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Children Delay Gratification for Cooperative Ends

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Abstract

To cooperate effectively, both in small-scale interactions and large-scale collective-action problems, people frequently have to delay gratification (i.e., resist short-term temptations in favor of joint long-term goals). Although delay-of-gratification skills are commonly considered critical in children's social-cognitive development, they have rarely been studied in the context of cooperative decision-making. In the current study, we therefore presented pairs of children (N = 207 individuals) with a modified version of the famous marshmallow test, in which children's outcomes were interdependently linked such that the children were rewarded only if both members of the pair delayed gratification. Children from two highly diverse cultures (Germany and Kenya) performed substantially better than they did on a standard version of the test, suggesting that children are more willing to delay gratification for cooperative than for individual goals. The results indicate that from early in life, human children are psychologically equipped to respond to social interdependencies in ways that facilitate cooperative success.

Keywords

delay of gratification, cooperation, children, trust, inhibitory control, open data, open materials

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Humans are exceptionally skilled cooperators (Bowles & Gintis, 2013; N. S. Henrich & Henrich, 2007). Over the last decades, findings from numerous studies have suggested that even young children are psychologically adapted for cooperation in ways that our closest primate relatives are not (e.g., Herrmann, Call, Hernàndez-Lloreda, Hare, & Tomasello, 2007). However, a key challenge of cooperation that has received little attention in the developmental or cross-cultural literature is that cooperative activities frequently require individuals to invest effort in the pursuit of joint long-term goals while ignoring desirable short-term incentives.

For instance, for people to share their food with others—for which they might earn a good reputation or reap long-term reciprocal benefits—they must resist the immediate temptation to eat the food themselves. Likewise, a researcher aiming to contribute to a collaborative project must withstand the urge to watch entertaining videos on the Internet. These capacities are similarly important in large-scale collective-action problems such as initiatives to curtail climate change, in which individuals must limit their individual resource consumption in favor of the collective long-term goal of conserving the environment. Cooperation thus directly taxes people's capacities for inhibitory control and delay of gratification. The cognitive demands this entails have long been recognized as important constraints for the emergence of cooperation in the animal kingdom (Brosnan & de Waal, 2002; Stevens & Hauser, 2004; Trivers, 1971).

Crucially, people often have to delay gratification in contexts of social interdependence (i.e., when individuals mutually rely on one another for cooperative success), adding further complication because individuals have to simultaneously trust that others will also delay

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gratification (e.g., researchers must trust their colleagues to equally disregard interfering temptations).

There are several reasons why social interdependence might facilitate children's propensity to delay gratification. On both an evolutionary and a proximate level, social interdependence is thought to be central to shaping human cooperative psychology (Aktipis et al., 2018; Balliet, Tybur, & van Lange, 2017; Roberts, 2005; Tomasello, Melis, Tennie, Wyman, & Herrmann, 2012). Interdependence might facilitate the formation of joint intentions, which typically involve commitments and a sense of obligation or responsibility toward cooperative partners (Bratman, 1992; Tomasello, in press). Individuals may thus be particularly prone to delay gratification in interactions in which they critically rely on one another.

However, interdependence may also have the opposite effect: When individuals rely on the contributions of others, the fruits of their own investment become less secure (e.g., individuals may be less willing to use shared resources responsibly when they cannot be sure that others will, too). Additional assurances, such as explicit norms or sanctioning institutions, might have to be in place for the risks inherent in interdependent decision-making to be overcome. Individuals, especially young children, may therefore be less willing to invest effort when they are interdependent compared with when they are independently responsible for their success.

