



## SHORT REPORT

# Preschoolers' generosity increases with understanding of the affective benefits of sharing

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### Abstract

*Research has demonstrated that sharing with others is rewarding, suggesting a proximal mechanism of humans' extraordinary tendency to engage in prosocial behavior. The current study explored the cognitive basis of the relation between generosity and happiness early in ontogeny. We demonstrate that preschool children understand the relation between generosity and happiness. Moreover, our results show that children's emotion ratings are predictive for their subsequent sharing behavior. This finding provides evidence for the theoretical claim that prosocial behavior may be related to the anticipation of positive feelings, and that this mechanism may explain early instances of generosity in preschool children.*

### Research highlights

- Preschool children expected positive emotions for sharing and negative emotions for not sharing with others.
- Children are aware about the relation between sharing and happiness.
- Individual differences in emotion understanding predict generosity in a sharing task.
- The predictive relations hold only for children's understanding of their own emotions.

### Introduction

The question why humans show such a strong propensity to engage in prosocial behavior has fascinated philosophers and psychologists for centuries (e.g. Aristotle, 2011). One intriguing claim has been that for humans the mere engagement in prosocial action is rewarding and promotes positive mood (e.g. Bierhoff, 2002), or, in other words, there is an affective benefit from prosocial behavior. Indeed, there is a body of recent evidence that demonstrates that sharing with others leads to increased happiness (Aknin, Hamlin & Dunn, 2012; Gebauer, Riketta, Broemer & Maio, 2008), activates brain regions

related to reward processing (Harbaugh, Mayr & Burghart, 2007; Zaki & Mitchell, 2011) and promotes well-being in general (Dunn, Aknin & Norton, 2008). The generality of the relation between prosocial action and happiness is impressively supported by cross-cultural as well as developmental research with young children (Aknin, Barrington-Leigh, Dunn, Helliwell, Burns *et al.*, 2013; Aknin, Broesch, Hamlin & van de Vondervoort, 2015), indicating that this could be a universal as well as a proximal mechanism of prosocial behavior that could subserve early instances of prosociality.

Despite this great interest in the relation between prosocial action and experienced emotion, the cognitive basis of this relation remains unclear. A fundamental question concerns whether the positive emotions resulting from sharing are merely a nice consequence (i.e. caused by sharing) without functional relevance (i.e. without themselves causing sharing) or whether they play a functional role in guiding prosocial action choices. Answering this question would be highly relevant for current research as it would inform us about a potential mechanism underlying young children's prosocial action (for debate see Carpendale, Kettner & Audet, 2015; Decety & Svetlova, 2012; Dunfield, 2013; Dunfield & Kuhlmeier, 2013; Martin & Olson, 2015; Paulus, 2014; Tomasello, 2009).

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One reason to doubt that people represent the intentional relation between generosity and happiness comes from a finding by Dunn *et al.* (2008, Experiment 4). They showed that a majority of adult participants thought that spending money on personal issues would make them happier than prosocial spending – whereas the reverse was actually the case. However, as this study pitted two tendencies against each other (and therefore assessed the relative strength of each tendency), it cannot exclude the possibility that people understand the emotionally positive consequences of prosocial action, and act accordingly. Moreover, adults are subject to the impact of lay theories that having money makes them happy and these flawed intuitions may mask other representations (Dunn, Aknin & Norton, 2014).

The aim of the current study was to explore children's understanding of the relation between sharing and happiness. Moreover, we examined whether individual differences in children's emotion understanding when sharing or not sharing with another would predict their actual sharing decisions. A positive answer to this question would provide evidence for the claim that an understanding of the emotional consequences of sharing could be one influential mechanism underlying early prosocial behavior.

