

## Cultures Crossing: The Power of Habit in Delaying Gratification

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### **Abstract**

Resisting immediate temptations in favor of larger later rewards predicts academic success, socioemotional competence, and health. These links with delaying gratification appear from early childhood, and have been explained by cognitive and social factors that help override tendencies toward immediate gratification. However, some tendencies may actually promote delaying gratification. We assessed children's delaying gratification for different rewards across two cultures that differ in customs around waiting. Consistent with our preregistered prediction, Japanese children ( $N = 80$ ) delayed gratification longer for food than for gifts, whereas American children ( $N = 58$ ) delayed longer for gifts than for food. This interaction may reflect cultural differences: waiting to eat is emphasized more in Japan than America, whereas waiting to open gifts is emphasized more in America than Japan. These findings suggest culturally-specific habits support delaying gratification, providing a new way to understand why individuals delay gratification and why this behavior predicts life success.

### **Statement of Relevance**

Children often enjoy immediate rewards rather than waiting for larger delayed rewards. Importantly, this ability to delay gratification predicts life outcomes. This link has been explained via cognitive and social factors that help override tendencies toward immediate gratification. However, some tendencies may actually favor delaying gratification. We found that cultural habits around waiting to eat (emphasized in Japan) and waiting to open gifts (emphasized in America) shape distinct profiles of delaying gratification: Japanese children waited three times longer for food than for gifts, whereas American children waited nearly four times longer for gifts than for food. Our

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findings offer new answers to why delaying gratification predicts life outcomes and suggests new directions for understanding and shaping children's delay of gratification.

### **Cultures Crossing: The Power of Habit in Delaying Gratification**

Overcoming impulses to enjoy here-and-now rewards in order to attain later benefits is fundamental to achieving goals. Such delaying gratification is often measured by the well-known “marshmallow task” (Mischel, Ebbesen, & Zeiss, 1972; Mischel, Shoda, & Rodriguez, 1989), in which children must resist the urge to enjoy one treat now in order to get more treats later. Individual differences in this task predict important later life outcomes such as academic success, socioemotional competence, and health (e.g., Ayduk et al., 2000; Michaelson & Munakata, 2020; Mischel, Shoda, & Peake, 1988; Schlam et al., 2013; Shoda, Mischel, & Peake, 1990; cf. Watts, Duncan, & Quan, 2018), thus drawing the attention of researchers, practitioners, and the public at large.

Many investigations of delaying gratification have focused on the role of cognitive and social factors that help to override tendencies to enjoy immediate rewards. For example, executive function and self-control processes regulate goal-directed behaviors in the face of temptations or distractions (e.g., Casey et al., 2011; Moffitt et al., 2011). Performance on the marshmallow task correlates with such processes, including inhibiting impulses (Casey et al., 2011) and temperament traits such as inhibitory control (Duckworth, Tsukayama, & Kirby, 2013). Neuroimaging studies provide converging evidence, with activation in prefrontal neural regions involved with executive function relating to delay of gratification performance (e.g., Luerssen et al., 2015). Delay of gratification is also influenced by social contextual information, such as trustworthiness, cooperation, and group norms (e.g., Doebel & Munakata, 2018; Kidd, Palmeri, & Aslin, 2013; Koomen, Grueneisen, & Herrmann, 2020; Ma et al., 2020; Michaelson & Munakata, 2016; Munakata et al., 2020). For instance, children are more

likely to delay gratification when they believe that in-group members delayed gratification and out-group members did not, compared to the converse scenario (Doebel & Munakata, 2018). Cognitive and social factors can thus help override tendencies toward immediate rewards and potentially support adaptive behavior across domains of life.

However, tendencies need not always favor immediate rewards. Some tendencies that are acquired through habits, such as everyday experiences of waiting for rewards, may actually promote delaying gratification. Young children may build up experiences in which they forgo an immediate reward, based on social conventions and instructions or encouragement from adults or other children (e.g., waiting for a turn to play with a toy). When delaying is reliably encouraged or recommended, children may repeatedly withstand the delay in that context and gradually develop implicit associations in memory between the context and the delaying behavior. Such implicit associations, or habits, can support goal-directed behaviors such as completing homework (Galla & Duckworth, 2015), stopping smoking (Baldwin et al., 2006), and making breakfast (Cooper, Ruh, & Mareschal, 2014) in learned contexts (e.g., Neal, Wood, Labrecque, & Lally, 2012; Wood & Neal, 2007). However, previous studies have largely neglected the potential role of habits in children's delay of gratification and implications for why this behavior predicts life success.