Studying children is a particularly fruitful approach for understanding the mechanisms underlying human cooperation because it can help reveal the social-cognitive origins of those mechanisms. Delay of gratification has long been a central topic in developmental psychology. Surprisingly, however, given its importance for cooperative activities, this facility has rarely been investigated in the context of cooperative decision-making. In probably the most famous paradigm, often called the *marshmallow test*, children are presented with a treat and told by an experimenter that they can eat the treat right away or wait until the experimenter comes back. Children receive a second treat when the experimenter returns if, and only if, they refrain from eating the first treat (Mischel, Shoda, & Rodriguez, 1989). Researchers have used this paradigm to investigate children's strategies to resist temptation; the social, cognitive, and neural underpinnings of their delay-of-gratification skills; and the implications these abilities have for children's personal and social outcomes later in life (Casey et al., 2011; Kidd, Palmeri, & Aslin, 2013; Ma, Chen, Xu, Lee, & Heyman, 2018; Mischel et al., 2010; Mischel, Ebbesen, & Zeiss, 1972; Watts, Duncan, & Quan, 2018). But although the important social implications of delay-of-gratification skills have long been recognized, children in all of these studies were required to delay gratification for nonsocial goals.

The few studies investigating these skills in cooperative contexts have been focused primarily on children's willingness to delay gratification in relation to generosity (e.g., the willingness to share resources or to invest effort on someone else's behalf rather than for their own benefit; Liu, Gonzalez, & Warneken, 2019; Moore, Barresi, & Thompson, 1998; Thompson, Barresi, & Moore, 1997). However, no research to date has examined children's delay-of-gratification skills in interdependent decision situations in which individuals have to not only continuously apply these skills but also trust their social partners to equally delay gratification to reach a joint cooperative goal.

To explore this, we presented pairs of children with either a standard marshmallow test (solo condition) or a cooperative version of the marshmallow test in which children's outcomes were interdependently linked: Children received a second treat only if both of them refrained from eating the first treat (interdependence condition). In a follow-up test, we sought to further investigate differences between these conditions (dependence condition).

If cooperative contexts do indeed facilitate children's motivation to delay gratification, their performance in the interdependence condition should be higher than in the solo condition. We call this the *interdependence hypothesis*. However, if children rationally maximize the material returns of their investment by weighing the cost of waiting against the benefit of receiving a second treat, we would expect the exact opposite: They should be less likely to delay gratification under interdependence. This is because interdependence introduces social risks and waiting is thus less likely to lead to a second treat (previous work has shown that, indeed, children respond to social risks in the marshmallow test and wait less if the second treat is perceived to be uncertain; Kidd et al., 2013). We call this the *rational-choice hypothesis* (note that this hypothesis relates only to material benefits).

Because the majority of research in the behavioral sciences has been conducted with Western populations, the inclusion of more diverse populations is of utmost importance for drawing more general conclusions about the nature of human cooperative psychology (J. Henrich, Heine, & Norenzayan, 2010). We therefore conducted this study with children from Germany—a large-scale postindustrialized Western society—and Kenyan children from a society of small-scale farmers (Kikuyu). Convergent results between these populations differing greatly in their subsistence, cooperative networks, and socialization goals would point to the existence of general motivational responses to interdependent decision contexts. Cultural differences, by contrast, would provide important insights into the plasticity and diversity of human cooperative cognition and its ontogenetic emergence.

Method

Participants

The final sample consisted of 104 German and 103 Kikuyu 5- to 6-year-old children. The German sample comprised 56 children who were 5 years old (31 girls) and 48 children who were 6 years old (22 girls). The Kikuyu sample comprised 50 children who were 5 years old (23 girls) and 53 children who were 6 years old (24 girls). Because age is not reliably known in the Kikuyu community, we did not record age to the specificity of months for either population. We tested this age range because (a) this was the youngest age at which we could test a sizeable sample of Kikuyu children, (b) children at this age have previously been shown to understand complex game instructions in interdependent decision-making contexts (Grueneisen, Wyman, & Tomasello, 2015; Koomen & Herrmann, 2018), and (c) basic self-control skills are well developed at this age (Posner & Rothbart, 2000). The sample size was determined prior to testing and was larger than in most previous studies on children's cooperation in interdependent decision-making contexts (e.g., Grueneisen et al., 2015; Koomen & Herrmann, 2018). All available 5- to 6-year-olds in the Kenyan subject pool were tested, and the German sample was matched accordingly.