To this end, we examined young children's reasoning about the emotional consequences of sharing vs. not sharing in three conditions. If children represent the emotionally positive consequences of prosocial action, they should expect that sharing makes people happy, and not sharing makes people less happy. Further, by relating children's emotion ratings to their actual sharing behavior in another situation, we investigated whether or not these representations actually affect their generosity. In one condition ('Self'), we examined whether children would predict that their own emotion would differ depending on sharing or not sharing. In a second condition ('Other'), in order to explore whether the representation of the relation between generosity and happiness is general, we also added a condition in which participants were asked to reason about another person's emotion when sharing or not sharing with others. This also allowed us to examine whether it is simply the understanding of their own emotions when sharing or when not sharing that guides their behavior, or whether also a more abstract, impersonal belief about the relation between generosity and happiness guides their prosocial choices in a sharing context. Finally, we included a third condition ('Control') in which children were also asked to reason about their emotions when knowing or when not knowing the content of a box (e.g. Rohwer, Kloo & Perner, 2012). This third condition allowed us to investigate whether it is specifically the understanding of emotions when sharing or when

not sharing that is predictive of future sharing behavior, or whether children's general understanding of emotions, also in other contexts, predicts their future sharing choices. Moreover, if focusing attention on the emotional consequences of sharing promotes generosity, we would expect that children in the Self (and maybe also the Other) condition would be more generous than children in the Control condition. Given that previous research suggested that effect anticipations guide children's action choices by 2–3 years (Klossek, Russell & Dickinson, 2008) and given that developmental research has provided established paradigms to study sharing behavior in preschoolers (e.g. Fehr, Bernhard & Rockenbach, 2008; Moore, 2009; Olson & Spelke, 2008; Paulus, 2016), we decided to examine preschool children.

## Method

### Participants

The final sample included 64 3- to 6-year-old preschool children ( $M = 60.8$  months,  $SD = 11.1$ ; 28 boys). Twenty-three children were in the Other condition ( $M = 61.7$  months,  $SD = 10.3$ ; 12 boys), 21 in the Self condition ( $M = 59.6$  months,  $SD = 11.9$ ; 8 boys), and 20 in the Control condition ( $M = 61.4$  months,  $SD = 11.5$ ; 8 boys). One child was excluded due to experimenter error. All participants were typically developing children from Munich (Germany) and were of mixed socioeconomic status. Informed consent for participation was given by the children's caregivers.

### Materials

#### Emotion judgment task (EJT)

Resources used in the EJT were colored balloons and a box. Pictures of age- and gender-matched children served as protagonists and recipients. The Facial Affective Scale (FAS; see Perrott, Goodenough & Champion, 2004) was employed to assess children's emotion ratings. The FAS includes nine schematic faces displaying facial expressions ranging from sad to happy. A neutral face represents its center point.

#### Resource allocation task

As items for the resource allocation task, colored stickers were used. Preschool children tend to value them highly and they have been used in many previous studies (e.g. Moore, 2009). A picture of a child of approximately the same age, the same gender, and the same ethnic

background served as the recipient in the resource allocation task.

### Procedure

Participants were tested individually in a quiet room and experimental sessions were videotaped. To familiarize children with the FAS and the different emotional expressions shown by the faces, the experimenter demonstrated first how to use the FAS to express emotion ratings herself and also asked the child to demonstrate using the scale (e.g. 'show me how you feel when you are sad/happy'). All children were able to use the FAS. Subsequently, the children participated in one of three conditions.

#### Self condition

The experimenter used the pictures of two age- and gender-matched children. She presented the participant with one of the pictures (e.g. calling the depicted child Maria) and two balloons, which were placed in front of the participant. She explained to the participant that she owns the balloons and could share one of them with Maria, sliding one of the balloons to the respective picture. Then, she asked the child: 'Pretend you would have given this balloon to Maria, how would you feel?' The participant was asked to demonstrate the feeling on the FAS. Then, participants were presented with a second scenario in which they were presented with the picture of another child (e.g. Ann) and two balloons. This time, however, participants were asked to say how they would feel if they had not shared with the other and to indicate this feeling on the FAS.

#### Other condition

The Other condition resembled the Self condition with the crucial difference that children were asked to rate another person's emotion when sharing or when not sharing with another person. To this end, children were presented with two pictures of age-matched children. They were told that one child (e.g. Kimberly) possesses two balloons and could share them with the other child. Indeed, Kimberly shares one balloon with the other child. The participant was asked to demonstrate Kimberly's feeling on the FAS. Then, participants completed a second scenario. They were presented with the same protagonist (e.g. Kimberly) again possessing two balloons and the picture of another recipient. This time, however, participants were told that Kimberly was not to share with the other.

Participants were asked to indicate the protagonist's feeling on the FAS.

