Title

Cultures Crossing: The Power of Habit in Delaying Gratification

Journal

Psychological Science, 33(7)

ISSN

0956-7976

Authors

Yanaoka, Kaichi
Michaelson, Laura E
Guild, Ryan Mori
et al.

Publication Date

2022-07-01

DOI

10.1177/09567976221074650

Peer reviewed

Research Article

Psychological Science
2022, Vol. 33(7) 1172–1181

DOI: 10.1177/09567976221074650
www.psychologicalscience.org/PS

Cultures Crossing: The Power of Habit in Delaying Gratification

Kaichi Yanaoka[1,2], Laura E. Michaelson[3], Ryan Mori Guild[4], Grace Dostart[4], Jade Yonehiro[5,6], Satoru Saito[7], and Yuko Munakata[5,6]

[1]Graduate School of Education, The University of Tokyo; [2]Japan Society for the Promotion of Science, Tokyo, Japan; [3]American Institutes for Research, Washington, D.C.; [4]Department of Psychology and Neuroscience, University of Colorado Boulder; [5]Department of Psychology University of California, Davis; [6]Center for Mind and Brain, University of California, Davis; and [7]Graduate School of Education, Kyoto University

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, results showed that children in Japan ($n = 80$) delayed gratification longer for food than for gifts, whereas children in the United States ($n = 58$) delayed longer for gifts than for food. This interaction may reflect cultural differences: Waiting to eat is emphasized more in Japan than in the United States, whereas waiting to open gifts is emphasized more in the United States than in Japan. These findings suggest that culturally specific habits support delaying gratification, providing a new way to understand why individuals delay gratification and why this behavior predicts life success.

Keywords

delay of gratification, self-control, habit, culture, children, open data, open materials, preregistered

Received 2/9/21; Revision accepted 12/1/21

Overcoming impulses to enjoy here-and-now rewards in order to attain later benefits is fundamental to achieving goals. Such delaying of gratification is often measured by the well-known "marshmallow task" (Mischel et al., 1972, 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 et al., 1988; Schlam et al., 2013; Shoda et al., 1990; cf. Watts et al., 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 et al., 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

Corresponding Author:
Kaichi Yanaoka, Osaka Kyoiku University, Department of Elementary Education
Email: makifactor@gmail.com

(e.g., Doebel & Munakata, 2018; Kidd et al., 2013; Koomen et al., 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 with the reverse 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 on the basis of 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 et al., 2014) in learned contexts (e.g., Neal et al., 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 in which they acquired those habits. We capitalized on 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 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 children in the United States. 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 that Japanese children would delay gratification longer for food than for other rewards relative to U.S. children.

In the context of opening gifts, U.S. children may experience waiting more consistently than Japanese children. Giving gifts is a more special event occurring on specific occasions in the United States (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 regular year-round event for Japanese people that is not consistently associated with traditions of waiting (e.g., Beatty et al., 1993; Witkowski & Yamamoto, 1991). Furthermore, people in the United States 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, people in the United States may also have more experience than Japanese people waiting to open gifts when the gift giver is not present. For example, when celebrating Christmas, U.S. 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.

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 the United States) shape distinct profiles of delaying gratification: Japanese children waited 3 times longer for food than for gifts, whereas U.S. children waited nearly 4 times longer for gifts than for food. Our findings offer new answers as to why delaying gratification predicts life outcomes and suggest new directions for understanding and shaping children's delay of gratification.