Fifteen additional children were excluded (a) because they showed signs of discomfort being alone in the room (8 German children), (b) because of technical failures (2 German children, 3 Kikuyu children), or (c) because of external disruptions to the testing room (2 Kikuyu children). Children were paired into same-age and same-sex dyads, and each dyad was randomly allocated to the interdependence ($n = 70$) or the solo ($n = 68$) condition in a between-subjects design. An additional sample was allocated to the dependence condition ($n = 69$) in a follow-up test.

Children were tested at a laboratory (Germany) or at local schools (Kenya). Hence, the Kenyan children knew each other beforehand. Children in both cultures were familiarized with each other prior to testing. The German children were from mixed social backgrounds in a medium-sized German city. They have a typical Western, educated, industrialized, rich, and democratic background (J. Henrich et al., 2010) in a society with extensive cooperative networks that are relatively detached from the nuclear family. The Kenyan children were from the Kikuyu cultural group near the city of Nanyuki. The Kikuyu are Kenya's largest ethnic group, living in the central part of the country. Traditionally, the Kikuyus are small-scale farmers who cultivate vegetables and practice animal husbandry for their subsistence, although wage work is increasingly common. People tend to navigate their social interactions in smaller networks and rely heavily on family relations (the basic economic unit is the nuclear family, and cooperation beyond the family is often organized by the church or local initiatives; Kenyatta, 1965). Older members of the communities are highly respected, and children are generally expected to be quiet and obedient (Whiting, 1996).

German and Kikuyu children have previously exhibited strikingly different strategies in limited-resource problems (Zeidler, Herrmann, Haun, & Tomasello, 2016), a cooperative context argued to be heavily influenced by cultural norms (Ostrom, 2000). Moreover, cultural variation in children's willingness to delay gratification has previously been linked to parenting styles (Lamm et al., 2017), which differ greatly in the two cultures: German parents tend to adopt authoritative parenting styles, placing relatively more emphasis on independence and autonomy, whereas Kikuyu parents tend to be authoritarian, placing a stronger emphasis on emotion regulation and obedience (Whiting, 1996; Zeidler et al., 2016).

Procedure

Children were introduced to each other by a first and second experimenter. Children were then invited to one of the testing rooms, where they played a 3-min collaborative warm-up game of balloon toss. Afterward, Experimenter 2 brought children out of the testing room so that Experimenter 1 could prepare the task. One child (Child 1) was selected to reenter the room with Experimenter 1 to receive the game instructions while the partner (Child 2) waited outside with Experimenter 2. In the room, Child 1 was asked to sit on a chair in front of a small table. On the table was a plate containing a cookie. At the beginning of the trial, the cookie and the plate were covered by a piece of cloth. Country-specific cookies were used—an Oreo cookie for the German children and a locally produced vanilla cookie for the Kikuyu children—to ensure that the sweet reward was familiar to the children of that culture.

Once Child 1 was seated, Experimenter 1 removed the cloth and stated the game instructions, which were identical in all conditions except for minor wording details that highlighted the different reward structures (see Table 1). In the interdependence condition, children's outcomes were interdependently linked, whereas in the solo condition, children's outcomes were independent. In the follow-up condition (dependence condition), children were under the impression that their partner depended on them but that they did not depend on their partner (Fig. 1). The protocol was approved by the ethics committee of the Max Planck Institute for Evolutionary Anthropology and was carried out in

Table 1. Verbal Instructions in the Three Conditions

Interdependence condition	Solo condition	Dependence condition
This is your spot, and this is your cookie. [Child 2] also has a cookie and you two play the game together. I have to leave in a minute. You can both eat your cookies now, or you can wait until I return. If, when I return, both of your cookies are still there and you are both still sitting, you will both get a second cookie. If one of you eats their cookie before I return, neither of you will get a second one—it's up to you.	This is your spot, and this is your cookie. [Child 2] also has a cookie and is also playing the game. I have to leave in a minute. You can eat your cookie now, or you can wait until I return. If, when I return, your cookie is still there and you are still sitting, you will get a second cookie. If you eat your cookie before I return, you will not get a second one—it's up to you.	This is your spot, and this is your cookie. [Child 2] also has a cookie but [he/she] does not play the game. I have to leave in a minute. You can eat your cookie now, or you can wait until I return. If, when I return, your cookie is still there and you are still sitting, you and [Child 2] will both get a second cookie. If you eat your cookie before I return, neither of you will get a second one—it's up to you.

accordance with the provisions of the World Medical Association Declaration of Helsinki.

