (that is, control condition). We therefore lumped these conditions. A second rater coded 44% of the data. The interrater agreement was 100%.

*Empathic responding.* At the third appointment (24 months), infants' reactions towards a person in distress were assessed by means of a procedure developed by Zahn-Waxler and colleagues (1992). Mothers were instructed to pretend their finger to be clamped in a clipboard and to simulate pain during a free play phase of their child. In particular, they were asked to simulate enduring pain for 30 seconds and decreasing pain for further 30 seconds. Mothers were also instructed not to request help from their child and not to directly look at him/her during the simulation. Infants' reactions during the mothers' simulation was assessed.

Infants' behaviour was coded from recordings following the scheme of Young and colleagues (Young, Fox, & Zahn-Waxler, 1999). We coded whether infants understood the distress of their mother on a 5-point scale (1: no understanding; 2: nonverbal gestures, e.g., pointing at the clipboard as cause of the pain; 3: verbal expressions, questions; 4: verbal expression and nonverbal exploration; 5: repeated verbal and nonverbal exploration). Furthermore, we assessed infants' prosocial behaviour on a 4-point scale (1: no signs of worriedness; 2: little help; 3: moderate help for 3−5 seconds; 4: repeated or enduring help for more than 5 seconds). Help was defined as any behaviour that aimed to diminish the pain of the other, such as blowing the finger, verbally offering help, or bringing a band-aid. A second rater coded 34% of the data. Cohen's Kappa ranged from $k = .75$ to $k = .92$.

*Gift delay.* At the third appointment (24 months), infants' behaviour in a delay-of-gratification task was assessed adapting a procedure after Kochanska and colleagues (1996). The experimenter told the child that she has a gift for her in a bag. She shows the bag to the child, yet not the content of the bag. Before handing over the bag that contains the gift, she pretends to have forgotten the ribbon to prepare the gift. She puts the bag on a table and asks the child to not touch it until she is back. Subsequently she leaves the room for 3 minutes.

Children's behaviour during the 3 minutes was coded from video recordings on a 6-point scale (6: bag not touched; 5: bag touched; 4: looked in bag; 3: hand in bag; 2: gift taken out of bag; 1: gift unwrapped). A second rater coded 30% of the data. The interrater agreement was $k = .89$.

*Inhibitory control and attentional control.* At the fourth appointment (30 months), the children's caregiver (mostly the mother) completed the respective subscales of the Early Childhood Behavior Questionnaire (Putnam, Gartstein, & Rothbart, 2006) in order to assess children's inhibitory control and attentional control competencies. This questionnaire contains items in a 7-point Likert-scale format that asks them to report on the frequency of particular behaviours in everyday situations. As parents' answered all items, we calculated a sum value indicating toddler's inhibitory control competencies and attentional control competencies.

*Perspective-taking.* At the fourth appointment (30 months), hiding skill was assessed with a task adopted from Flavell and colleagues (1978) as well as McGuigan and Doherty (2002). The task consisted of two sub-tasks, first the *hiding* and then the *judgement* task.[2]

For the hiding task, experimenter and child sat at opposite sides of a table. A cardboard screen (18 cm high × 23 cm wide) with an attached wooden base was placed between them and a teddy (a 10 cm × 5 cm × 3 cm Pooh© toy teddy) was used as item. The child was then asked by the experimenter to "put the teddy on the table so that I don't see him." This was repeated four times, with varying positions of the experimenter in relation to the child's position: sitting 180° opposite the child, 90° to the child's right, 90° to the child's left, and then next to the child. For each trial, the child was awarded one point for each trial in which the teddy was placed so that the screen was between the experimenter and the teddy. Thus the score for this perspective hiding task could range from 0 to 4. A random sample of 30% of the valid sample were coded by a second coder blind to the judgement of the first coder, interrater agreement was $\kappa = .95$.

The judgement was modelled after McGuigan and Doherty (2002). Overall, children received 2 trials with 4 test questions. On the first trial (180° trial), the experimenter (E) sat opposite of the child at a narrow table. The same items as in the hiding task were used. E put the cardboard screen broadside to herself, in such a way that the bear was blocked from her view, but in clear sight of the child. The child was asked: "Can I see the bear, now?" and "Can you see the bear, now?" Then, the experimenter put the cardboard screen broadside to the child, so that the bear was blocked from the child's view, but in clear sight of the experimenter. Again, the child was asked the same questions.

