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SELF-CONTROL IS NEGATIVELY LINKED TO PROSOCIALITY IN YOUNG CHILDREN

RUNNING TITLE: SELF CONTROL AND PROSOCIALITY IN CHILDREN

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Abstract: Human prosociality is a valuable but also deeply puzzling trait. While several studies suggest that prosociality is an impulsive behavior, others argue that self-control is necessary to develop prosocial behaviors. Yet, prosociality and self-control in children have rarely been studied jointly. Here, we measured self-control (i.e. delay-of-gratification) and prosociality (i.e. giving in a dictator game) in 250 4- to 6-year-old French schoolchildren. Contrary to previous studies, we found a negative relationship between waiting in the delay-of-gratification task and giving in the dictator game. The effect was especially pronounced when the partner in the dictator game was unknown compared to giving in a dictator game where the partner was familiar. Our results suggest that self-control is not always necessary to act prosocially. Future studies investigating whether and how such pattern develops across the lifespan and across cultures, are warranted.

Keywords: prosociality; delay of gratification; child development; dictator games; altruistic sharing; decision making

1) Introduction

From biological to social sciences, the origins of prosociality such as sharing, cooperating and helping (Batson & Powell, 2003; Eisenberg et al., 2006) fascinate researchers due to its key role in the functioning of advanced human societies (Boyd & Richerson, 2009). While several developmental studies suggest that self-control (Stevens et al., 2005) and social norms are necessary to exert prosocial behaviors (Blake et al., 2015), others argue that prosociality is an “instinctive” and impulsive behavior (Rand et al., 2012; Uziel & Hefetz, 2014).

Self-control and age are both positively correlated with prosocial actions. Children who perform better on inhibitory control tasks are more prosocial in cooperative play tasks with peers (Giannotta et al., 2011) and give more in sharing games (Aguilar-Pardo et al., 2013). In addition, children better in inhibition as evaluated by parents, are more able to follow a norm with respect to altruistic giving in a dictator game (Blake et al., 2015) and display more in-group favoritism and egalitarian tendencies (Fehr et al., 2008). Further, younger children (3- to 4-year-old), that usually have lower self-control, display more selfish behaviors than older children (7- to 8-year-old) in sharing games (Fehr et al., 2008; Yu et al., 2016). Thus, prosociality seems to increase with age as with cognitive development including self-control (Rueda et al., 2004).

Importantly however, young children engage in prosocial actions such as spontaneous helping (Rheingold & Hay, 1980; Sloane et al., 2012; Sommerville et al., 2013) before the development of self-control. Furthermore, both children (Plötner et al., 2021) and adults (Rand et al., 2012) are more prosocial in social dilemmas, when given less time to respond and prompted to act “intuitively”, suggesting that intuition supports prosocial impulses but that rational thought can hinder them. The development of certain cognitive abilities related to strategic thinking and self-control might thus have a negative impact on such prosocial impulses. Consequently, when children engage more and more in rational cognitive processes, prosociality could be reduced (Flook et al., 2019).

We might thus wonder, how prosociality can be the result of both impulsivity and self-control. Self-control in children has been widely measured with delay-of-gratification tasks (Kidd et al., 2013; Mischel et al., 1989; Moffett et al., 2020) where children are asked to choose between an immediately available reward vs. a larger reward available in the future (Mischel & Mischel, 1987; Newman et al., 1992; Prencipe et al., 2011). Delay-of-gratification is known to be a competence which develops between ages 4 to 6. Prosociality, and more specifically altruistic sharing has been traditionally measured with dictator games in which children can share a resource with a recipient. Two kinds of dictator games have been used: dictator games with an unknown partner (Benenson et al., 2007; Fehr et al., 2008; Gummerum et al., 2010) which aim at measuring pure altruistic sharing and dictator games with a known partner which aim at estimating reciprocal sharing (Yu et al., 2016). While the study of the relations between prosociality and self-control is not new, the number of studies looking at how self-control is related to children's prosocial sharing is fairly limited. A positive relationship between delay-of-gratification and reciprocal sharing has been reported by Moore & Macgillivray (2004) and Koomen et al. (2020) in a modified delay-of-gratification task, in which children could wait to provide benefits to a familiar third party and by Sebastián-Enesco & Warneken (2015) where resources obtained in a delay-of-gratification task could be shared with a puppet.