The instructions were followed by two comprehension questions, in response to which Experimenter 1 reiterated the game structure (regardless of children's answers to the questions). After stating the instructions, Experimenter 1 slid the plate closer to Child 1 and said, "Good. Here is your cookie. See you soon," after which she left the room while surreptitiously starting a stopwatch. Experimenter 1 then took Child 2 to the second testing room, where the table, plate, cookie, and cloth were already prepared, and gave Child 2 the same instructions. Children were then left alone in their respective rooms for 10 min. When the 10 min were up, children were reunited and either given or not given a second cookie, depending on their game decisions. Children were then returned to the classroom from which they came or to their parents, who jointly waited in a warm-up room. Hence, children from both cultures and in all conditions faced their partner again after the task was completed.

Coding

Experimental sessions were video recorded via cameras that were hidden inside cardboard boxes with one-way mirrors on one side. This prevented children from being aware that their behavior was being monitored while they were alone in the testing rooms. Children's behaviors were coded from videotape. The measure of delayed gratification was whether or not children consumed part or all of the cookie during the 10 min in which they were left alone in the room. Failing to delay gratification was defined as visibly ingesting a piece of the cookie. This included a lick, nibble, tiny bite, or the use of a finger to wipe crumbs or cream into the mouth. Leaving the testing room at any time during the 10 min was also coded as a failure to delay gratification. Twenty percent of the videos from both cultures, spread equally across all three conditions, were recoded by a second coder in order to establish interrater reliability. Agreement between the two coders was high (unweighted Cohen's $\kappa = 0.793$, number of videos coded = 42, $p < .001$).

Data analysis

To analyze whether the children's tendency to delay gratification was affected by experimental condition and culture, we ran generalized linear mixed models (GLMMs; Bates, Maechler, Bolker, & Walker, 2014) with binomial error structures. The dependent variable was whether or not children successfully delayed gratification. The fixed-effect test predictors were condition, culture, and their interaction. We also included age in years and sex as fixed-effect control predictors, as well as the random effect of the dyad. The models were fitted in R using the function "glmer" of the R package *lme4* (Baayen, 2008). We ran several model diagnostics (several checks for influential cases, variance-inflation factors), which were all unproblematic. To avoid multiple testing issues, we first compared the full model described above with a null model not including the test predictors but retaining the control predictor and random effect, using a likelihood-ratio test to determine whether the combined test predictors had an effect on the dependent variable (Forstmeier & Schielzeth, 2011). We then examined individual predictors using likelihood-ratio tests by dropping them from the model one by one.

Results

Main analyses

A GLMM indicated that the combined predictors condition, culture, and their interaction had a significant effect on children's delayed gratification as measured by their tendency to eat or taste the cookie—full model