#### Control condition

In the Control condition were participants asked to also think about themselves and their emotions, but this time in a context of epistemic reasoning (rather than reasoning about their generosity or selfishness). We capitalized on an established paradigm in which children are presented with a box and are asked to tell whether or not they know what is inside the box (e.g. Kim, Paulus, Sodian, & Proust, 2016; Rohwer *et al.*, 2012). In one scenario, children were presented with the object (e.g. a marble) beforehand and observed how the experimenter hid it in the box. In the other scenario, the experimenter secretly hid an object in the box. In both scenarios, participants were asked to indicate their feeling on the FAS.

#### Resource allocation task

As in the previous task, a picture of a child of approximately the same age, the same gender, and the same ethnic background (different from the child in EJT) served as the recipient in the resource allocation task. The child was introduced by her/his name (e.g. Max). The participant was told that they were going to have the possibility to share stickers between themselves and Max. As Max could not be present, all his stickers would be sent to him by mail.

Participants were then presented with four blocks of trials. Each block contained one trial of each of three trial types. Children were thus presented with 12 trials in total. Trial order and the order of the choices offered in each question were counterbalanced among blocks and participants. The following trial types were administered: costly sharing trials, noncostly sharing trials, and open trials. In the costly and noncostly sharing trials, the experimenter put the respective number of stickers on the table, and children had to choose between two options (establishing a mini-dictator game; e.g. Fehr *et al.*, 2008; Thompson, Barresi & Moore, 1997). In the costly sharing trials, the participant could choose to take two stickers for themselves (2,0 alternative) or to take one sticker for themselves and one sticker for the other child (1,1 alternative). In the non-costly sharing trials, the participant could choose to take one sticker for themselves only (1,0 alternative) or to take one sticker for themselves and one sticker for the other child (1,1 alternative). In the open trials participants were presented with three stickers and could distribute them freely between themselves and the other (i.e. without any

predefined choice). We decided to include this trial type as it has been suggested that such open formats are better operationalizations of children's sharing behavior than the closed formats of mini-dictator games. Moreover, giving them three items to divide enabled us to include a trial type in which no equal split was possible and to study therefore whether children rather tend to prefer themselves or the other person in their sharing.

### Data coding

#### Emotion judgment task (EJT)

Children's ratings in the EJT were coded on a scale ranging from 4 (representing the happiest face) to -4 (representing the very sad face) with 0 representing the neutral face. Emotion ratings were recorded for each Sharing event (sharing, non-sharing) separately. One child in the Control condition did not provide data for the non-sharing event. To allow for full statistical treatment, the group average was inserted. In addition, we calculated an Emotion Rating Difference Score (ERDS) by subtracting the rating in the sharing event from the non-sharing event to measure how much participants differentiated between the two events.

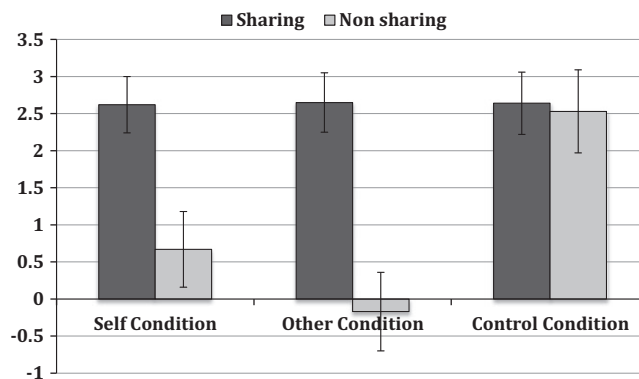
#### Resource allocation task

In the costly and noncostly sharing trials, participants received a score of 1 if they chose the option that afforded more items to the other recipient, that is, the (1/1) alternative. Scores were summed over the four trials of each trial type. Children could thus receive a maximum score of 4. In the open trial type, children could share freely between 0 and 3 items per trial. Here, we calculated the average number of items shared across the four trials.