To our knowledge, no study has yet measured delay-of-gratification and prosocial sharing using (1) two independent tasks, where decisions regarding delay are independent from sharing decisions, and (2) involving "real" same-age children as partners in a realistic environment (i.e. school). Here, we evaluate whether a relationship can be observed between the ability to delay gratification and prosocial sharing in 250 4- to 6-year-old children tested in a quiet room of their school in two tasks measuring independently delay-of-gratification (i.e. one candy now vs. two candies at the end of the testing session) and prosociality (i.e. dictator games). Considering previous studies on similar topic and comparable age ranges, we hypothesized that self-control and prosociality will be positively correlated.

We further hypothesize that the identity of the partner in the dictator game might influence the choice to act prosocially or not. While giving anonymously to an unknown partner will be mainly driven by general concerns for altruism and fairness; giving to a known partner might be rather motivated by reputation motives, expected future returns or emotional involvement in the exchange. Indeed, DISCUSS AND INCLUDE PAPER SUGGESTED BY R3. We thus separately observe behavior in two dictator games: one dictator game in which participants share their stickers with an unknown partner (i.e. pure altruistic sharing) and a second dictator game with their self-reported “best-friend” (i.e. reciprocal sharing). We expect children to be more prosocial with a familiar partner than with an unknown partner. We further expect that this difference (i.e. favoring friends over strangers) will be higher for children who exert a high level of self-control.

1) Methods

Participants

We recruited 250 children from 18 kindergartens¹ in the region of “Occitanie” in southwestern France. The sample consisted of 79 4-year-old (37 female, 42 male), 109 5-year-old (61 female, 48 male) and 62 6-year-old (27 female, 35 male) children. We obtained the approval of an appropriate ethics committee to conduct the research.

All parents signed an informed consent form for their children and only children who gave their verbal assent were included. Among the 250 questionnaires sent to parents, 238 were returned allowing us to obtain information about parents’ income, number of siblings and native language. Forty-five percent of children were from low and middle-income backgrounds (0 to 30,000 euros/year). Participants had 1.1 siblings on average: 23% were an only child, 55% had only one sibling, 15% had two siblings and 7% had more than 2 siblings. All children (except one) were native French, and all children were French speaking. Two trained female experimenters tested children individually in a single video-recorded session in an available room at their schools.

Design and procedures

The experimenter told children that they would play some games together. The child and the experimenter then entered the testing room (i.e., an available room at their school). Participants completed a series of tasks including a delay of gratification task and two dictator games in one single 15-min long session (see Appendix A for detailed instructions).

Participants performed the delay of gratification task with candies. They had to choose between one candy immediately available and two candies available at the end of the testing session. After this, participants performed two dictator games with stickers, one with respect to an unknown child and one with respect to a familiar child. The order of the two dictator games was counterbalanced across participants, resulting in two protocol orders. Dictator games and the delay of gratification task were not counterbalanced because dictator game outcomes might have influenced delay of gratification choices.² After this, children who chose to delay in the delay of gratification task received their reward. Finally, children were given a single choice between receiving the small versus the large candy reward “now”, to evaluate their motivation for the larger versus the smaller reward. In the following we will discuss each task in detail.

Delay of gratification task

For the delay of gratification task, a cup containing one candy and another one containing two candies, were presented to the child. The experimenter said: “Do you want to have one candy now or do you want to wait until the end of the games to get two candies?” If the child chose the one candy option, he/she received one candy immediately. If the child chose to wait, the experimenter put the two cups away and continued the testing session.

Dictator games

The children engaged in two dictator games. The order of the two conditions was counterbalanced across children. Before the dictator games, the experimenter asked the participating child to name the child he/she liked the most to play with. The named child was the “familiar recipient” in the dictator game with a familiar partner.

¹ In France kindergartens (ecole maternelle) are part of the official school system and attendance is required from the age of 3.