Depending on the trial, to be correct, children had to either nod or answer the question with "yes" or to shake their head or answer the question with "no", respectively. Coding was done from recordings. For each correct answer, children received a score of 1. For each incorrect answer children received a score of 0. Thus, across the 2 trials, children could receive a maximum score of 4. Due to experimenter error or lack of cooperation, not all children received all trials. Consequently, only children who had received and answered at least 3 out of 4 questions of each subtask were included in the analyses and the percentage of correct answers of both subtasks out of all valid questions was used as the dependent variable. Approximately 30% of the sample were coded by a second coder blind to the judgement of the first coder, which yielded 100% interrater agreement.

*Verbal IQ.* At the fifth appointment (48 months), we administered the subscales Comprehension and Similarities of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III, Petermann, 2009, following Wechsler, 2002) to control for the impact of verbal IQ on the sharing task. Children's performances in the subscales of the Wechsler Preschool and Primary Scale of Intelligence were analysed following the scheme of Wechsler (2002) to estimate the participants' verbal IQ.

*Sharing behaviour.* At the sixth appointment (60 months), sharing behaviour was assessed adapting a task by Fehr et al. (2008) and

**Table 1.** Descriptive results of the predictor variables.

| Variable | *Mean* | *SE* |
|---|---|---|
| Goal encoding (7 months; $n = 34$) | 59.5% | 3.5 |
| Working memory (7 months; $n = 65$) | 0.67 | 0.02 |
| Prosocial responding (24 months; $n = 62$) | 3.8 | 0.15 |
| Distress understanding (24 months; $n = 62$) | 1.8 | 0.15 |
| Gift delay (24 months; $n = 70$) | 3.99 | 0.24 |
| Inhibitory control (30 months; $n = 58$) | 47.6 | 1.2 |
| Attentional control (30 months; $n = 58$) | 49.2 | 0.7 |
| Perspective-taking (30 months; $n = 64$) | 59% | 2.2 |
| Verbal IQ (48 months; $n = 50$) | 107 | 1.7 |

*Note.* The table shows the descriptive results for the predictor tasks. Goal encoding could range from 0 to 100 and Working memory from 0 to 1. Empathic responding was coded on a 4-point scale, Distress understanding on a 5-point scale, and Gift delay on a 6-point scale. Possible scores for Inhibitory control and Attentional control could range from 0 to 70. Perspective-taking ranged from 0 to 100.

Moore (2009). Children were prompted to think about the name of a friend and a disliked peer (that is, somebody they did not like to play with). Children were then asked to choose amongst a set of puppets one that represents their friend and one that represented the disliked peer. Each puppet was paired with a paper envelope. The participant was told that the envelope would go to the child whose was represented by the respective puppet. Additionally, the children themselves received an envelope. Following Moore (2009), stickers were used for the sharing task. The sharing task consisted of two types of trials. In the prosocial trials, children could choose between one sticker for themselves and no sticker for the other, or one sticker for themselves and one sticker for the other (that is, sharing without costs). In the sharing trials, children could choose between two stickers for themselves and no sticker for the other, or one sticker for themselves and one for the other (that is, sharing with costs). Each trial type was administered with each sharing partner, giving raise to a 2 (sharing partner: friend, disliked peer) × 2 (trial type: prosocial, sharing) design. Children were presented with three blocks of trials, with each block containing all four possible trials.

Children's choices in the sharing task were coded online by the experimenter. For each trial, participants received a score of 0 if they chose the inequitable (1,0) or (2,0) option and a score of 1 if they chose the equitable (1,1) option. To assess interrater reliability, 26 randomly chosen children were recoded by a second person from video recordings. Correlation analyses for the four measures were between $r = .99$ and $r = 1$, showing an excellent agreement between both raters.

## Results

*Descriptive results.* Table 1 gives an overview on the descriptive results for each task.

*Goal encoding.* To ensure that participants' showed the expected effect (that is, longer looking to a switch in the actor's goal than the movement path, indicating a preferential encoding of the other's action goal), a one-sample $t$ test against chance level (50%) was performed. It revealed that infants' looking pattern was highly significant, $t(33) = 2.681$, $p = .01$, replicating earlier findings (Woodward, 1998).