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). U.S. 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 U.S. 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 U.S. 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 U.S. 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 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 Japanese children with high sensitivity to social conventions would delay gratification longer in the food condition; the same logic can be applied to U.S. children in the gift condition. 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 et al., 2012). Whereas 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 Japanese children. The same logic can be applied to U.S. children in the gift condition. 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

Following our preregistered plan (https://osf.io/m7vgf), we justified our sample size (i.e., 70 participants in each country) on the basis of available resources that we could access until our lab closure (June 2020). In total, sixty 4- to 5-year-old children in the United States (M = 57.9 months, SD = 6.63, range = 48.2–71.8; 33 male, 26 female, no response = 1) and eighty-four 4- to 5-year-old children in Japan (M = 60.1 months, SD = 8.09, range = 48.4–71.7; 39 male, 41 female) participated in this experiment (for details, see the Supplemental Material available online). Among these children, six were excluded from the final analyses because the experimenter made errors (n = 2), they had difficulty staying alone in a room (n = 1), or they required their parents to stay in the room throughout the procedure (n = 3), resulting in a final sample of 58 children in the United States and 80 children in Japan. Each child was randomly assigned to one of two experimental conditions: one with a food-based reward (marshmallow; food condition) or one with a nonfood reward (gift-wrapped toy; gift condition). Twenty-six U.S. children and 40 Japanese children were in the food condition, whereas 32 U.S. children and 40 Japanese children were in the gift condition.

Participants in the United States 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.[1] This study was approved by the institutional review board at the University of Colorado Boulder and the institutional ethics committee for experimental psychology research at Graduate School of Education, Kyoto University. 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 the United States, 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; Rothbart et al., 2001). All children first engaged in coloring a child-friendly sheet as a warm-up for approximately 8 min, followed by the delay-of-gratification task with either a food reward (food condition; Mischel & Ebbesen, 1970) or a nonfood reward (gift condition; similar to the methodology of Kochanska et al., 1996), Social Conventions Questionnaire, and Reward Liking Questionnaire. Marshmallows were used as the food-based reward in the food condition. Wrapped 2 in. × 2 in. × 2 in. 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 by 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, 4 in. 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/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 reward, the experimenter announced, "Oh, let me tell you something else first." If the child said they just wanted one reward, the experimenter announced, "Okay, well you can have this one [marshmallow/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 (a) unambiguously ate the marshmallow or opened the gift (including tasting, licking, or eating the marshmallow; peeling the wrapping paper; or opening the gift), (b) became upset, (c) opened the door of the testing room, or (d) waited the full 15 min. The experimenter also returned to the room if the parent asked to stop the task. If the child did not wait the full 15 min, the experimenter returned to the room and said, "Okay, all done with [snack/gift] time for now!" If the child waited the full 15 min, 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 was designed to measure children's sensitivity to social-convention transgressions. Following Levy et al. (1995), Levy, Taylor, and Gelman (1995), Barbieri and Griguolo (1993), and Smetana (1981), we presented children with two social-convention-transgression 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 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-type scale: 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 with and given an explanation about a 5-point Likert-type scale with different-size 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 to which parents encourage their child to shape the habits of waiting to eat (i.e.,

"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"). If parents selected "I don't know" or "NA" (not applicable), their data were excluded from the analysis for this question.

Child Behavior Questionnaire. This parent-reported questionnaire was 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 the U.S. sample and its Japanese version (Kusanagi, 1993) for the Japanese sample. Parents responded to each question using a 7-point scale or indicated that the item was 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 (Version 1.2.1; Hagedorn et al., 2008). One coder who was naive 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-gratification task ended. The delay-of-gratification task ended if the child said that he or she wanted only one reward, the child tasted or ate the marshmallow or tore or opened the gift, the child or parent became distressed or asked to stop, the child opened the door of the testing room, or the child waited the maximum of 15 min, whichever came first. To confirm reliability of the coding, a second naive coder then coded randomly selected videos comprising 20% of the total videos. Interrater reliability was high in both countries (United States: intraclass correlation coefficient [ICC] = .99; Japan: ICC = .98; for details, see the Supplemental Material).

Analytic approach

The study design, hypotheses, and analytic plan were preregistered on OSF (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 (Version 3.2-11; Therneau, 2021) in the R programming environment (Version 3.5.2; R Core Team, 2013). In our main analysis, to test whether cultural differences were associated with differences in delaying gratification for food and a gift, we compared two Cox regression models: one containing culture (United States, Japan), reward (food condition, gift condition), and their interaction, and another without the interaction term (for details, see the Supplemental Material).