² Given our order of events it is of course possible that delay of gratification choices might have influenced dictator game behavior. Children who failed to delay gratification (and who were motivated by the larger reward) might have experienced some frustration, while children that were able to delay gratification might have experienced some pride. However, note that since negative emotions and ego depletion are in general observed to be linked to less generosity in dictator games (Capra, 2004; Achtziger et al., 2015), this effect would rather impose a higher bound regarding the relationship between patience and giving in the dictator game with an unknown partner. In addition, the ordering allowed us to minimize frustration from unoccupied waiting during delay gratification. Since children performed the dictator game tasks during the waiting period, our delay gratification task can therefore be considered as a postponing task which is known to minimize frustration (Paglieri et al., 2015).

In both games, four very attractive stickers were presented to the child. The experimenter asked the child whether he/she liked the stickers, if not, the stickers were changed until the child said that he/she liked all the stickers. After this, the experimenter explained to the child that he/she could give some of the stickers to another child. The experimenter explained to the child that this decision would not be observed by the experimenter and demonstrated this by closing her eyes while the child allocated the stickers to two different envelopes.

In the game with an unknown partner, the experimenter explained that the recipient child would be a child from another school, randomly selected and would receive the stickers from another experimenter. It was made explicit that the child would not know who would receive the stickers. In the game with a familiar partner, the experimenter explained to the child that the recipient would be his/her best friend and that the participating child would hand over the stickers in person. It was made explicit that the recipient was the best friend and that the recipient would know who donated the stickers. Children were asked to hand over the stickers in person, to make the possibility of reciprocal actions by the recipient salient. Again however, the experimenter explained that she would not know about the decision and demonstrated this by closing her eyes while the child allocated the stickers to the two different envelopes.

Motivation task

Since recent papers suggest that waiting in delay-of-gratification tasks can be affected by the motivation for the reward (Barragan-Jason et al., 2018; Paglieri et al., 2015), motivation was explicitly measured (Paglieri et al., 2015) in asking children whether they preferred a small or a large reward when no delay was applied. For the motivation task, the experimenter said: “If you could have one candy now or two candies now, what would you choose?”

Statistical analysis

All analyses were performed in the R environment for statistical computing version 4.0 (Coreteam, 2018). The variable of interest from the delay of gratification task was binary, namely either “wait” or “don’t wait”. Similarly, motivation was evaluated through a single choice between the larger and smaller reward used in the delay of gratification task. In the dictator games, we observe donations between 0 and 4. As motivation for the reward has been shown to be a key component of delay of gratification (Barragan-Jason et al.; Paglieri et al., 2015), we exclude individuals that did not choose the larger reward in the motivation task, and thus were not motivated by the type of reward used in the delay-of-gratification task from the main analysis. A single mixed effects linear model was performed (“lmer” function in R) on the remaining individuals (N=212) to investigate whether the number of stickers given in the dictator games

was related to waiting in the delay-of-gratification task while controlling for the type of dictator game, parents' income, number of siblings, age in months, sex, protocol order and the participants identity as random effects.

For each fixed effect, statistical significance was evaluated by likelihood ratio tests of the full model against the same model without the tested fixed effect. We report likelihood ratio, t-values, confidence intervals and P-values. Regarding sample size, the recommended ratio is 20:1, i.e., 20 observations per independent variables (IVs; Brink & Wood, 1998; Tabachnick & Fidell, 1989). Our models involve a maximum of 7 IVs, suggesting that our minimal sample size should be 140. Our sample is **212** participants.

2) Results

We investigated the link between altruistic giving and delay of gratification for motivated children. Two variables were significant: the type of dictator game ($p < .001$; Table 1) and choices regarding delay-of-gratification ($p < .05$). Specifically, the number of stickers given was significantly and negatively related to waiting in the delay-of-gratification task and positively link to interacting with a familiar partner in the dictator game (Table 1 and Figure 1).

We thus investigate whether the relationship between sharing and delay-of-gratification differed regarding the type of dictator game. To do so, we built two additional linear models including control variables separating each dictator game and found that children that wait in the delay-of-gratification task give significant less stickers in the dictator game with a familiar partner while no significant difference was observed in dictator game with an unknown partner (Figure 1). The same pattern holds for each age group (Table x? and Figure S1).