The current study thus tested the prediction that habits support children's delay of gratification in the context where they acquired those habits. We capitalized upon cultural differences in customs around waiting. In the context of eating food, Japanese people are accustomed to waiting. When having meals, Japanese people typically wait until all individuals are served and say together "Itadakimasu" (literally "I humbly

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receive” but roughly akin to “Bon appetit”) before eating, and they consistently practice this custom across contexts and with different people (e.g., at home, school, and restaurants; Omori & Kurokawa, 2012). In addition to practicing these waiting habits at meals, Japanese children are used to waiting for sweets at school snack time in the same way (e.g., Akasawa & Arao, 2004). Moreover, Japanese children repeatedly experience waiting for sweets at home and school until a set time in the day (Okuda & Kuragano, 1998). Such customs of waiting to eat food are not as prevalent in the daily experiences of American children. Thus, Japanese children have a greater history of everyday experiences of waiting in the context of eating, which may lead to habits of waiting that support children’s resistance to immediate rewards in the context of food. We therefore predicted Japanese children would delay gratification longer for food than for other rewards relative to American children.

In the context of opening gifts, American children may experience waiting more consistently than Japanese children. Giving gifts is a more special event occurring on specific occasions for Americans (e.g., birthdays, Christmas) that can involve traditions of waiting (e.g., waiting until the end of a birthday party to open presents that were brought by guests at the start, or waiting for hours or days after Christmas presents are placed under a tree before they are opened on Christmas day-- and even then waiting as gifts are sorted and decisions are made about which gift will be opened when); in contrast, gift-giving is a more regular year-round event for Japanese people that is not consistently associated with traditions of waiting (e.g., Beatty, 1993; Witkowski & Yamamoto, 1991). Furthermore, Americans favor waiting to open gifts until the gift-givers are present compared with Japanese people, who do not have such preferences (Green & Alden, 1988; Hanna & Srivastava, 2015). As a result, Americans may also

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have more experience than Japanese people waiting to open gifts when the gift-giver is not present. For example, when celebrating Christmas, American children commonly wait until their parents wake before opening gifts; in contrast, Japanese children commonly wake to gifts placed by their bed during the night by their parents and open them immediately even in the absence of the parents. Similarly, in other year-round gift-giving events that occur in Japan, children typically open gifts immediately, either in front of the gift-giver (e.g., when gifts are given in person) or in the gift giver's absence (e.g., when the gifts are left in the child's room or the gift-giver or child departs the scene immediately after the gifts are given). American children typically do not experience similar year-round gift-giving events, so their gift experiences are more localized to occasions that can involve traditions of waiting. Thus, the cultural customs and children's associated histories of waiting in the context of opening gifts may provide more support for American children's resistance to immediate rewards when opening gifts. This may be particularly true when children may be waiting to open the gift in front of the gift-giver, as in the delay of gratification task, where the gift-giver (experimenter) leaves the room before the child can partake in the offering.

We thus compared delay of gratification in American and Japanese children in two contexts that varied in the rewards used: either a food item (marshmallow) or a gift item (wrapped box containing a toy). Our focal confirmatory tests were designed to evaluate the prediction that reward type would interact with culture, such that Japanese children would delay gratification longer for food than for gifts relative to American children. We furthermore investigated the role of individual differences in children's delaying gratification between different cultures and for different rewards. We tested the prediction that strength of habits of waiting to eat, assessed via parent report, would

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correlate with delaying gratification in the food condition but not in the gift condition. Furthermore, given that learning of cultural customs around waiting may depend on sensitivity to social conventions, we tested the prediction that children with high sensitivity to social conventions would delay gratification longer in the food condition of Japan; the same logic can be applied to children in the gift condition in America. That is, children's sensitivity to social conventions should predict their delaying of gratification in contexts that align with cultural habits of waiting. We also tested the possibility that habits of waiting reduce the need for children to engage self-control (e.g., Hofmann, Baumeister, Förster, & Vohs, 2012). While children's self-control may support and thus correlate with delaying gratification in general as in prior work (Casey et al., 2011; Duckworth et al., 2013), we predicted that this relationship would be minimized in the food condition for children in Japan. The same logic can be applied to children in the gift condition in America. That is, children's self-control should predict their delaying of gratification in contexts that do not align with cultural habits of waiting. Finally, we asked children to indicate how much they like eating marshmallows (if they were in the gift condition) or opening gift boxes (if they were in the food condition). We did not have strong predictions about liking. Through this combination of reward manipulations, cultural comparisons, and measures of individual differences, we tested our key hypothesis that habits can promote children's delaying gratification in learned contexts.

