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Brief Report

Enhancing behavioral control increases sharing in children

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ABSTRACT

Young children endorse norms of fairness but rarely act on them. We investigated whether a failure of behavioral control can partially explain why children do not share more generously than they do. We experimentally manipulated behavioral control and observed its effects on sharing in 120 children aged 6–9 years of age. Using a between-participants design, we presented children with stories in which a protagonist either exerted behavioral control in an unrelated context or not. Following this, children engaged in a sharing task. We found that children who had been read a story promoting behavioral control shared more than children who had been read a neutral story. This effect held over two different types of instruction. Perceptions of fairness, on the other hand, were identical across conditions. These findings speak to the importance of behavioral control in prosocial behavior, and specifically sharing, during middle childhood.

Introduction

Prosocial behavior is crucial for initiating and sustaining interpersonal relationships (Over, 2016; Steinbeis, Bernhardt, & Singer, 2012). Children help (Warneken & Tomasello, 2006), share with (Benenson, Pascoe, & Radmore, 2007; Harbaugh, Liday, & Krause, 2003; House et al., 2013; Schmidt & Sommerville, 2011) and comfort others (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992)

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from early in development. Whereas the occurrence of prosocial behavior early in development is uncontested, there is much less agreement regarding its underlying mechanisms. This is a crucial topic for empirical research because if we can understand the mechanisms that influence prosocial behavior, then we can help to support and encourage its development. It has been shown that mechanisms underlying prosocial behavior early in development do not necessarily correlate with those later in development (Paulus et al., 2015) and that individual differences in various types of prosocial behavior (i.e. helping, sharing and comforting) do not correlate with each other (Dunfield, Kuhlmeier, O'Connell, & Kelley, 2011). This suggests a potential multitude of different mechanisms operating in support of prosocial behavior throughout development. Here we focused on the role of behavioral control as a potential mechanism underlying sharing during middle childhood, an age when children reliably show sharing behavior (Benenson et al., 2007; Blake, Piovesan, Montinari, Warneken, & Gino, 2015; Smith, Blake, & Harris, 2013).

When considering the development of prosociality, it is necessary to consider both children's knowledge about social norms and their actual behavior (Blake, McAuliffe, & Warneken, 2014). Previous research has shown that children demonstrate sensitivity toward fair (equal) distributions from around 16 months of age (Geraci & Surian, 2011). From at least 3 years of age, children explicitly endorse fairness norms, stating that they ought to share equally (Smith et al., 2013). Infants also engage in some sharing behavior themselves, but they typically share considerably less than half of the resources they have available (Schmidt & Sommerville, 2011). Sharing of valuable resources, such as sweets and stickers, undergoes considerable development from then onward, increasing with age (Benenson et al., 2007; Fehr, Bernhard, & Rockenbach, 2008; Harbaugh et al., 2003; House et al., 2013) and taking several years until it conforms to explicitly held norms regarding how much should be shared (Smith et al., 2013). Thus, there is an interesting discrepancy between the very early onset of fairness sensitivities during infancy and the much later development of acting in accordance with ideas of fairness. This so-called knowledge–behavior gap has been argued to decrease with age (Smith et al., 2013). This leaves us with an important question: Why do children not share more generously than they do?

One important candidate for enabling children to share more generously and align their behavior with explicitly endorsed norms is behavioral control (Steinbeis, 2016; Steinbeis et al., 2012). Especially when resources are valuable, behavioral control could allow children to curb the temptation to keep more for themselves than is dictated by their stated fairness norm. Behavioral control refers to the ability to align behavior with one's goals (Ajzen & Madden, 1986; Miller & Cohen, 2001). It comprises the control of both thoughts and actions and is thus closely related to the concept of self-regulation (Rothbart, Sheese, Rueda, & Posner, 2011). Sharing has been shown to correlate with independent measures of behavioral control (Blake et al., 2015), which would predispose such a mechanism to aligning behavior and goals. The evidence however is contradictory. In a recent study children aged 3–8 years stated that they themselves should share equally but failed to engage in equal sharing until around age 7 or 8 years (Smith et al., 2013). A concomitantly acquired experimental task of behavioral control (i.e., bear–dragon task) failed to explain this behavioral discrepancy. As a result, it was concluded that increasing willpower and behavioral control were not responsible for closing the knowledge–behavior gap (Blake et al., 2014; Smith et al., 2013). More recently, however, it was shown that other measures of behavioral control (i.e., parental questionnaires of self-regulation) could account for age-related changes in closing the knowledge–behavior gap (Blake et al., 2015). These discrepancies in previous research might be due, in large part, to different methodologies employed and the use of correlational rather than experimental research designs. We sought to provide an experimental test of the relationship between behavioral control and sharing behavior through an experimental manipulation.