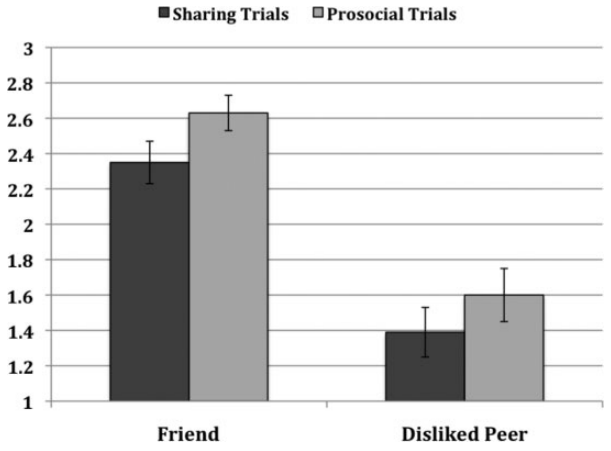


**Figure 1.** Mean number of trials on which participants ($n = 72$) choose the equitable (1,1) option as a function of trial type (prosocial or sharing) and recipient (i.e., friend or disliked peer). Note that the y-axis starts with 1 (item range: 0–3). Error bars indicate standard errors of the means.

*Instrumental helping.* Of the 61 infants, 24 received a score of 1 and 37 a score of 0. The number of infants showing competent helping (around 40%) were comparable to Warneken and Tomasello (2006) who reported 70% helping in the experimental trial of the clothespin task and 25% helping in the control trial of the marker task (ca. 45% difference).

*Sharing behaviour.* The results of the sharing task can be seen in Figure 1. A repeated-measures ANOVA was conducted with the factors Friendship (friend, disliked peer) and Trial Type (sharing, prosocial). The analysis yielded a significant main effect of Friendship, $F(1, 71) = 54.193$, $p < .001$, $\eta^2 = .43$, showing that the children were more inclined to share with their friends than the disliked peers. Moreover, the analysis yielded a significant main effect of Trial Type, indicating that the children shared more in the prosocial trials than in the sharing trials, $F(1, 71) = 9.252$, $p < .005$, $\eta^2 = .12$. There was no effect of the interaction term, $F < 1$.

Given that the different trial types (i.e., sharing and prosocial) for each sharing partner (friend, disliked peer) were highly correlated (both $r$s $= .70$, $p$s $< .001$), we decided to build a compound measure for each partner by averaging the data across trial types. This was justified by the fact that we were interested in examining whether the variance in this task could be explained by variance in the earlier measures and the fact that both trial types shared large parts of their variance.

*Relations between the predictors and the outcome measure.* To investigate our main research question, that is, the relation between the early measures of prosocial behaviour as well as the early correlates and children's sharing, we conducted correlational analyses employing Pearson's coefficients. Missing data led to pairwise deletion. The results of these analyses are presented in Table 2. Correlational analysis revealed significant correlations between early measures of social-cognitive competencies in infancy and toddlerhood, and preschool children's sharing. In particular, analyses showed that self-control abilities (e.g., gift delay, inhibitory and attentional control) were positively related to preschool children's sharing behaviour with friends and disliked peers. Furthermore, for sharing with friends distress understanding was a predictor variable,