## **Method**

### **Participants**



As specified in our preregistered plan (<https://osf.io/23zvb/>), we took the approach of justifying our sample size (i.e., 70 subjects in each country) based on available resources that we could access until our lab closure (June 2020). In total, sixty 4- to 5-year-old children in America ( $M = 57.9$  months,  $SD = 6.63$  months, range: 48.2–71.8 months, male = 33, female = 26, NA = 1) and eighty-four 4- to 5-year-old children in Japan ( $M = 60.1$  months,  $SD = 8.09$  months, range: 48.4–71.7 months, male = 39, female = 41) participated in this experiment (details in Supplemental Materials). Among these children, six children were excluded from final analyses because the experimenter made errors ( $n = 2$ ), children had difficulty staying alone in a room ( $n = 1$ ), or children required their parents to stay in the room throughout the procedure ( $n = 3$ ), resulting in a final sample of 58 children in America and 80 children in Japan. Children were randomly assigned to one of two experimental conditions, one with a food-based reward (marshmallow, food condition) or one with a non-food reward (gift-wrapped toy, gift condition). Twenty-six American children and 40 Japanese children were in the food condition, whereas 32 American children and 40 Japanese children were in the gift condition.

Participants in the US were recruited from a database of families in Boulder, Colorado and surrounding areas who expressed interest in participating in developmental research. Japanese participants were recruited from a database of families in Kyoto, Osaka, and surrounding areas from a research consulting company. For the Japanese sample, we recruited only participants who had eaten a marshmallow before (as confirmed by parent report) to ensure that all children were familiar with marshmallows.<sup>1</sup> This study was approved by the Institutional Review Board at the University in America and the institutional ethics committee for experimental

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psychology research at the University in Japan. In both locations, we obtained verbal assent from children and informed consent from their parents prior to their participation. After the experiment, parents were paid a small amount of money and children received a small token.

### **Materials and Procedure**

Children came to the laboratory with their parents. After obtaining informed consent, the experimenter asked the parents to move to another space (i.e., another observation room in America, a chair outside of the testing room in Japan) and complete survey measures of their children's habits of waiting to eat (Habits of Waiting to Eat Questionnaire) and behaviors outside of the lab (four subscales of the Child Behavior Questionnaire (CBQ); Rothbart et al., 2001). All children first engaged in coloring a child-friendly sheet as a warm-up for approximately eight minutes, followed by the delay of gratification task with either a food reward (food condition, Mischel & Ebbsen 1970) or non-food reward (gift condition, as similar to Kochanska et al., 1996), Social Conventions Questionnaire, and Reward Liking Questionnaire. Marshmallows were used as the food-based reward in the food condition. Wrapped 2x2x2 inches boxes containing a bouncy ball or toy sea creature were used in the gift condition; children were not told what was inside the box.

#### *Delay of Gratification Task.*

The procedure was similar to that used in Michaelson and Munakata (2016) and Doebel and Munakata (2018). The experimenter first placed a marshmallow on a plate or a gift box in front of the child, four inches from the table's edge. The following announcement was given to the child: "Now it's snack (gift) time! You have a choice for your snack (gift) today. You can either have this one marshmallow (gift) to eat

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(open) right now, or if you wait for me to get more marshmallows (gifts) from the other room, you can have two marshmallows (gifts) to eat (open) instead. How does that sound? You stay right there in that chair. I'll leave this right here, and if you haven't eaten (opened) it or opened the door before I get back, you can have two to eat (open) instead." During the announcement, if the child attempted to grab the gift, the experimenter announced "Oh, let me tell you something else first." If the child said they just wanted one gift, the experimenter announced "Okay, well you can have this one gift now, or you can wait and get two later!"

After the instructions, the experimenter left the room and monitored the child's behavior. The experimenter returned to the room if the child: 1) unambiguously ate the marshmallow or opened the gift (including, tasting/licking/eating the marshmallow, peeling the wrapping paper or opening the gift), 2) became upset or the parent asked to stop the task, 3) opened the door of the testing room, or 4) waited the full 15 minutes. If the child did not wait the full fifteen minutes, the experimenter returned to the room and said "Okay, all done with snack (gift) time for now!" If the child waited the full fifteen minutes, the experimenter returned to the room and said "Good job waiting for me to come back! Here is your second marshmallow (gift). You can eat (open) them now if you want."

#### *Social Conventions Questionnaire.*

This child-reported questionnaire aimed to measure children's sensitivity to social convention transgressions. Based on Levy, Taylor, and Gelman (1995), Barbieri and Griguolo (1993), and Smetana (1981), we presented children with two social convention transgressions scenarios with illustrations and asked them to answer three questions per scenario. First, they were asked a rule knowledge question and verbally picked one of

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two options (e.g., Where do we place our toys, where we are told or on the floor?).

Second, they were asked about the seriousness of the transgression (e.g., What's it like when a child places his or her toys on the floor instead of where they were told?), and responded using a 4-point Likert scale (i.e., large green checkmark ("Great"), small green checkmark ("Just OK"), small red X ("Bad"), and large red X ("Very Bad")).

Third, children were asked if the transgressor should be reminded (yes/no) and if so, how much (a little or a lot) (e.g., Do you think a child who places their toys on the floor instead of where they are told should be reminded by his or her parent?). Children responded verbally. We used a composite score of the z-scored average of all three questions.