Behavioral control is not easy to manipulate in laboratory settings (hence the dearth of experimental research on this topic). Priming paradigms offer a potential solution to this problem. By randomly assigning children to hear content that activates the mental representation of interest, in this case behavioral control, researchers can gain understanding of the role it plays in determining a particular social behavior (Stupica & Cassidy, 2014). Previous research has shown that social priming can influence children's eating behavior (Harris, Bargh, & Brownell, 2009), emotional responses (Cortez & Bugental, 1995), and self concept (Bryant-Tuckett & Silverman, 1984). More recent research has shown that goal priming influences children's tendency to wait for a large reward or to choose an

immediately available small one (Kesek, Cunningham, Packer, & Zelazo, 2011). By means of stories, children were primed either to maximize their rewards or to go for something immediately available. *Maximize* primes led to a greater proportion of children choosing a larger delayed reward compared with *immediacy* primes. The effect was stronger than when children had received explicit instructions to the same effect. A recent study in adults could show that priming reflective or automatic behavioral tendencies had an influence on subsequent sharing behavior (Rand, Greene, & Nowak, 2012). This work demonstrates that priming is an effective means by which to manipulate behavioral control. We used this basic method to experimentally investigate the role that behavioral control plays in prosocial behavior.

We devised two stories to use as primes. In one story, a protagonist actively engaged in behavioral control to resist a strong urge not to eat sweets (i.e., a behavioral control prime; see Appendix), whereas in a virtually identical story there was no active engagement of behavioral control because the protagonist chose to leave the scene of temptation, thereby removing the necessity for behavioral control (i.e., neutral prime; see Appendix). We then assessed the effect of the priming conditions on sharing behavior using a child-friendly version of the Dictator Game (DG) in which children were asked to distribute 7 monetary units (MUs) between themselves and an anonymous other. We opted for anonymity to avoid a potential effect of contextual variables that are known to become increasingly important during childhood (Martin & Olson, 2015). We predicted that if a failure of behavioral control is one reason for low levels of sharing, then children should share more after behavioral control priming than after neutral priming. We also sought to examine the effect of behavioral control priming over two sharing contexts: when children were told they could share how they wished (*want share*) and when children were told to share how they think they should (*should share*). Previous research has demonstrated that behavioral control correlates with sharing behavior when children are asked to share as they wish (Blake et al., 2015). This research suggests that the effect of behavioral control priming may be stronger in the want share condition than in the should share condition. To control for potential effects of the primes on fairness judgments and mood, which could in turn affect prosocial behavior, we also obtained fairness ratings and an indicator of children's emotional state.

Method

Participants

A total of 120 children aged 6–9 years were tested (M_{age} = 7.2 ± 0.936 years, range = 5.70–8.98; 59 girls). Children were recruited from schools in the area. This study was approved by the local ethics committee (E029-11-24012011), and written parental consent was provided for all participants. Children were recruited from a database of parents in a mid-sized town who had volunteered their children to participate in child development studies. Although no specific demographic data were collected, participants came from mostly middle-class backgrounds, and approximately 98% of the population from which the sample was drawn was native German.

Design

As part of the priming procedure, all children listened to a story via headphones about a gender-matched protagonist and subsequently were given MUs that they could share with another anonymous child. Half of the children (n = 60; 30 girls) were assigned to a condition in which the story's protagonist needed to exercise strong self-restraint (*behavioral control* group), whereas the story's protagonist for the other half of the children (n = 60, 29 girls) did not (*neutral* group). During the subsequent decision phase, children in both the behavioral control and neutral groups were further divided into one of two groups. Members of the first group were told that they could share as they wished (n = 30; 15 girls), whereas members of the second group were told that they could share like they think they ought to share (n = 30; 14 girls). There were no age differences between any of the groups.

Priming

Children listened via headphones to a story of a protagonist (Paul/Paula) who was matched to the participants' gender. For female participants, the story was as follows. Paula was visiting her grandmother. Her grandmother had been busy all morning baking cakes and cookies, including her favorite ones, for a tea party that was to take place later in the day. The delicious aroma of cake pervaded the kitchen, and Paula realized how hungry she was. Her grandmother told her not to touch any of the cakes because they were for later, after which her grandmother left the house to do some shopping. In the *neutral prime* condition, Paula goes to the garden after her grandmother leaves to spend the rest of the afternoon there. In the *behavioral control prime* condition, Paula remains in the kitchen until her grandmother returned and did not touch any of her favorite cakes in spite of them smelling delicious and her being very hungry. Both audio clips were exactly 103 s long. The experimenter was unaware of how each participant was primed and had never heard the audio clips.