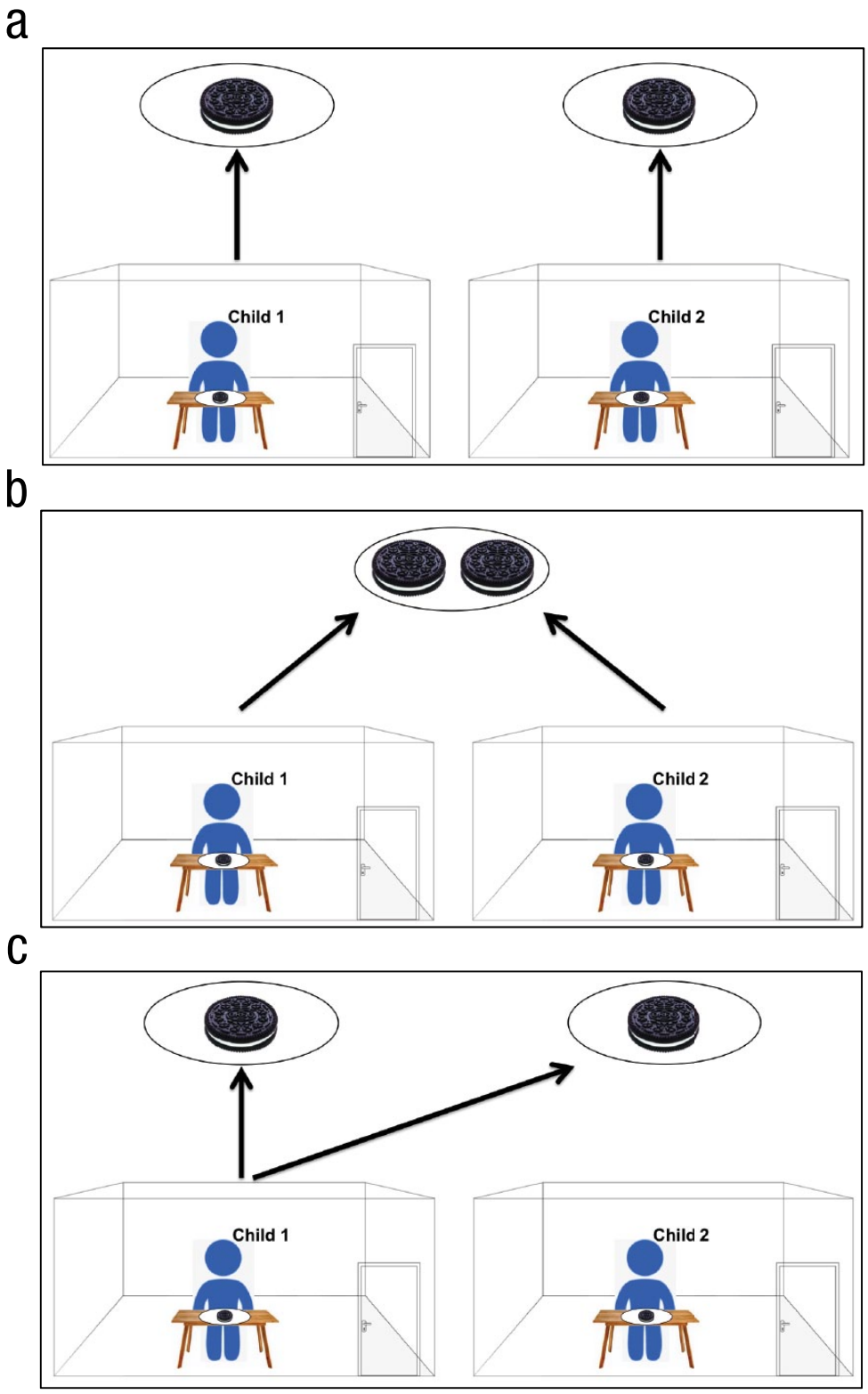

Fig. 1. Experimental setup. In the (a) solo condition, two children were each given a cookie. If they refrained from eating it, they received a second one. Each child's outcome was unaffected by his or her partner's actions. In the (b) interdependence condition, two children were each given a cookie. If both refrained from eating it, they both got a second cookie. If one of them ate his or her cookie, neither child got a second one. In the (c) dependence condition, two children were each given a cookie. Each was under the impression that by refraining from eating the cookie, both children in that pair would get a second cookie but that each child was unaffected by the other's actions (i.e., all children in this condition thought that their partner depended on them but they did not depend on their partner).

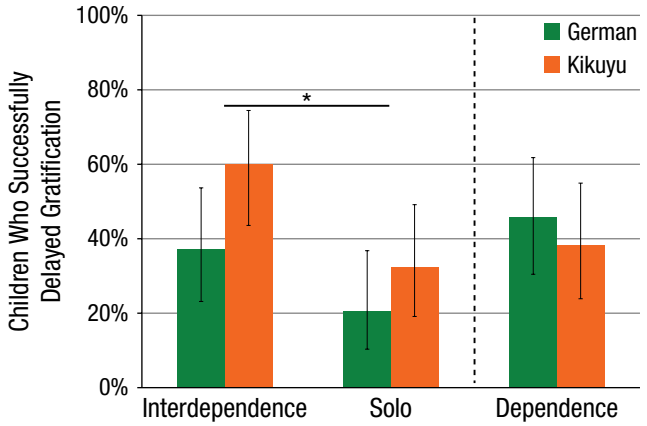

Fig. 2. Percentage of German and Kikuyu children (N = 207) who successfully delayed gratification in the interdependence, solo, and dependence conditions. Error bars represent 95% binomial proportion confidence intervals. The asterisk indicates a significant between-conditions difference (p < .01). The dashed vertical line separates the original two test conditions from the follow-up test.