#### *Reward Liking Questionnaire*

This child-reported questionnaire aimed to measure how much the child likes eating a marshmallow or opening a gift box. Children were presented and given an explanation about a five-point Likert scale with different sized stars ranging from small ("A Little") to large ("A Lot"). Children in the food condition were shown a wrapped gift box and asked how much they like opening a gift box. Children in the gift condition were shown a marshmallow and asked how much they like eating a marshmallow.

#### *Habits of Waiting to Eat Questionnaire*

This parent-reported questionnaire consisted of five items measuring the strength of the habits of waiting to eat. Parents responded to four of five questions using a 5-point scale. Two items concerned the strength of children's habits of waiting to eat at home or outside home (i.e., "How often does your child wait independently until others have been served at home (outside home)?") and the other two items measured the degree of which parents encourage their child to shape the habits of waiting to eat (i.e.,

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“How often do you instruct your child to wait to eat until others have been served at home (outside home)?”). The other question concerned the encouragement to shape the habits of waiting to eat from teachers (i.e., “If your child attends school, daycare, or preschool, do teachers instruct your child to wait to begin eating until others are served?”) using a 4-point scale (Yes, teachers do; No, teachers don’t; I don’t know; NA), in which if parents select “I don’t know” and “NA”, their data were excluded from the analysis for this question.

#### *Child Behavior Questionnaire*

This parent-reported questionnaire is designed for measuring temperament in 4- to 7-year-olds through 195 items, of which only the subscales of children’s self-control and reward-related impulses were selected. We used the original version (Rothbart et al., 2001) for an American sample and its Japanese version (Kusanagi, 1993) for a Japanese sample. Parents responded to each question using a 7-point scale or NA (not applicable). Following Duckworth et al. (2013), we selected subscales of Attention Focusing (the capacity to maintain attentional focus) and Inhibitory Control (the capacity to plan and to suppress inappropriate responses) as measures of self-control. In addition, subscales for Approach/Anticipation (excitement and positive anticipation for expected pleasurable activity) and Activity Level (gross motor activity) were selected as measures of reward-related impulses.

#### *Coding of waiting time from videos*

We conducted double-coding for the delay of gratification task in each country using VCode annotation software (Hagedorn, Hailpern, & Karahalios, 2008). One coder who was naïve to all hypotheses coded all the videos. Delay times were calculated as the time elapsed between when the experimenter left the room and when the delay of

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gratification task ended. The delay of gratification task ended if: the child said he or she only wanted one reward, the child tasted/ate the marshmallow or tore/opened the gift, the child/parent became distressed or asked to stop, the child opened the door of the testing room, or if the child waited the maximum of 15 minutes, whichever came first. To confirm reliability of the coding, a second naïve coder then coded randomly-selected videos that were 20 percent of total videos. Interrater reliability was high in both countries (America: ICC = 0.99, Japan: ICC = 0.98; details in Supplemental Materials).

### *Analytic Approach*

The study design, hypotheses, analytic plan were preregistered in the Open Science Framework (<https://osf.io/23zvb/>). As expected, waiting time in the delay of gratification task was heavily right-censored; thus, we conducted survival analyses with Cox proportional hazards regression models (Cox, 1972). The analyses were conducted using the “survival” package (Therneau, 2021) in R (R Core Team, 2013). In our main analysis, to test whether cultural differences were associated with differences in delaying gratification for a food and a gift, we compared two Cox regression models, one containing culture (America/Japan), reward (food condition/gift condition), and their interaction, and another without the interaction term. (Details provided in Supplemental Materials.)

## **Results**

Japanese and American children showed distinct profiles of delaying gratification. As predicted, culture and reward interacted in children’s likelihood of delaying ( $\chi^2(1) = 9.99, p = .002$ , Figure 1): Japanese children waited longer for delayed rewards in the food condition (Median wait time = 15.00 min) than in the gift condition (Median wait

time = 4.62 min) (hazard ratio = 0.68,  $\chi^2(1) = 6.48$ ,  $p = .011$ , CI = [0.51, 0.92]). In contrast, American children showed the reversed pattern: they waited longer for delayed rewards in the gift condition (Median wait time = 14.54 min) than in the food condition (Median wait time = 3.66 min) (hazard ratio = 1.37,  $\chi^2(1) = 3.87$ ,  $p = .049$ , CI = [1.00, 1.87]).