Sharing

Prior to listening to the story, children were shown a table stacked with rewards such as games and toys that would be of interest to their age group. The rewards were arranged from left to right by increasing attractiveness as determined through extensive previous piloting with this age range (Steinbeis, Bernhardt, & Singer, 2015; Steinbeis, Haushofer, Fehr, & Singer, 2016; Steinbeis & Singer, 2013; Steinbeis et al., 2012). Children were told that they were going to play some games during which they could win poker chips (the MUs), which they could subsequently trade in for one of the rewards. The greater the number of chips they had, the larger the range of rewards from which they could choose.

To test for children's willingness to share, they played one round of the DG in the role of the proposer. For this, children were given 7 MUs and shown two round boxes marked with differing colors, one of which belonged to the participant and the other of which belonged to another child who was anonymous. Half of the children were told that they could share as they wished by dividing the poker chips whichever way they wanted between the two boxes, whereas the other half were told that they could share how they feel they should. We were unsure whether sharing MUs would be sensitive to the influence of the preceding primes. As a result, we decided to let children decide over an unequal number of MUs because that would force them to decide to give either more or less than they have themselves to the anonymous other.

We ensured that all children had fully understood the instructions. This was checked by means of control questions pertaining to the number of MUs with which children were endowed, who they thought they were playing with, and which of the two boxes was for whom. If children responded incorrectly on any of the questions, the instructions were reiterated up to two times. As a result, all children were graded on their understanding of the task with deductions for having needed to reiterate the instructions. In spite of repeated instructions, 6 children continued to give wrong answers to at least one of the questions. They participated in the study, but their data were subsequently excluded from further analysis. All other children understood the instructions and the nature of the game at least after one repetition.

To ensure that not too much time would be taken up through the instruction of the games, and to wash out any effect of the previous manipulation on behavior, participants were first instructed on the DG and then listened to one version of the story before playing the game immediately after that.

Fairness ratings

After having played the DG, children were asked to indicate whether the different ways in which 7 MUs could be shared (7:0; 6:1; 5:2, and 4:3) were fair or not. To do so, they were given a sheet with the four distributions depicted and asked to tick a Yes box or a No box depending on whether they considered the distribution fair. Note that there was no indication that these were the result of decisions with a proposer or a responder; children were merely shown four distributions and asked to rate

whether they thought the distributions were fair or not. This was done to see what children's understanding of a fair distribution was.

Emotion ratings

To check for any differences in emotional experience following the procedure, we also asked children how they felt after they played the DG. They were presented with three scales denoting happiness, sadness, and anger. Each scale was marked with a representative drawing of a face depicting the relevant emotion. Each scale was flanked by a large version and a small version of the depicted image, in each case indicating how weak or strong the specific emotion was felt. Children could indicate on a line going between the small face and the large face how they felt. Fairness and emotion ratings were counterbalanced across participants.

Results

We tested for differences in sharing as a function of the prime (behavioral control or neutral) and the sharing instruction (want or should) as well as an interaction between the factors prime and instruction. A univariate analysis of variance with the factors prime and instruction yielded a significant effect of prime, $F(1, 110) = 5.394$, $p = .022$, partial $\eta^2 = .047$ (behavioral control prime: $M = 5.11$, $SE = 0.185$; neutral prime: $M = 4.54$, $SE = 0.166$); a significant effect of instructions, $F(1, 110) = 29.045$, $p = .001$, partial $\eta^2 = .209$ (want instruction: $M = 4.22$, $SE = 0.137$; should instruction: $M = 5.45$, $SE = 0.182$); and no interaction between the two factors (see Fig. 1). Children shared more after the behavioral control prime than after the neutral prime, and they shared more when instructed to share how they should than when instructed to share how they wished. These effects remained significant also when controlling for the factors age, gender, performance on the control questions, fairness ratings, and self-reports of emotional experience, as indicated by an analysis of covariance: factor prime, $F(1, 102) = 5.74$, $p = .018$, partial $\eta^2 = .053$; factor instruction, $F(1, 102) = 29.045$, $p = .001$, partial $\eta^2 = .222$.

Children rated the fairness of the four distributions in the following way (% of children who said the distribution was fair): 4:3, 98.3%; 5:2, 93.3%; 6:1, 88.3%; 7:0, 0.8%. More important, there were no differences in the fairness ratings between any of the groups ($F < 1$, $p > 0.3$) or in their self-reports of emotional experience ($F < 2.2$, $p > .14$).