## Results

#### Emotion judgment task (EJT)

Our first analysis focused on children's reasoning about their and another's feelings when sharing resources. See Figure 1 for the descriptive results. A preliminary analysis including the factor Gender revealed no effect of this factor so we dropped it from the main analyses. We conducted a univariate analysis of covariance (ANCOVA) on the ERDS with the between-subjects factor Condition (Self, Other, Control) including age (in months) as a covariate. The ANCOVA revealed only a significant main effect of the Condition,  $F(2, 60) = 3.92$ ,  $p = .025$ ,  $\eta^2 = .12$ . Post-hoc independent samples  $t$ -tests revealed



**Figure 1** Results of the emotion judgment task (EJT). Error bars indicate standard errors of the means.

that the Self and Other conditions differed significantly from the Control condition, both  $ps \leq .003$ , whereas they did not differ significantly from each other,  $p = .633$ . In addition, to assess differences within event types, we ran two separate one-way ANOVAs on the different Sharing Events with the between-subjects factor Condition (Self, Other, Control). The ANOVA on the Sharing event yielded no effect,  $F < 1$ , whereas there was a significant effect for the Non-Sharing event,  $F(2, 63) = 6.70$ ,  $p = .002$ ,  $\eta^2 = .18$ . Post-hoc LSD tests confirmed that the Self and the Other conditions differed significantly from the Control condition, both  $ps < .01$ , whereas they did not differ from each other,  $p = .233$ .

#### Resource allocation task

Since one central question was whether children's understanding of own emotions relates to their actual sharing behavior, we ran partial correlations, controlling for age, between children's emotion judgments and their performance in the three trial types. We initially focused the correlational analyses on the ERDS score as this score reflects participants' understanding of the emotional consequences of sharing compared to non-sharing (independent of individual differences in their overall tendencies to positive or negative emotional evaluations). For the significant trial effects, we ran separate correlations with the FAS rating in the sharing event as well as the FAS rating in the non-sharing event to examine whether these effects are mainly driven by the FAS rating of one condition. See Table 1 for an overview of the results of the correlational analyses controlling for participant age. These analyses revealed significant effects for the Self condition, whereas there were no effects for the Other condition and the Control condition. Subsequent detailed analyses for the Self condition showed that the effects were present and equally strong



**Table 1** Results of the correlational analyses. All results report partial correlations controlling for participant age

	Sharing	Prosocial	Open
(A) Correlation between ERDS in each condition and trial types			
Self Condition	$r = .72, p < .001^{**}$	$r = .55, p = .013^*$	$r = .61, p = .005^{**}$
Other Condition	$r = -.19, p = .400$	$r = .09, p = .691$	$r = .03, p = .902$
Control Condition	$r = -.20, p = .421$	$r = -.05, p = .836$	$r = .06, p = .822$
(B) Correlation between FAS ratings in the Self condition and trial types			
FAS Sharing	$r = .62, p = .003^{**}$	$r = .30, p = .197$	$r = .46, p = .040^*$
FAS Non sharing	$r = -.62, p = .004^{**}$	$r = -.57, p = .008^{**}$	$r = -.56, p = .010^{**}$

\* $p < .05$ , \*\* $p \leq .01$

in both Sharing events (with the exception of the Prosocial trials in the Sharing event). This suggests that the more children rated their own emotion to be positive when sharing with another person, the more they actually shared; and the more they rated their own emotion as being negative when not sharing with another person, the more they shared.

To further substantiate this finding and to explain the contribution of our predictor variables to explained variance, hierarchical linear regression analyses were performed for each trial type (of the Self condition) using the stepwise method. Both Sharing event variables as well as age (in months) were entered as predictors into the analysis. The regression analysis on the sharing trials confirmed that both Sharing event and Non-Sharing event were significant and independent predictors (Sharing event:  $\beta = .47$ ; Non-Sharing event:  $\beta = -.41$ ),  $F(2, 18) = 10.35, p = .001$ , and  $\Delta R^2 = .48$ . For the prosocial trials, only Non-Sharing event remained a significant predictor ( $\beta = -.57$ ),  $F(1, 19) = 9.26, p = .007$ , and  $\Delta R^2 = .29$ . Likewise, for the open trials, only Non-Sharing event remained a significant predictor ( $\beta = -.57$ ),  $F(1, 19) = 9.19, p = .007$ , and  $\Delta R^2 = .29$ .