**Table 2.** Intercorrelations between the predictor and the outcome variables.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Goal encoding (7 months) | – | | | | | | | | | | | |
| 2. Working memory (7 months) | −.34* | – | | | | | | | | | | |
| 3. Instrumental helping (18 months) | −.09 | .14 | – | | | | | | | | | |
| 4. Distress understanding (24 months) | −.16 | .10 | −.24 | – | | | | | | | | |
| 5. Prosocial behavior (24 months) | .22 | .00 | −.04 | .19 | – | | | | | | | |
| 6. Gift delay (24 months) | .08 | −.01 | −.01 | .00 | .00 | – | | | | | | |
| 7. Inhibitory control (30 months) | .27 | −.19 | −.26 | .19 | .14 | .10 | – | | | | | |
| 8. Attentional control (30 months) | .06 | .16 | −.09 | .21 | .02 | −.07 | .13 | – | | | | |
| 9. Perspective-taking (30 months) | −.1 | −.10 | .16 | −.19 | −.12 | .09 | .13 | −.03 | – | | | |
| 10. Verbal IQ (48 months) | .08 | −.16 | −.11 | −.17 | .19 | .04 | .01 | −.10 | .14 | – | | |
| 11. Gender | −.07 | .12 | .32** | −.02 | −.10 | −.20 | −.21 | −.13 | −.25 | .00 | – | |
| 12. Sharing friend (60 months) | .07 | −.06 | −.01 | .29* | .15 | .35** | .31* | .28* | −.12 | .09 | −.08 | – |
| 13. Sharing disliked peer (60 months) | .39* | .03 | −.02 | −.02 | .20 | .15 | .31* | .15 | −.16 | .02 | −.14 | .35** |

*Note.* The table shows the intercorrelations between the predictor variables (rows) and the target variables (columns). For each variable, the age of assessment and the n's for the zero point correlations are given in brackets. Two-tailed tests were employed to assess the significance of the correlations. ** $p \leq .01$; * $p \leq .05$.

whereas sharing with disliked peers was predicted by goal encoding abilities.

It is possible that the relations between the social-cognitive variables (that is, goal encoding and distress understanding) and preschoolers' sharing were mediated by self-control abilities. Indeed, research on the neurocognitive substrate of theory of mind has suggested that inhibitory competencies play an important role in children's developing social understanding (e.g., Perner & Lang, 1999). Thus, we further analysed whether the relations between the social-cognitive competencies (that is, goal encoding, distress understanding) were independent of more general self-control abilities (cf. Wellman et al., 2008). Due to the small sample size of participants for which we had data in all tasks (e.g., only 24 children remained for whom we had data on the goal-encoding task, the inhibitory control measure, and the sharing task), we were not able to conduct regression analyses (cf. Draper & Smith, 1998). For this reason, partial correlations—controlling for children's self-regulation abilities—were used instead of regression analyses.

More concretely speaking, we controlled for these measures of self-control that in the previously reported correlational analyses had shown significant interrelations with the sharing task, that is, inhibitory control for sharing with friends, and inhibitory control, attentional control, and gift delay for sharing with the disliked peer. In other words, we calculated partial correlations between children's distress understanding and their sharing with friends, controlling for the impact of inhibitory control, and between children's goal encoding and their sharing with disliked peers, controlling for the impact of inhibitory control, attentional control, and gift delay.

The partial correlation for distress understanding and sharing with friend, controlling for the impact of gift delay, inhibitory control, and attentional control, revealed a significant relation, $r(n = 45) = .31$, $p = .03$. The partial correlation for goal encoding and sharing with the disliked peer, controlling for the impact of inhibitory control, revealed a significant effect, $r(n = 24) = .40$, $p < .05$.

## Discussion

The present study examined the early development of prosocial behaviour by means of a longitudinal investigation. In particular, we examined the longitudinal relations between early measures of prosocial behaviour—such as instrumental helping and comforting—as well as social-cognitive abilities in the first 2 years of life, and sharing behaviour at 5 years of age. Results suggest that early instances of prosocial behaviour do not relate to preschool children's sharing. Yet, they provide evidence that self-regulation competencies and early social-cognitive abilities play an important role in the development of sharing behaviour.

Overall, the study aimed at examining three interrelated questions. The first question was whether or not there are longitudinal relations between early forms of prosocial behaviour present in infancy (that is, instrumental helping, comforting) and later forms of prosocial action such as sharing behaviour in the preschool age. A second question concerned potential relations between early self-regulation as well as social-cognitive abilities and preschool children's prosocial behaviour. Finally, given recent findings that preschoolers' prosocial behaviour is recipient-dependent (Moore, 2009; Paulus & Moore, 2013) and dependent on the costs related to sharing (Svetlova et al., 2010), we were interested whether children's increasingly differentiated prosocial behaviour would be predicted by the same measures. Let us consider each point turn by turn.