Discussion

In this study, we used an experimental manipulation to test for the role of behavioral control in bringing about increased sharing in 6–9-year-old children. We used a short gender-matched vignette

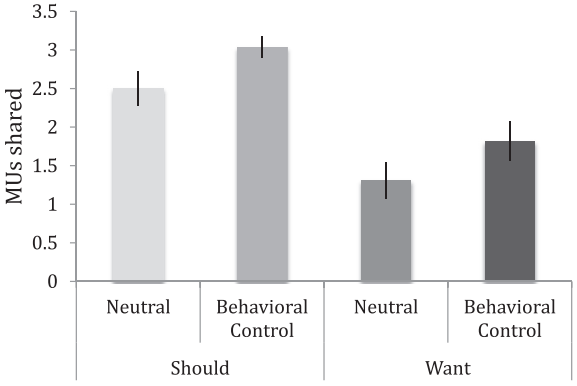

Fig. 1. Results. The mean number of monetary units (MUs) children shared in each of the four conditions.

portraying a child exerting behavioral control in a non-sharing context to prime behavior in a subsequent sharing task. Using a between-participants design, we found that children who had listened to the behavioral control story shared more with an anonymous other child compared with children who had listened to identical stories but without the protagonist needing to exert behavioral control. We also found that this effect held to a similar extent over two different sharing instructions, namely telling children either to share as they wished or to share as they thought they should. The results cannot be easily accounted for by changes in emotional experiences or different perceptions of fairness as a function of the primes, which did not differ between the groups. Nor can they be explained by simple mimicry of the characters in the primes given that the primes described behavioral control in a context entirely different from the experimental situation (i.e., resisting the temptation to eat something sweet vs. resisting the temptation to keep coins to oneself). These findings suggest that behavioral control plays an important role in promoting sharing during childhood.

It is worth emphasizing that our neutral prime condition was a relatively conservative control to the behavioral control prime condition. In the neutral prime condition, the protagonist chooses to leave the room of temptation and go out into the garden. It could be reasonably argued that this is already a form of self-regulation, whereby in order not to be tempted any further, the child decides to extract himself or herself from the potentially compromising situation. Arguably, however, the level of behavioral control exerted occurs to a lesser degree than continuing to resist temptation. The fact that there is a significant difference between the neutral prime condition and the behavioral control prime condition in spite of the similarity of the two conditions and the relative degree of behavioral control also required in the neutral prime condition suggests the potential power of the current approach in modifying child behavior in socially appropriate ways. When thinking about the nature of the priming manipulation, it is interesting to note that hearing about another child exerting behavioral control had a significant effect on children's own sharing behavior. Social psychological research has shown that this also occurs in other domains. For example, in work on ostracism, observing someone else being excluded from the group (Over & Carpenter, 2009; Pawling, Kirkham, Tipper, & Over, 2017; Song, Over, & Carpenter, 2015; Watson-Jones, Legare, Whitehouse, & Clegg, 2014) has similar behavioral consequences to being excluded oneself (Watson-Jones, Whitehouse, & Legare, 2016; Williams, 2007). The current study shows that this technique can also be applied to processes like behavioral control. We do not believe that the priming manipulation increases behavioral control capacity; rather, we believe that it leads to a temporary shift toward greater behavioral control. The concomitant increase in sharing suggests that behavioral control and types of prosocial behavior are linked during childhood.

We show a priming effect of behavioral control in two different sharing conditions. Thus, children share more when primed by behavioral control both when told to share as they wish and when told to share as they think they should. Children also shared more in the should share condition than the want share condition, indicating that they appear to be sensitive to the suggestion of sharing according to prescribed norms. This finding is in line with existing literature on sharing behavior in this age group (Smith et al., 2013). We did not find an interaction between the prime and the sharing instruction. The fact that behavioral control primes also had an effect on sharing even when norms were invoked suggests that the mere act of giving up a valuable resource irrespective of the context requires behavioral control. This interpretation is buttressed by the lack of a priming effect on perceived fairness, implying that the primes selectively influenced the act of sharing and not the perception of fairness. However, note that the DG and the fairness ratings of various distributions were not counterbalanced. This was done to avoid questions related to fairness influencing sharing decisions in the DG. An alternative explanation for the lack of group differences in the perception of fairness may be that priming effects dissipated following the decision of how much to share. In addition, children might respond differently if they were making fairness judgments and thought themselves to be the donor or recipient. Future studies should also include explicit measures of the stated norms and preferences (Smith et al., 2013). Finally, the fact that fairness ratings were presented simultaneously may have skewed the ratings to a certain degree in that they could have been made relative to other possible options.