Finally, we analyzed whether there were any differences in children's sharing behavior between conditions. See Table 2 for an overview. We first ran an ANCOVA with the within-subjects factor Trial Type (Prosocial, Sharing) and the between-subjects factors Condition (Self, Other, Control) and Gender (Male, Female) including age (in months) as a covariate. This analyses revealed only a significant interaction between Trial Type and Gender,  $F(1, 57) = 9.00, p = .004, \eta^2 = .14$  (all other  $ps > .11$ ). To follow up on the interaction between Trial Type and Gender, we ran post-hoc independent samples  $t$ -tests on the prosocial and sharing trials. The  $t$ -test on the prosocial trials showed no difference between boys' ( $M = 3.6, SD = 0.16$ ) and girls' ( $M = 3.2, SD = 0.18$ ) inclination to choose the more generous option,  $t(62) = 1.50, p = .14$ . The  $t$ -test on the sharing trials showed a tendency of girls ( $M = 2.6, SD = 0.25$ ) to select the more generous option more often than boys

**Table 2** Mean sharing rates for the three trial types (costly sharing, noncostly sharing, open trials), separated by condition (Self, Other, Control). Note that the numbers of the sharing trial types represent mean number of trials in which participants chose the more generous option, whereas the numbers of the open trials represent average numbers of items shared. Values in parentheses denote standard errors of the means

	Costly sharing	Noncostly sharing	Open trials
Self	2.8 (.32)	3.4 (.22)	1.2 (.08)
Other	2.3 (.30)	3.3 (.21)	1.3 (.08)
Control	1.8 (.33)	3.4 (.23)	1.3 (.08)

( $M = 1.9, SD = 0.27$ ),  $t(62) = 1.90, p = .06$ . Since the open trials had a different format (and coding) we ran a separate univariate ANCOVA with the between-subjects factors Condition (Self, Other, Control) and Gender (Male, Female) including age (in months) as a covariate. This analysis yielded no significant effect (all  $ps > .13$ ). Overall, there were thus no differences between conditions in children's sharing behavior.

## Discussion

Previous research has provided compelling evidence that there is a positive affective benefit of sharing (e.g. Aknin *et al.*, 2012, 2013; Dunn *et al.*, 2008, 2014) but has left open the question of the cognitive basis of this phenomenon. The current study examined whether children understand the relation between sharing and happiness. It provides evidence that preschool children understand that sharing makes one happier than not sharing. This understanding covers both the actions of the self and that of others. Moreover, it demonstrates that individual differences in children's emotion ratings at least for the self are predictive for their subsequent sharing behavior. This finding supports the theoretical proposal that prosocial behavior may be caused by the anticipation of positive feelings (i.e. a warm glow; Bierhoff, 2002),

and that this mechanism may explain early instances of generosity in preschool children.

Notably, children's emotion ratings were different for the sharing and the non-sharing event with significantly more positive emotion being associated with the sharing event. This suggests that preschool children understand the emotional consequences of acting generously. Interestingly, emotion ratings did not differ between the Self and the Other conditions. This suggests that preschoolers' understanding is of a rather abstract (i.e. actor-independent) nature as it could be equally well applied to Self and Other. Our findings stand, on first view, in contrast to findings by Dunn and colleagues (2008, Experiment 4) who reported that adult participants do not expect that prosocial spending would make them happier than spending resources on personal issues. Yet, given that these authors' main interest was to examine whether people tend to attribute more positive emotions to prosocial spending compared to selfish spending, their design might have underestimated people's knowledge about the positive emotional consequences of prosocial spending. Our study therefore extends this finding by showing for the first time that children understand the relation between generosity and happiness, and that this understanding is already in place in the preschool years.

Second, and perhaps even more important, the correlational analyses revealed that children's emotion ratings were related to their subsequent sharing decisions. The more positive they predicted their emotions to be when sharing, the more generous they were in a subsequent sharing task. Likewise, the more negatively they rated their emotion when not sharing with others, the more generous they were subsequently. Notably, these associations were there for all trial types. This finding adds to the ongoing debate on the cognitive basis of the relation between prosocial spending and happiness (e.g. Aknin *et al.*, 2012; Bierhoff, 2002; Dunn *et al.*, 2008, 2014) by suggesting that children's beliefs about the emotional consequences of sharing affect their actual sharing behavior. It has profound consequences for the current debate on why humans in general and children in particular engage in prosocial behavior (e.g. Decety & Svetlova, 2012; Dunfield & Kuhlmeier, 2013; Martin & Olson, 2015; Tomasello, 2009) by suggesting a potential psychological basis for the willingness to spend resources on others.