First, we were interested in assessing developmental continuity and discontinuity between early measures of prosocial behaviour such as instrumental helping and later developing instances of prosocial action such as differentiated sharing at preschool age. That is, whereas previous longitudinal research on early prosocial development has focused on developmental stability within one particular measure (e.g., Hay et al., 1999; Knafo & Plomin, 2006a, 2006b), we examined possible developmental interrelations between different forms of prosocial behaviour. To avoid ceiling or floor effects, we assessed each task at a suitable point in development, that is, when they were first reliably shown and when there was sufficient variation in children's performance. Interestingly, we neither found a relation between instrumental helping at 18 months and preschool children's sharing nor between prosocial behaviour in a comforting task at 24 months and later sharing behaviour at 5 years. Whereas previous cross-sectional studies indicated that there were no interrelations between the different instances of prosocial behaviour (Dunfield et al., 2011; Dunfield & Kuhlmeier, 2013), the present study is amongst the first to systematically examine longitudinal relations between different measures of prosocial action in the first

years of life, indicating that the variety of prosocial actions do not relate to each other.

How can we interpret these findings? On the one hand, one can assume a common underlying prosocial motive, subserving children's behaviour in all prosocial tasks. Yet, given different task demands, these measures do not relate to each other. However, while we agree that the different task demands might decrease the potential interrelations between tasks, we should still expect at least some interrelations when we were to assume a common underlying mechanism. We therefore suggest a second interpretation: the results could suggest that different social-cognitive mechanisms might underlie different forms of prosocial actions. From a conceptual point of view, our findings thus provide longitudinal support for recent proposals that the varieties of prosocial actions are based on partly distinct mechanisms and follow their own developmental pathways (e.g., Dunfield & Kuhlmeier, 2013; for a review, see Paulus, 2014). Further research is needed to examine the developmental pathway of each prosocial action in greater detail.

A second aim of the current study was an assessment of the social-cognitive and cognitive precursors of preschool children's sharing behaviour. Here, our study revealed significant relations between domain-general self-control abilities as well as more specific social-cognitive abilities, and preschoolers' inclination to share with others. Relatively independent of the specific recipient, toddlers' self-control competencies were important predictors for their later sharing behaviour. This is in line with findings and theoretical proposals that self-control plays an important role in the development of social competence in general (e.g., Eisenberg et al., 2009; Kochanska et al., 2000; Rubin, Burgess, Dwyer, & Hastings, 2003; Steinbeis, Bernhardt, & Singer, 2012) and of prosocial behaviour, in particular (for a review, see Eisenberg, 2000). It suggests that an important psychological mechanism in the development of sharing behaviour is the ability to inhibit one's own behavioural tendencies, e.g. to take all of the items for oneself. These findings extent research on longitudinal relations between early delay of gratification and inhibitory control (e.g., Eigsti et al., 2006; Funder, Block, & Block, 1983; Shoda, Mischel, & Peake, 1990) to the realm of sharing behavior in preschool children by showing that already early interpersonal differences in self-control at 2 years of age are predictive for sharing behavior at 5 years.

Yet, our study revealed no relation between the early development of perspective-taking and preschool children's prosocial behaviour. This finding could be interpreted in two ways. On the one hand, it corresponds to a few other studies that reported no relation between perspective-taking abilities and prosociality (e.g., Astington & Jenkins, 1995; Peterson, 1983), indicating that perspective-taking is not conceptually related to prosocial action (but see Eisenberg et al., 2006, for a review on a considerable number of studies that reported relations between perspective-taking and prosocial behaviour). Then, it is possible that by 5 years of age, all children had reached the same level of perspective-taking and that, consequently, early differences in this ability were not predictive of later prosocial behaviour. Yet, this interpretation stands in contrast to findings of concurrent relations between perspective-taking and prosocial behaviour (cf. Eisenberg et al., 2006). On the other hand, potential relations between perspective-taking and prosocial behaviour could strongly depend on the specific aspect (of the rather broad concept) of perspective-taking that is assessed in the respective investigation. We assessed perspective-taking by means of a task of McGuigan and Doherty (2002), which followed the classical design of Flavell and colleagues (1978). This task assessed spatial perspective-taking as it examined children's evaluations of what others can see. In contrast, Eisenberg and colleagues (2001), for example, reported on a relation between cognitive perspective-taking and prosocial behaviour. Our results could thus indicate that cognitive, but not perceptual, perspective-taking plays an important role in the development of prosocial behaviour. It remains a task for future research to examine the different notions of perspective-taking and their relation to prosocial behaviour in greater detail.