According to parent reports, Japanese children were more likely than American children to wait until others were served to begin eating and to be encouraged by their parents and instructed by their teachers to wait until others were served to begin eating (Table 1). Moreover, children with stronger habits of waiting to eat independently waited longer for delayed rewards in the food condition (hazard ratio = 0.43,  $\chi^2(1) = 16.93$ ,  $p < .001$ , CI = [0.29, 0.65]) but not in the gift condition (hazard ratio = 1.06,  $\chi^2(1) = 0.12$ ,  $p = .724$ , CI = [0.77, 1.46]).<sup>2</sup> Similar numerical patterns were observed within cultures (see Figure 2). Japanese children with stronger habits of waiting to eat waited longer in the food condition ( $r(38) = .57$ ,  $p < .001$ ) but not in the gift condition ( $r(38) = .20$ ,  $p = .213$ ). American children with stronger habits of waiting to eat showed numerically but not significantly longer wait times for food ( $r(22) = .26$ ,  $p = .224$ ), potentially due to habits of waiting being insufficiently strong. American children with stronger habits of waiting to eat did not wait longer in the gift condition ( $r(27) = .03$ ,  $p = .862$ ).

Across both cultures, children with higher sensitivity to social conventions waited longer for delayed rewards (hazard ratio = 0.62,  $\chi^2(1) = 7.35$ ,  $p = .007$ , CI = [0.44, 0.86]). The predicted three-way interaction among sensitivity to social conventions, culture, and reward was not significant (hazard ratio = 1.36,  $\chi^2(1) = 2.00$ ,  $p = .157$ , CI = [0.90, 2.05]). In planned pairwise comparisons, sensitivity to social conventions

predicted wait times only in the two conditions that aligned with cultural habits of waiting: in the food condition for Japanese children (hazard ratio = 0.43,  $\chi^2(1) = 4.93$ ,  $p = .026$ , CI = [0.21, 0.89]) and in the gift condition for American children (hazard ratio = 0.50,  $\chi^2(1) = 3.98$ ,  $p = .048$ , CI = [0.27, 0.94]) but not in the gift condition for Japanese children (hazard ratio = 0.77,  $\chi^2(1) = 0.83$ ,  $p = .362$ , CI = [0.45, 1.32]) or in the food condition for American children (hazard ratio = 0.78,  $\chi^2(1) = 0.31$ ,  $p = .580$ , CI = [0.32, 1.88]). This pattern is consistent with the learning of cultural customs around waiting depending on sensitivity to social conventions.

Across both cultures, children with more inhibitory control waited longer for delayed rewards than children with less inhibitory control (hazard ratio = 0.69,  $\chi^2(1) = 8.29$ ,  $p = .004$ , CI = [0.54, 0.89]).<sup>3</sup> The predicted three-way interaction among culture, reward, and inhibitory control was not significant (hazard ratio = 0.84,  $\chi^2(1) = 1.84$ ,  $p = .175$ , CI = [0.64, 1.08]). In planned pairwise comparisons, inhibitory control predicted wait times in only the gift condition for Japanese children (hazard ratio = 0.56,  $\chi^2(1) = 8.00$ ,  $p = .005$ , CI = [0.38, 0.82]), where demands on inhibitory control might be expected because cultural habits of waiting do not support delaying gratification. Inhibitory control did not predict wait times in the food condition in Japanese children (hazard ratio = 0.81,  $\chi^2(1) = 0.42$ ,  $p = .517$ , CI = [0.44, 1.51]). American children showed the reverse pattern numerically (gift condition: hazard ratio = 0.89,  $\chi^2(1) = 0.21$ ,  $p = .646$ , CI = [0.54, 1.46]; food condition: hazard ratio = 0.63,  $\chi^2(1) = 2.62$ ,  $p = .105$ , CI = [0.37, 1.11]), although the correlation in the food condition, where demands on inhibitory control might be expected, did not reach significance. Approach/anticipation did not predict delaying gratification (hazard ratio = 1.05,  $\chi^2(1) =$



0.11,  $p = .736$ ,  $CI = [0.78, 1.42]$ ). (Supplemental Table A summarizes descriptive statistics.)

American children liked opening a gift and eating a marshmallow ( $M = 4.65$ ,  $SD = 1.04$ ) more than Japanese children ( $M = 4.05$ ,  $SD = 1.17$ ) ( $F(1, 135) = 11.72$ ,  $p < .001$ ). Culture and reward interacted in children's likeability ratings ( $F(1, 135) = 4.58$ ,  $p = .034$ ): American children liked opening a gift ( $M = 5.00$ ,  $SD = 0$ ) more than eating a marshmallow ( $M = 4.44$ ,  $SD = 1.37$ ,  $t(31) = 2.33$ ,  $p = .027$ ), whereas Japanese children showed no significant differences in their ratings of opening a gift ( $M = 3.93$ ,  $SD = 1.25$ ) and eating a marshmallow ( $M = 4.18$ ,  $SD = 1.08$ ,  $t(76.48) = 0.96$ ,  $p = .342$ ).

## Discussion

Consistent with our prediction, Japanese children resisted eating one marshmallow three times longer time than they resisted opening one gift, suggesting that habits of waiting to eat support children in delaying gratification in the context of eating food. Parent reports confirmed that Japanese children were more likely to have developed habits around waiting to eat than American children. Furthermore, variances in the strength of these habits of waiting to eat across American and Japanese children predicted greater delaying gratification, only in the context of eating food. This is the first evidence to reveal the role of habits of waiting to eat hidden in the classic delay of gratification task.