compared with a null model not including the test predictors: $\chi^2(3) = 11.31$, $p = .010$. Follow-up tests revealed that there was no significant interaction between condition and culture (estimate = 0.402, SE = 0.887, 95% confidence interval, or CI = [–1.391, 2.292]), $\chi^2(1) = 0.21$, $p = .650$. However, across both conditions, Kikuyu children were more likely to delay gratification (i.e., they were less likely to eat or taste the cookie) than German children (estimate = 0.889, SE = 0.456, 95% CI = [0.032, 1.928]), $\chi^2(1) = 4.13$, $p = .042$.

Most importantly, significantly more children delayed gratification in the interdependence condition than in the solo condition (estimate = 1.184, SE = 0.476, 95% CI = [0.325, 2.296]), $\chi^2(1) = 7.35$, $p = .007$, lending support to the interdependence hypothesis and contradicting the rational-choice hypothesis (Fig. 2). Indeed, in the interdependence condition, delaying gratification was significantly less likely to lead to a second cookie than in the solo condition, Fisher's exact test, $p = .020$, which indicates that children's behavior did not constitute a self-maximizing strategy in terms of game payoffs. Overall, 6-year-olds were slightly more likely to delay gratification than 5-year-olds (estimate = 0.906, SE = 0.459, 95% CI = [0.054, 1.958]), $\chi^2(1) = 4.37$, $p = .037$. Sex did not affect delay-of-gratification rates (estimate = 0.323, SE = 0.442, 95% CI = [–1.281, 0.556]), $\chi^2(1) = 0.54$, $p = .461$.

To further investigate the difference between conditions, we coded delay latencies and divided children into the following categories: those who ate or tasted the cookie within the first minute, those who ate or tasted the cookie after waiting at least 1 min, and those who successfully delayed gratification over the whole trial (this categorization is based on the finding that most children who give up do so early, and the probability of quitting gradually declines the longer children have already waited; McGuire & Kable, 2013). This revealed that the percentage of children who ate right away was virtually identical across conditions (Table 2). By contrast, children in the solo condition were substantially more likely to eat after waiting for at least 1 min (and less likely to wait the whole time) than children in the interdependence condition. A chi-square test confirmed that children were unevenly distributed across these categories, $\chi^2(2) = 7.89$, $p = .019$. Hence, the number of children who initially decided to wait was equal in both conditions, but children in the interdependence condition showed more persistence than children who completed the task alone.

Follow-up test

To further investigate the observed condition effect, we ran a follow-up test with a new sample (35 German and 34 Kikuyu 5- to 6-year-olds) in which the children were informed separately that if they refrained from eating the cookie, they and their partner would both get a second cookie, whereas if they ate the cookie, neither of them would get a second one. We call this

Table 2. Number (and Percentage) of Children Who Ate Within the First Minute, Who Ate After Waiting at Least 1 Min, and Who Successfully Delayed Gratification in the Three Conditions

Group	Interdependence condition	Solo condition	Dependence condition
Ate within first minute	17 (24.3%)	19 (27.9%)	19 (27.5%)
Ate after waiting	19 (27.1%)	31 (45.6%)	21 (30.4%)
Successfully delayed	34 (48.6%)	18 (26.5%)	29 (42.0%)

Note: See Table S1 in the Supplemental Material available online for a further subdivision by culture and condition.

the dependence condition because the children were under the impression that their joint success depended on their own behavior but that they did not similarly depend on their partner's behavior. As in the interdependence condition, therefore, children had the opportunity to provide a second cookie not only to themselves but also to their partner, except that in the dependence condition, children did not face any risk: Their own investment led to certain success, and there was no need to trust the partner to delay gratification as well.