Table 1. Results from the Mixed effects linear model showing the effect of waiting in the delay-of-gratification task, type of dictator game, parents' income, number of siblings, age in months, sex, protocol order and participants' identity.

<i>Predictors</i>	Number of stickers given in dictator games				
	<i>Estimates</i>	<i>std. Error</i>	<i>CI</i>	<i>Statistic</i>	<i>p</i>
<i>(Intercept)</i>	1.33	0.08	1.18 – 1.49	16.59	<0.001
Waiting in delay-of-gratification task [0=don't wait ; 1= wait]	-0.13	0.06	-0.25 – -0.00	-2.01	0.045
Type of dictator game [1=unknown ; 2=familiar]	0.17	0.04	0.09 – 0.25	4.17	<0.001
Parents' income [1 (low) to 6 (high)]	0.05	0.05	-0.06 – 0.15	0.84	0.399
Number of siblings	0.04	0.06	-0.07 – 0.16	0.75	0.451
Age in months	0.06	0.06	-0.07 – 0.18	0.87	0.383
Sex [M=0 ; F=1]	0.01	0.11	-0.21 – 0.22	0.05	0.960
Protocol order	0.07	0.06	-0.04 – 0.18	1.25	0.212
Random Effects					
σ^2	0.62				
$\tau_{00 \text{ ID}}$	0.23				
ICC	0.27				
N_{ID}	183				
Observations	366				
Marginal R^2 / Conditional R^2	0.059 / 0.314				

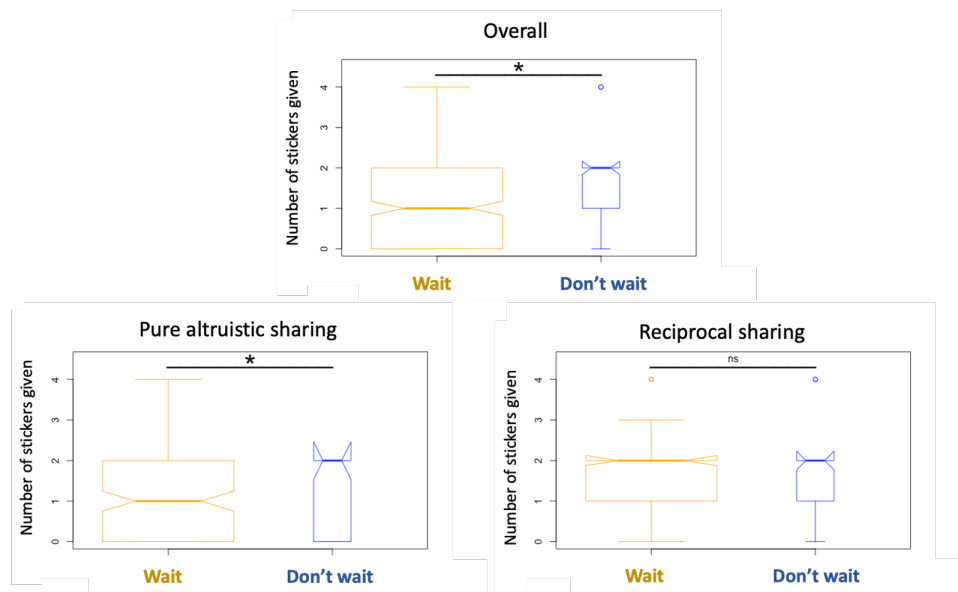


Figure 1. Relationship (boxplots) between waiting in the delay-of-gratification task and giving in the dictator games. The notched part of the boxplot indicates the confidence intervals around the medians and the width of the boxplot is proportional to the sample size. (a) Number of stickers given in aggregate over the two dictator games (top; (Wait: N=XX; Don't wait: N=XX)). (b) Numbers of stickers given in each dictator game. Dictator game with unknown partner left (Wait: N=XX; Don't wait: N=XX), and dict(Wait: N=XX; Don't wait: N=XX); atorgame with familiar partner right (bottom)

3) Discussion

In the present study, we examined the relationship between self-control and prosociality in 4- to 6-year-old children. Children who waited in the delay-of gratification task give on average slightly less to their partner when aggregating results from two types of dictator games.³ This result fits with the hypothesis that rather than requiring self-control, prosociality is an impulsive response (Rand et al., 2012). Indeed, previous findings report that infants are naturally altruistic (Warneken, 2015), prosocial responses are more rapid than selfish ones in adults (Koomen et al., 2020; Rand et al., 2012) and prosocial responses do not activate brain regions associated with cognitive control (Lieberman, 2007).