Strikingly, American children showed the opposite pattern, resisting opening one gift for nearly four times longer time than they resisted eating one marshmallow. This pattern may also reflect the strength of habits, given differences between American and Japanese cultures when gifts are given and opened (Green & Alden, 1988; Hanna &

Srivastava, 2015), which may lead American children to be more well-positioned to resist immediate gift rewards in the absence of the gift-giver. We did not measure children's habits of waiting around gift-giving; however, American children's higher liking rating for opening gifts compared to eating a marshmallow, relative to Japanese children, is consistent with gift-opening representing a more special occasion for American children.

Cultural habits shaped not only whether children delayed for different rewards but might have altered the nature of the mental processes involved. Children were overall more likely to delay gratification if they were higher in inhibitory control (as in Casey et al., 2011; Duckworth et al., 2013), and if they were more sensitive to social conventions. These relationships appeared to depend on cultural customs and associated contexts, though the three-way interactions between culture, delay, and mental processes were not significant. Still, within cultures, sensitivity to social conventions predicted children's delaying of gratification only in contexts when cultural customs support delaying gratification (waiting to eat in Japan and waiting to open gifts in America), consistent with sensitivity to behaviors shared among a community promoting development of cultural habits. Conversely, inhibitory control demands appeared to be minimal in these conditions, consistent with habitual behaviors reducing demands on control processes.

Our findings support a novel perspective that delaying gratification is promoted by the strength of habits of waiting for rewards accumulated in an everyday context, not simply reflecting higher-level processes that override temptations. This perspective raises implications for measurement and interpretation. Delay of gratification tasks may measure different psychological processes depending on the rewards and individuals

involved. For example, for Japanese children, performance on the classic marshmallow test may mainly reflect the strength of habits of waiting to eat and sensitivity to social conventions. In contrast, their waiting to open a gift might be more influenced by self-control and trustworthiness. Researchers should weigh such considerations when selecting and developing delay of gratification tasks, and in interpreting results. For example, variations in delaying gratification, such as those observed across cultures and commonly attributed to differences in executive function (e.g., Duckworth et al., 2013), could be revisited from the lens of culturally accumulated habits.

Our findings also have implications for shaping resistance to temptations. Groups in each culture have unique social conventions that function to increase cohesion and cooperation (e.g., Legare, Wen, Herrmann, & Whitehouse, 2015). Such conventions require inhibiting behaviors toward personal needs or goals and implementing socially-motivated behavior with affiliative functions. In addition, culture-specific parenting values and styles correlate with and may promote children's delaying of gratification (Lamm et al., 2018). Such everyday practices may create habits of resisting temptations that increase delaying of gratification while decreasing reliance on control processes.

Moreover, our perspective may provide a missing piece to the puzzle of why childhood delay of gratification predicts life outcomes. These longitudinal associations are explained in part by social and cognitive factors that support overriding temptations, but less than half the variance in these associations is explained by such factors (Michaelson & Munakata, 2020). The missing variance may reflect habits created through cultural customs around waiting and children's sensitivity to social conventions that support acquisition of such habits -- processes highlighted by our findings that different delay of gratification tasks yield different results. For example, children in

cultural groups or subgroups that prioritize delaying gratification may develop habits around delaying that minimize the need for control processes, thereby increasing chances of success in goal-directed behaviors in life. Moreover, children who are sensitive to social conventions may develop delaying habits based on cultural customs and harness this sensitivity to social conventions to support their success in other situations (e.g., to attend in school and engage in socially-accepted behaviors). We thus propose that a full account of why delaying in childhood predicts life outcomes requires consideration of culturally accumulated habits and children's sensitivity to social conventions.

Future research should address limitations of the current study and remaining questions. Our findings with inhibitory control correlations were consistent with our prediction that inhibitory control demands would be minimized in contexts where delaying gratification was supported by habits; however, future work should address control processes *during* delay of gratification (e.g., using physiological measures such as pupillometry, brain activation, or heart rate). More generally, while individual-difference findings with sensitivity to social conventions and inhibitory control were consistent with our framework, future work should be conducted with larger samples to test the predictions of 3-way correlational interactions. Another important question for future work concerns the generalizability of habits around delaying gratification. We have focused here on the context-specificity of habits, but certain types of experiences might support greater generalizability. For example, if children develop habits of waiting across multiple contexts, they might be more likely to resist temptations in novel contexts (e.g., Doebel, 2020). Incorporating measures of habits of waiting around

gift-opening and other behaviors in addition to eating will be informative in such future work.

In summary, we demonstrated that delaying gratification is shaped by cultural habits accumulated in an everyday context. This work suggests new directions for understanding and shaping children's delay of gratification and associated life outcomes.