Our experimental demonstration of a role of behavioral control in sharing during childhood is of particular interest in the light of recent debates on the underlying mechanisms of sharing behavior.

Whereas some argue that sharing occurs automatically, intuitively, and effortlessly (Rand et al., 2012; Zaki & Mitchell, 2013), others claim that sharing requires effort, self-restraint, and mechanisms of behavioral control (Knoch, Pascual-Leone, Meyer, Treyer, & Fehr, 2006; Rachlin, 2002). The findings of our study suggest that sharing, at least during middle childhood, requires behavioral control. This simultaneously implies that during this developmental period altruistic decisions are not automatic and effortless. These results fit with previous research demonstrating that prosocial decisions become increasingly subject to contextual variables such as moral status of the recipient (Vaish, Carpenter, & Tomasello, 2010), group membership (Dunham, Baron, & Carey, 2011) and reputation concerns (Engelmann, Herrmann, & Tomasello, 2012; Leimgruber, Shaw, Santos, & Olson, 2012). Such an increasing context-related variability implies the necessity of a behavioral control in order to titrate behavior according to the need to adhere to social norms and expectations and form relationships with others and, at the same time, to accumulate resources for oneself.

Recent work has shown that briefly taxing behavioral control leads to a subsequent reduction in prosocial behavior during middle childhood, the same ages as in the current study (Steinbeis, 2016). The current findings extend this work by showing that increasing behavioral control through priming leads to greater prosocial behavior in the same age group. Thus, they pave the way for future more applied work on how to encourage prosocial behavior in children through enhancing behavioral control. These sets of findings suggest that prosocial behavior is malleable at least for short periods of time through targeting behavioral control. One open question relates to how this can be translated into more long-lasting changes. Studying the effects of training executive functions over longer periods of time for durable changes in transfer tasks has witnessed increased scientific interest (Diamond & Lee, 2011). However, whether such trainings also lead to transfer effects onto other domains such as prosocial behavior remains to be seen. One confound that needs to be considered is a potential experimenter demand effect. Whereas the priming context and the experimental context differed substantially, it might be that the prime of increased behavioral control was perceived by children as a demand to exert behavioral control in an unrelated context.

The current study used an experimental manipulation to demonstrate the role of behavioral control in sharing behavior in children aged 6–9 years. Priming behavioral control led to increased sharing compared with neutral primes across two sharing contexts. The influence of behavioral control primes on young children's sharing speaks to a privileged role of behavioral control in prosocial acts during childhood, a mechanism capable of accounting for both age-related and individual differences in sharing (Steinbeis et al., 2012). This research adds to a small but growing literature on the value of priming as a technique for experimentally investigating social behavior during development (Over & Carpenter, 2009; Stupica & Cassidy, 2014) and could potentially be incorporated into interventions. For example, storybooks may prove to be useful ways of encouraging children to demonstrate self-restraint within important educational contexts. To this end, it would be useful to test for the longevity of priming effects and their utility over repeated instances. Understanding the influence of priming over a one-shot interaction is already a promising step in creating positive interpersonal relationships.

Appendix: Text of the priming stories

Main story (for female participants)

Paula went to visit her grandmother, who lived in a nearby town. She was going to stay for the weekend. Her grandmother had prepared lots of cakes and cookies because later that day some of her friends were going to come around for tea. All the cakes and cookies were laid out in the kitchen—including chocolate cake and strawberry shortbread, which were Paula's favorites. It smelled absolutely delicious in the kitchen, and Paula, who had not eaten for some hours, was very hungry and really wanted to try them. Her tummy was rumbling—that's how hungry she was! Her grandmother told her not to touch the cakes and cookies yet because they were for later and that she should wait. Her grandmother then told Paula that she just had to go outside to buy some tea and coffee and that Paula could stay in the kitchen but that she must not touch any of the cakes and cookies.

Behavioral control ending

After her grandmother had left, Paula knew she had to be firm and resist the temptation to eat some of the cookies her grandmother had made. They just smelled so delicious! She did not touch any of the cookies. Nor did she eat any of the chocolate cake. She sat very still on her chair and waited patiently for the entire time that her grandmother was away.

Neutral ending

After her grandmother had left, Paula decided to leave the kitchen, where her grandmother had made the cookies and cakes, and go into the garden. She walked to the bottom of the garden and looked at the trees and flowers. Then Paula decided to play on the swing. She played on the swing the entire time her grandmother was away.

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