Further analyses revealed that the negative relationship between self-control and prosociality only holds when children have to give to an unknown partner while no difference is observed when they give to a familiar partner. The ability to exert self-control has been previously shown to be a rational behavior (Kidd et al., 2013; Moffett et al., 2020) which starts to develop at 5- to 6-year-old and which is consistently observed in children over 7 (Fehr et al., 2008; Flook et al., 2019) who are able to internalize social norms (Blake et al., 2015) including parochialism (Fehr et al., 2008). As such, our findings suggest that children who are developing rational thinking favor reciprocal sharing over pure altruistic prosociality (Figure 1). Likewise, a recent study reports that preschoolers (4-year-old) were more egalitarian than older children (9-year-old) because older children tend to be more selective depending on the recipient (Flook et al., 2019). The authors conclude that “with cognitive maturation [...] children become less generous as they age” (Flook et al., 2019) or in other terms, they become more rational and select the partners according to their probability to reciprocate.

Taking the above together suggests an answer to the question of how prosociality can be the result of both impulsivity and self-control. While some cognitive abilities follow a linear developmental trajectory (Steinberg et al., 2018), others show non-linear developmental changes (Gopnik et al., 2017). These transitions might be driven in the case of prosociality by the development of other abilities, for example self-control, rational thinking and social norm internalization.

³ One caveat regarding the finding that impatient children give more in general, is that impatient children had just received their candy reward when being presented with the first dictator game. However, note, that we intentionally used another type of reward in the dictator games (stickers) than in the delay of gratification task (candy) to minimize spill-over effects.

In conclusion, our findings provide experimental evidence regarding a negative influence of self-control on prosocial behaviors which might allow parochialism to develop. This study provides an important and crucial input towards future studies focusing on whether, how and why shifts in prosociality develop across the lifespan and is surely important to consider with respect to educational policies aimed at improving patience (Alan & Ertac, 2018) and social skills in children (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

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Figure legend:

Figure 1. Relationship between giving in dictator games and waiting in the delay-of-gratification tasks for motivated children. We plot the percentage of children that were 'not waiting' (N=47) and 'waiting' (N=165), who gave 0, 1, 2 or 3 to 4 stickers to an unknown or familiar partner, respectively (top). Below we separately show results for boys (bottom left) and girls (bottom right).

SI: Additional results

Overall, 72% of children (180 out of 250) chose to wait for the larger reward in the delay of gratification task. In line with previous studies, older children delayed more often than younger ones ($\chi^2 = 11.8$; $P < 0.005$) with 59 % of the 4-year-old (47 out of 79), 73% of the 5-year-old (80 out of 109) and 85% of the 6-year-old (53 out of 62) delaying gratification. In the motivation task 85% of children (212 out of 248) selected the larger reward. Among the motivated children, 78 % chose to wait (167 out of 215) whereas only 39 % of the non-motivated children did (14 out of 36); thus motivated children delayed more often than non-motivated children ($\chi^2 = 21.3$; $P < 0.0001$).

In the dictator games, participants gave significantly more stickers to the familiar partner (median = 2; SD = 0.91; range: [0-4]) compared to the unknown partner (median = 1; SD = 0.97; range: [0-4]; Wilcoxon paired-test: $V = 880$; $P < 0.0001$).

Though we did not anticipate sex differences initially, we also analyzed behavior separately for boys and girls. The separate regressions reveal that while both boys and girls are giving more to familiar partners, however girls treat familiar and unfamiliar partners only differently when they have been waiting in the delay-of-gratification task (Interaction effect significant at 5% level, see Appendix B.3). While these results are potentially interesting, we note that they were not part of our original hypotheses and thus warrant further investigation to test their robustness.

If confirmed such a result