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### **Footnote**

1. The current study thus supported tests of delaying gratification across cultures using identical stimuli that were familiar to participants. The marshmallows were also appealing: Japanese and American children indicated high and similar levels of liking to eat a marshmallow (Japan:  $M = 4.18$ ,  $SD = 1.08$ , America:  $M = 4.44$ ,  $SD = 1.37$ ,  $t(58.30) = -0.89$ ,  $p = .379$ ). We expect these findings to replicate across a range of food rewards (e.g., given that our pilot work with Japanese children revealed notably long wait times using the favorite sweet that each child selected from among three familiar sweets, and nearly 1 in 3 children selected the marshmallow as their favorite sweet among the three options, indicating its appeal). Future studies could test such replicability using different food rewards.

2. The interaction between culture and reward was dropped from the preregistered model for this analysis, because it did not satisfy the proportional hazards function assumption of a Cox regression analysis.

3. We focused on the inhibitory control and approach/anticipation subscales of the CBQ based on our preregistered approach to select primary and secondary subscales according to demonstrated internal reliability.

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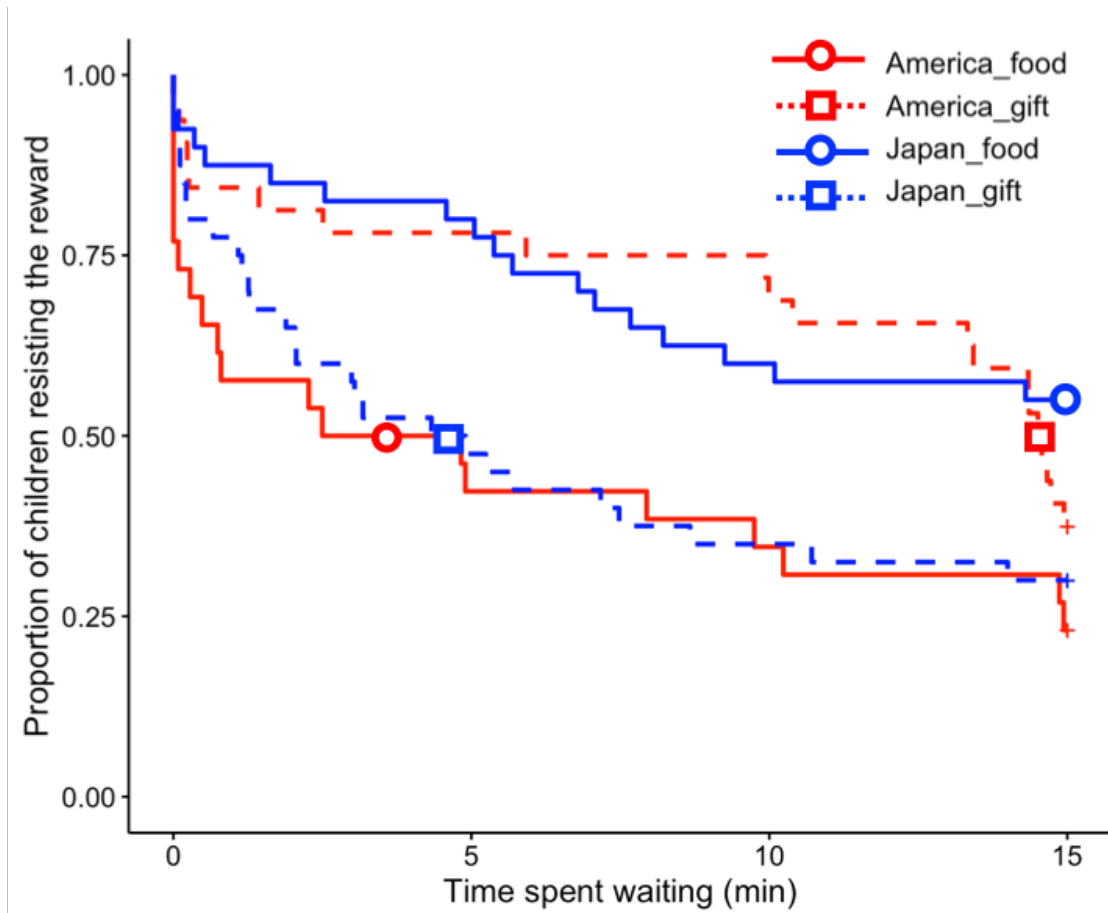
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**Figure 1**

Interaction between culture and reward in delaying gratification: Survival functions are plotted for each condition. Circles/squares show median wait times, with Japanese children waiting 10 minutes longer for food than for gifts, while American children waited 10 minutes longer for gifts than for food.