Our finding of specific relations between social-cognitive precursors and preschoolers' sharing relates to our third question. In particular, we were interested whether we were to find different developmental precursors for sharing with different recipients. In other words, we aimed at examining whether different psychological processes related to the emergence of differentiated prosocial behaviour.

Notably, the difference between sharing with friends vs. disliked peers was quite substantial indicating that different processes might subserve these decisions (that is, sharing with friends or disliked peers), and that, as a consequence, the nature of the individual variation that needs to be explained is also different. The present study confirms previous studies, which also showed an effect of type of recipient on preschool- and school-aged children's sharing behaviour (Birch & Billman, 1986; Fehr et al., 2008; Moore, 2009; Paulus & Moore, 2013), and relates to research showing that children treat and reason about friends and non-friends differently (e.g., Bigelow, 1977; Olson & Spelke, 2008; Slomkowski & Killen, 1992). However, whereas these previous studies have provided compelling evidence that preschool (and older) children treat different recipients differently, the developmental pathway and the precise underlying psychological mechanisms of this recipient-dependent sharing behaviour have remained an open question.

One of the most interesting findings of our study was that children's inclination to share with the disliked peer was predicted by their goal-encoding abilities. That is, 7-month-old infants' performance in the goal-encoding task following Woodward (1998) predicted their likelihood to share resources with the disliked peer at 5 years of age. Previous research had demonstrated that goal encoding is an important precursor ability for young children's developing concept of others as intentional agents with own beliefs and desires (Aschersleben et al., 2008). Accordingly, our finding indicates that early competences in encoding other's goal-directed behaviour support the emergence of prosocial behaviour. The present study extents findings about concurrent relations between social understanding and prosocial behaviour (e.g., Guroglu et al., 2009; Moore et al., 1998) to very early childhood, by demonstrating that individual differences as early as age 7 months are predictive for later-developing prosocial behaviours.

Interestingly, such a relation was not found for sharing with the friend. Yet, distress understanding selectively predicted sharing with the friend, but not with the disliked peer. This finding further supports the notion that partly different social-cognitive processes might underlie prosocial behaviour directed towards friends and towards disliked others. The relation between infants' developing ability to understand others' distress (that is, cognitive empathy) and their later sharing with friends could indicate that the better the preschool children were in anticipating their friends becoming distressed when not being shared with, the more they shared. In other words, their understanding of the friend's potential distress led them to be more generous, pointing to the impact of early

differences in cognitive empathy on the development of prosocial behaviour.

From a process-developmental point of view, it is of high interest to examine possible mediator effects. Given that we found interrelations between 5-year-old children's sharing behaviour, and distress understanding as well as goal encoding on the one hand, and inhibitory control as well as delay-of-gratification on the other hand, we investigated in greater detail whether children's self-control abilities were the common underlying capacities that subserved or mediated the developmental effect between distress understanding as well as goal encoding and children's sharing. Given that distress understanding and goal encoding were independently (of inhibitory control and delay-of-gratification) related to sharing with friends and disliked peers, we can exclude that these effects were subserved or mediated by children's self-control abilities. Rather, our data suggest a specific developmental pathway between the social-cognitive precursor variables and preschool children's sharing behaviour.

This interpretation is further supported by the fact that we did not find positive relations between measure of general cognitive abilities, that is, working memory/information processing in infancy and verbal IQ at the preschool age, and children's sharing behaviour. This suggests that our findings of positive relations between early social-cognitive measures and preschool children's sharing cannot be reduced to general cognitive abilities. Rather, it suggests that these links are specific for social-cognitive and self-control abilities.