One might thus predict that, compared with children in the interdependence condition, children in the dependence condition would have a tendency to delay gratification even longer because they could provide a benefit to their partner (and themselves) without fearing that their investment would be in vain. However, if the observed main effect of condition was at least partly the result of both children depending on one another and the feelings of commitment this tends to generate (Bratman, 1992; Kachel & Tomasello, 2019), children's delay of gratification in the dependence condition might be expected to be intermediate between the solo and the interdependence conditions. By comparing this new condition with the solo condition, the follow-up test also allowed us to test whether being responsible for the partner's outcome (in addition to their own) was sufficient to increase children's willingness to delay gratification.

We ran the same GLMM again with all three conditions included in the analysis. The comparison between the full and null models indicated a significant effect of the test predictors (culture, condition, and their interaction) combined, $\chi^2(5) = 11.856$, $p = .037$. Follow-up tests revealed that neither the interaction of condition and culture (estimate = 1.463, $SE = 0.867$, 95% CI = [–0.200, 3.343]), $\chi^2(2) = 3.14$, $p = .208$, nor the main effect of culture (estimate = 0.455, $SE = 0.365$, 95% CI = [–0.256, 1.236]), $\chi^2(1) = 1.60$, $p = .207$, were significant. However, condition significantly affected children's tendency to delay gratification, $\chi^2(2) = 7.27$, $p = .026$. Pairwise comparisons revealed that the dependence condition was intermediate between but not significantly different from either the interdependence condition (estimate = –0.342, $SE = 0.446$, 95% CI = [–1.317, 0.554]), $\chi^2(1) = 0.60$, $p = .440$, or the solo condition (estimate = 0.799, $SE = 0.453$, 95% CI = [–0.055, 1.822]), $\chi^2(1) = 3.37$, $p = .066$ (although, given the low p value, this might be a Type II error). This suggests that the significant main effect of condition was driven by the original comparison between the solo and the interdependence conditions. Overall, 6-year-olds were more likely to delay gratification than 5-year-olds (estimate = 0.734, $SE = 0.370$, 95% CI = [0.033, 1.540]), $\chi^2(1) = 4.21$, $p = .040$. Sex did not have a significant effect (estimate = 0.275, $SE = 0.363$, 95% CI = [–0.448, 1.031]), $\chi^2(1) = 0.577$, $p = 0.447$.

Discussion

Delaying gratification is often critical for cooperation to succeed. Here, 5- to 6-year-olds from two highly distinct cultures were more likely to delay gratification when their outcomes were interdependently linked than when they performed the same task alone, even though the interdependent context entailed additional risks. These findings support the notion that human cooperative relations, particularly social interdependence, critically shape cognitive performance from an early age.

Children from both populations responded similarly to being in a cooperative context. Overall, however, Kikuyu children were somewhat more likely to delay gratification than German children (although this effect was not found in the follow-up analysis). Although Kikuyu but not German children knew each other beforehand, this is unlikely to account for the main effect of culture because the solo condition should have been unaffected by prior familiarity (there was no interaction between condition and culture). A more plausible explanation might be differences in socialization goals in the two cultures: Kikuyu parents tend to focus more on obedience and self-regulatory capacities (e.g., emotion regulation) than German parents (Whiting, 1996), and this might give Kikuyu children an advantage at inhibiting immediate urges (see Lamm et al., 2017, for a similar argument). Another possibility is that the perceived value of the second cookie may have differed between cultures or that the populations differed in how they viewed adult authorities—another factor shown to affect performance (Michaelson & Munakata, 2016). Whereas the current data do not allow us to distinguish between these alternatives, it is important to note that all of these factors should affect children's performance equally across conditions. That is, they cannot account for the main finding that children from both cultures were more willing to delay gratification for cooperative than for individual goals. This suggests that the observed condition effect is not the result of culture-specific norms or socialization goals but instead points to a more general strategy for responding to interdependencies.