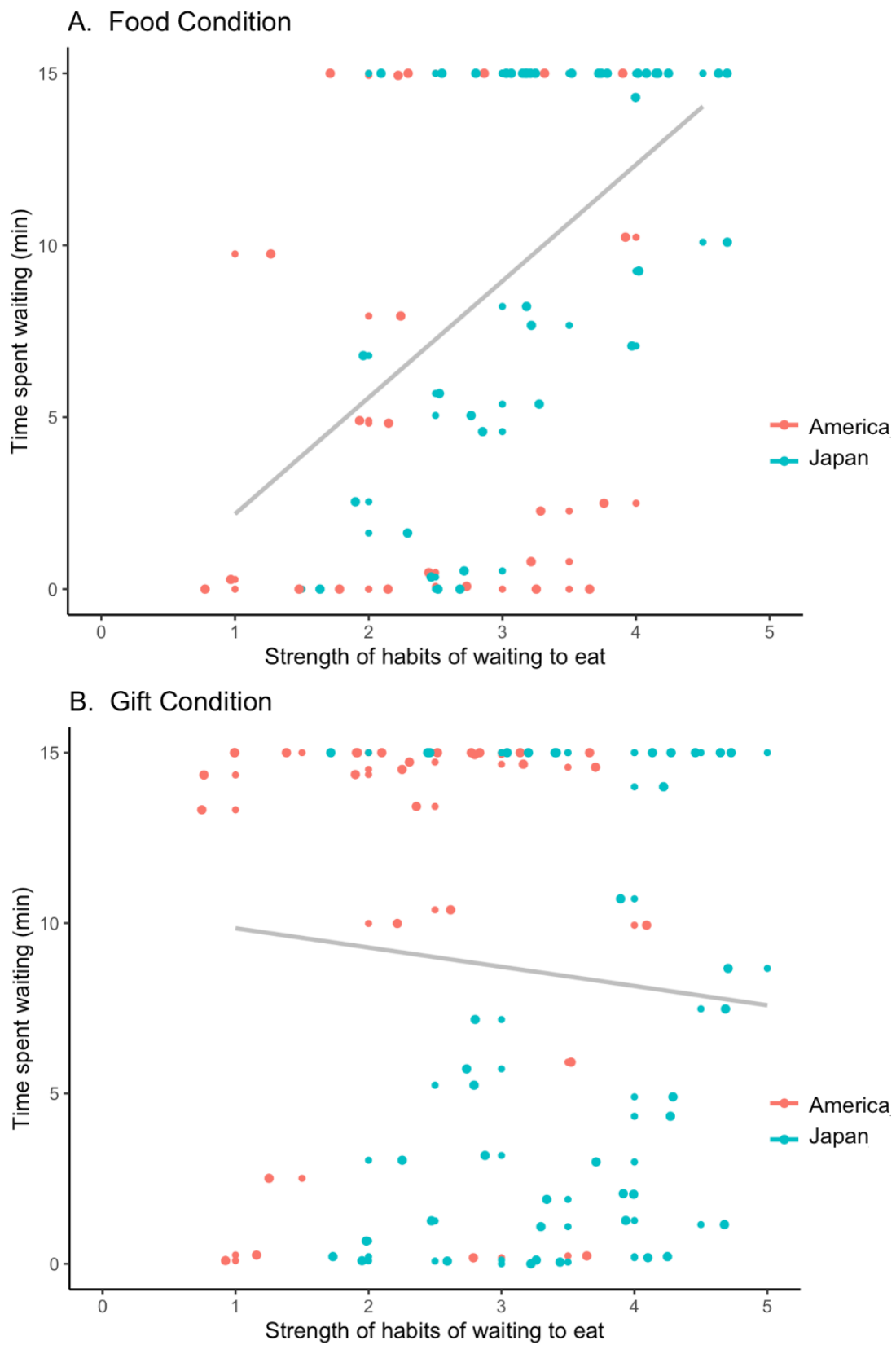


Figure 2.

Across cultures, children with stronger habits of waiting to eat waited longer for delayed food rewards (A) but not for delayed gift rewards (B). Similar patterns were observed within cultures but did not reach significance within the American sample, potentially because habits of waiting to eat were weaker than in the Japanese sample and insufficiently strong to support delaying gratification.



Table 1. Results of Habits of Waiting to Eat Questionnaire in Japan and America

Aspects of children's habits of waiting to eat	Range	Japan	America	Cultural differences
Strength	0-5	3.31 (0.83)	2.43 (0.94)	$F(1, 134) = 32.97$ , $p < .001$
Encouragement from parents	0-5	2.74 (0.79)	2.39 (1.00)	$F(1, 134) = 5.12$ , $p = .025$
Instructed by teachers*	0-1	0.95	0.6	Fisher exact test, $p = .0003$

Note. Numbers within parentheses represent standard deviations.

\*17 out of 81 Japanese parents selected "I don't know" or "NA", whereas 34 out of 54 American parents selected either one.