Two further aspects should be noted. It was specifically children's ratings of *own* emotions when sharing and when not sharing with others that related to their actual sharing decisions, whereas there was no relation for their rating of another's emotion in the same context. This differential effect suggests that it is not abstract (i.e. person-independent) knowledge on emotions associated with

prosocial action (as, for example, examined in research on moral emotions; e.g. Nunner-Winkler & Sodian, 1988) or social competence in general that guided their behavior, but the prediction of their own, personal emotions. This finding relates to the idea that anticipated affective consequences of actions (e.g. via somatic markers) guide human prospective action control (e.g. Damasio, 1996; Eder & Hommel, 2013). Moreover, further regression analyses indicated that it was specifically children's understanding of negative emotions when not sharing that affected their sharing decisions. Although both judgment types correlated with children's sharing, this finding could mean that it is specifically children's avoidance of negative emotions (when not sharing) that motivates their generosity. Such an anticipation of own negative emotions when not acting generously might be one basis of guilt (Eisenberg, 2000).

Third, it is important to note that, overall, children's generosity did not differ between groups. This indicates that explicitly asking children to reflect on the relation between sharing and happiness as well as on the relation between non-sharing and reduced happiness does not promote generosity. This may suggest that although children are able to reflect on the relation between sharing and happiness, this established functional relation between anticipated emotions and action selection cannot be easily altered through reasoning explicitly about it (see Eder & Hommel, 2013). Moreover, this pattern provides support for the validity of our findings; had we found that children in the Self condition shared more, it would have remained open to what extent our instruction (i.e. to reflect about the relation between sharing/non-sharing and happiness) would have altered their usual sharing behavior. The fact that there was no difference between groups supports our claim that individual differences in preschool children's understanding of the emotional consequences of their sharing behavior relates to their sharing decisions.

How does an understanding of the relation between sharing and its affective consequences develop? Notably, by 2 years of age, children show greater happiness when sharing with others than when receiving valuable items themselves (Aknin *et al.*, 2012). It is likely that this relation forms the basis for children's developing understanding of the relation between sharing and happiness. On the one hand, children could simply notice this relation themselves. An awareness of this relation might emerge through a conceptual redescription (see Karmiloff-Smith, 1992), a process that allows children to move behavioral knowledge and behavioral experiences to a conceptual level, which allows the building of naïve theories. On the other hand (and not mutually exclusively), this understanding might be promoted by

emotional discourses about the affective consequences of prosocial behavior. Such an interpretation relates well to findings that parental emotional talk relates to the development of sharing and helping in young children (Brownell, Svetlova, Anderson, Nichols & Drummond, 2013). Alternatively, it is also possible that an understanding of the positive and negative affective consequences of sharing might result from socialization processes in which children are praised when behaving generously (i.e. leading to an association of positive emotions and sharing) and are admonished when not being generous (see also Hastings, Utendale & Sullivan, 2007). Yet, the extent to which socialization processes play a role in the early development of prosocial behavior is highly disputed in the current literature (e.g. Dahl, 2015; Hammond & Carpendale, 2015; Warneken & Tomasello, 2008) and requires further examination.

Notably, the current findings relate to a recent study that examined the impact of preschoolers' anticipation of recipients' emotions on their sharing behavior (Paulus & Moore, 2015). This study showed that asking children to reflect on the emotional consequences increased their generosity. In addition, there was some evidence that children were more likely to share the more negatively they evaluated a recipient's emotions when not being shared with. Our results complement this study by demonstrating that preschoolers understand not only the affective consequences of sharing for the recipient, but also for the giver; and that both factors play a role in their sharing decisions. Interestingly, both studies provide convergent evidence for the primary role of negative emotions: in both studies the expectation of negative feelings when not being shared with or when not sharing, respectively, was a stronger predictor for subsequent sharing behavior than the expectation of the respective positive feelings. A difference between these studies is that, in the former study, asking children to reflect about the affective consequences of sharing for recipients led to an increase in subsequent generosity, whereas there was no such effect in the current examination. One interpretation of this difference could be that reflecting on the feeling of recipients is a rather effortful process that, once it is performed, has a positive impact on generosity. In contrast, taking one's own feelings as a giver into account might be a more automatic process, probably based on rewarded early experiences (see Aknin *et al.*, 2012), that is not further fostered by explicitly reflecting on it. If this interpretation is true, it would suggest that, although preschool children's appreciation of the giver's affective consequences explain a considerable amount of variance, reminding them of affective consequences for the recipient is a more effective means when one wants to promote their generosity.