How should we then interpret the finding of a zero correlation between goal encoding and sharing with the friend? On the one hand, one could argue that this lack of correlation could be due to the fact that different social partners were employed in the different tasks (e.g., the mother in the distress task, a stranger in the helping task, an unknown person in the goal-encoding task). This variation in social partner could explain the differential associations between distress understanding and sharing with friends, as both were related to partners one has social relations to (that is, mother, friend); as well as goal encoding and sharing with disliked peers, as both relate to persons with which the child has no close relations. If this interpretation were true, it would suggest that from its developmental origins onwards, prosocial behaviour is quite partner-specific and keeps this specificity to the preschool age. Yet, this interpretation cannot account for all of our findings. For example, also in the instrumental helping task a stranger served as social partner. Nevertheless, there was no relation between goal encoding and instrumental helping nor between sharing with disliked peer and instrumental helping.

We thus suggest a second interpretation. Note that previous research has shown that interpersonal understanding between friends is considerably higher than interpersonal understanding between non-friends (Kurdek & Krile, 1982). We think that through repeated interaction with friends, children were quite aware about the friends' subjective nature (that is, their individual preferences and goals; Hughes & Dunn, 1998; Maguire & Dunn, 1997), so that their general ability to reason about the others' intentionality had no impact on prosocial behaviour directed towards the friends (with variance mainly explained by level of empathic concern). With disliked peers, the tendency to share is low and, given generally lower social understanding between non-friends, whether one shares at all may depend on levels of social understanding (e.g., being aware, at all, of the others' goals). In other words, with friends, levels of social understanding are high (Kurdek & Krile, 1982), and the tendency to share is high anyway, with individual variation maybe depending on degree of empathic concern. Assuming that early differences in goal encoding predict later social-cognitive abilities (e.g., Aschersleben et al., 2008), this could explain the relation between goal encoding in infancy and sharing in preschool children. It is also possible that the link between early goal encoding and later sharing is not mediated through the development of social understanding, but other social abilities or tendencies. For example, it is possible that early social-cognitive abilities relate to quality of peer interactions, enhancing children's social experiences. As a consequence of these experiences, children could become more inclined to behave generously even towards disliked others. Further research is thus needed to examine the nature of infants' social-cognitive abilities (for discussions see Uithol & Paulus, 2013; Woodward, 2009) and, in particular, the specific developmental pathway between early goal understanding and the development of prosocial behaviour.

The present study thus joins recent findings on developmental continuity within social cognition from the infant age to the preschool years (Wellman et al., 2008; Yamaguchi, Kuhlmeier, Wynn, & vanMarle, 2009). It extends previous studies by demonstrating for the first time a relation between tasks employed to assess social cognition in infancy and later prosocial behaviour, which was independent from general cognitive abilities such as inhibitory control. Although the data demonstrate a longitudinal relation between infant social cognition and preschool children's prosocial action, the precise neurocognitive mechanisms that subserve this continuity in social-cognitive abilities need further investigation.

While the present study informs current theorizing about the early development of prosocial behaviour, it also has clear limitations. Instead of examining developmental stability of one type of prosocial behaviour across age, the current study assessed interrelations between tasks that have usually been applied at different points in development, such as simple instrumental helping at 18 months (Warneken & Tomasello, 2006), and recipient-dependent resource allocation at 5 years (Moore, 2009). A more comprehensive design, assessing the same tasks at the same time points, would allow for an extended analysis of concurrent and longitudinal relations.

Taken together, the current study provides longitudinal evidence for an impact of early self-control and goal encoding abilities on preschoolers' sharing behaviour. Furthermore, it shows a relation between distress understanding in the infant age and preschool children's prosociality, pointing thus to social-cognitive precursors of early development of sharing behaviour.

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## Conflict of interests

None declared.

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## Notes

1. Although the drop-out rate for this task seems high, it is comparable to other habituation-based studies with infants that employed similar designs (e.g., Csibra, Gergely, Bíró, Koós, & Brockbank, 1999). To check whether this high rate was selective with respect to our outcome measures, we performed independent-samples *t* tests comparing the sharing rates of children for which we had data points in the goal encoding task with the children for which we had no data points. These tests revealed no significant differences (all *p*s > .21). The same was true for the working memory task (all *p*s > .16), the helping task (all *p*s > .12), the measures of the comforting task (all *p*s > .81), the perspective-taking task (all *p*s > .54), the ECBQ measures (all *p*s > .55), and the IQ (all *p*s > .52).
2. Piloting showed that the 'move screen' task as employed by Flavell et al. (1978) yielded performance at floor level. Therefore it was replaced by the judgement task described here.

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