Children's performance was also clearly not a reflection of a rational calculation aimed at maximizing material payoffs: Had children simply weighed the cost of waiting against the value of the second reward, they should have been less likely to delay gratification in the interdependence than in the solo condition. We observed the exact opposite pattern. Indeed, delaying gratification was significantly less likely to lead to a

second reward in the interdependence than in the solo condition.

Instead, the results support the notion that for children, cooperative contexts elicit motivations to invest effort. The lack of a difference between the interdependence and dependence conditions indicates that this was at least partly driven by prosocial motives or feelings of responsibility toward partners. However, being responsible for a partner's outcome was not fully sufficient to significantly increase children's delay of gratification—the only clear difference was between the interdependence and the solo conditions (and not between the dependence and solo conditions). In the two cooperative conditions, particularly when interdependent, children may have conceptualized the task as a truly joint endeavor, which typically makes individuals feel committed to a task (Bratman, 1992; Kachel & Tomasello, 2019; Tuomela, 2007). Indeed, the difference between conditions was primarily driven by children showing more persistence in the interdependence compared with the solo condition, which indicates a pattern of greater commitment when children were interdependent. Moreover, recent theorizing suggests that people, and already young children, develop a sense of obligation toward their social partners in the context of mutualistic cooperation. That is, they feel they should meet certain shared behavioral standards or else their partners can legitimately reprimand them (e.g., by expressing resentment or blame; Darwall, 2006; Tomasello, in press). In the current study, children may thus have been motivated to delay gratification because they felt they should not let their partner down and that, if they did, their partner would have had the right to hold them accountable. Hence, while children's behaviors in the current study did not maximize their material payoffs, they were almost certainly socially rational (Chase, Hertwig, & Gigerenzer, 1998) in the sense that they helped children establish and maintain functioning cooperative relationships.

Finally, children may have felt particularly motivated in the interdependence condition because by failing to wait, they would have wasted their partner's investment in addition to preventing them both from getting a second treat (see Székely & Michael, 2018, for a corresponding finding in adults). In future studies, researchers could further ascertain the relative contributions of these motivations by manipulating the amount of effort the partner is perceived to have invested or how much the partner would benefit from children's efforts. They could also examine whether the observed motivational consequences extend beyond children's willingness to delay gratification (e.g., their willingness to invest physical effort).

Importantly, children's delayed gratification longer in the interdependence condition even though they had to simultaneously trust their partner to also delay gratification, suggesting that from early in development, children are motivationally equipped to overcome the social risks inherent in interdependent decision-making. These findings add cross-cultural support to a growing body of evidence that from early on, children prefer, derive more enjoyment from, and are more motivated to engage in joint activities compared with individual tasks (Butler & Walton, 2013; Rekers, Haun, & Tomasello, 2011). They also indicate that the ability to delay gratification is not a stable trait but is affected by the context in which it is used.

The ability to delay gratification has long been recognized as an important prerequisite for cooperation, but the tasks used to assess this skill have mostly been individualistic in nature. By introducing a cooperative version of the marshmallow test, the current study demonstrates that children are more willing to delay gratification for cooperative than for individual ends. This supports the notion that the social dependencies that pervade human social life play an important role in shaping cooperative motivations from early in life and suggests that highlighting people's sense of interdependence may help foster cooperative behaviors.

Action Editor

Bill von Hippel served as action editor for this article.

Author Contributions

R. Koomen and S. Grueneisen contributed equally to this work and therefore share first authorship. R. Koomen devised the initial study idea. All authors designed the study. Testing and data collection were performed by R. Koomen. S. Grueneisen and R. Koomen analyzed and interpreted the data in close consultation with E. Herrmann. S. Grueneisen drafted the manuscript, and R. Koomen and E. Herrmann provided critical revisions. All authors approved the final version of the manuscript for submission.

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Declaration of Conflicting Interests

The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797619894205

Open Practices

All data have been made publicly available via the Open Science Framework and can be accessed at https://osf.io/zr52m/. All materials are given in the current article. The design and analysis plans were not preregistered. The complete Open Practices Disclosure for this article can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797619894205. This article has received the badges for Open Data and Open Materials. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

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