There are some limitations and open issues of the current study that deserve further attention. In order to assess preschoolers' emotion understanding, we adapted previous research (e.g. Atance & Meltzoff, 2005; Paulus & Moore, 2015) that relied on a protocol that depicted the respective scenarios to the child and let the experimenter act out the respective behavior. We instructed the child to pretend to be in this situation and to have carried out the respective behaviors (i.e. sharing and non-sharing) themselves. One could argue that this procedure assesses emotion understanding, but – as the modeling of the experimenter approximated the experience of the respective events – is only an indirect measure of true emotion *anticipation*. Moreover, given the current study's main aim of a correlational analysis between individual differences in emotion understanding and subsequent sharing behavior, we followed other correlational studies (e.g. Kochanska, 2002; Paulus, Licata, Kristen, Thoermer, Woodward *et al.*, 2015; Spinrad & Stifter, 2006) and kept task order constant for participants. Randomizing order between participants could result in participants' task performance being differently affected by order, which would undermine a central premise of the correlational approach (see also Robertson Zelaznik, Lantero, Gadacz Bojczyk, Spencer *et al.*, 1999). Yet, given the fixed order we cannot exclude the possibility that the FAS ratings affected each other and their absolute value should therefore be interpreted with caution. Finally, we did not find an effect of age (that was included as a covariate in the group-level analyses), although other studies have reported age-related differences in preschool children's emotion understanding (e.g. Harris, Johnson, Hutton, Andrews & Cooke, 1989; Paulus & Moore, 2015). On the one hand, this could be due to an early development of the awareness of the affective consequences of sharing behavior, which does not show major developmental changes across the preschool period. On the other hand, it should also be noted that our study was not optimized to systematically detect age-differences. We have to leave it to future research to examine this issue in greater detail.

The current finding also bears on a classical debate in philosophy and the empirical sciences. To what extent can prosocial behavior be considered to be altruistic when it is related to affective consequences? Although it is impossible to discuss fully this question in an empirical paper, we would like to raise two points. First, with respect to the current results, one should note that it hardly ever happened that children gave nothing (only one child gave nothing in the prosocial and sharing trials, but shared something in the open trials). Thus, even though anticipated affective consequences play a role and explain variance in generosity, they do not explain

all instances of preschoolers' sharing. Second, there is an intense philosophical debate on the nature of true altruism and morality. Some have argued – based on initial considerations by Kant (1785) – that only behavior that is performed out of a sense of duty can be truly moral (e.g., Nunner-Winkler, 2003) and that prosocial acts that are motivated by anticipated positive feelings cannot be truly moral and altruistic (for discussion see Khalil, 2004). Others have suggested that such a concept of 'pure altruism' is unrealistic and violates our use of the concept of 'altruism' (for discussion see, for example, Tugendhat, 2003, 2006). In fact, if we assume a mechanistic worldview according to which each event is caused by another event and each behavior is subserved by a motivational antecedent, altruistic behavior must be based on such antecedents. If one accepts this tenet, then enjoying benefitting others might not be a form of 'impure altruism', but maybe – as proposed by Aristotle (2011) – rather the finest form of altruistic behavior (although it cannot be excluded that the anticipated positive emotions are an accidental consequence of (not) fulfilling one's moral ideal, which could thus be the primary motivation to engage in prosocial action).

Overall, the current findings add to a growing body of evidence on how children's understanding and reasoning about emotions predict social behavior and competence (e.g. Izard, Fine, Schultz, Mostow, Ackerman *et al.*, 2001; Paulus & Moore, 2015; Roberts & Strayer, 1996). It extends this previous research by demonstrating for the first time that their understanding and prediction of their own emotions relates to their prosocial behavior. Moreover, it suggests a potential psychological mechanism through which the 'warm glow' that has been supposed to be a central proximal mechanism of prosocial action leads to higher generosity.

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