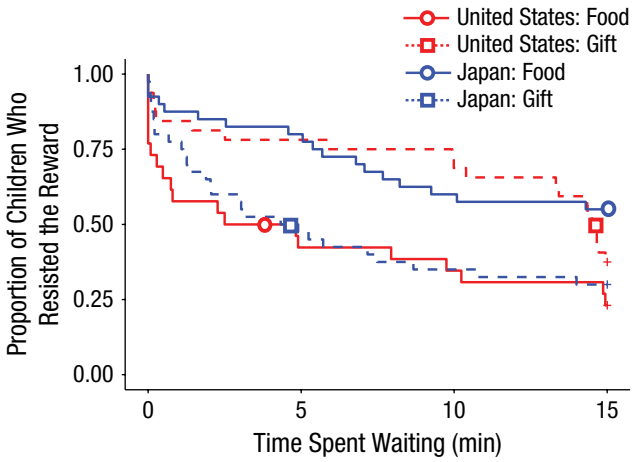

Fig. 1. Survival functions showing the proportion of children in the United States and Japan who resisted the reward as a function of delayed gratification (time spent waiting) in the food and gift conditions. Circles and squares show median wait times.

Results

Japanese and U.S. children showed distinct profiles of delaying gratification. As predicted, culture and reward interacted in children's likelihood of delaying, $\chi^2(1, N = 138) = 9.99$, $p = .002$ (Fig. 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, $\chi^2(1, N = 138) = 6.48$, $p = .011$, 95% confidence interval (CI) = [0.51, 0.92]. In contrast, U.S. 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, $\chi^2(1, N = 138) = 3.87$, $p = .049$, 95% CI = [1.00, 1.87].

According to parent reports, Japanese children were more likely than U.S. 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

Table 1. Results of Habits of Waiting to Eat Questionnaire in Japan and the United States

Item	Range	Japan	United States	Comparison
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[a]	0–1	.95	.6	Fisher's exact test, $p = .0003$

Note: Numbers in parentheses represent standard deviations.
[a]Seventeen of 81 Japanese parents and 34 of 54 U.S. parents selected "I don't know" or "NA" (not applicable).

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, $\chi^2(1, N = 133) = 16.93$, $p < .001$, 95% CI = [0.29, 0.65], but not in the gift condition, hazard ratio = 1.06, $\chi^2(1, N = 133) = 0.12$, $p = .724$, 95% CI = [0.77, 1.46].[2] Similar numerical patterns were observed within cultures (Fig. 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, $r(38) = .20$, $p = .213$. U.S. children with stronger habits of waiting to eat showed numerically but not significantly longer wait times for food, $r(22) = .26$, $p = .224$, potentially because their habits of waiting were insufficiently strong. U.S. 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, $\chi^2(1, N = 136) = 7.35$, $p = .007$, 95% 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, $\chi^2(1, N = 136) = 2.00$, $p = .157$, 95% 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, $\chi^2(1, N = 136) = 4.93$, $p = .026$, 95% CI = [0.21, 0.89], and in the gift condition for U.S. children, hazard ratio = 0.50, $\chi^2(1, N = 136) = 3.98$, $p = .048$, 95% CI = [0.27, 0.94], but not in the gift condition for Japanese children, hazard ratio = 0.77, $\chi^2(1, N = 136) = 0.83$, $p = .362$, 95% CI = [0.45, 1.32], or in the food condition for U.S. children, hazard ratio = 0.78, $\chi^2(1, N = 136) = 0.31$, $p = .580$, 95% 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, $\chi^2(1, N = 134) = 8.29$, $p = .004$, 95% CI = [0.54, 0.89].[3] The predicted three-way interaction among culture, reward, and inhibitory control was not significant, hazard ratio = 0.84, $\chi^2(1, N = 134) = 1.84$, $p = .175$, 95% CI = [0.64, 1.08]. In planned pairwise comparisons, inhibitory

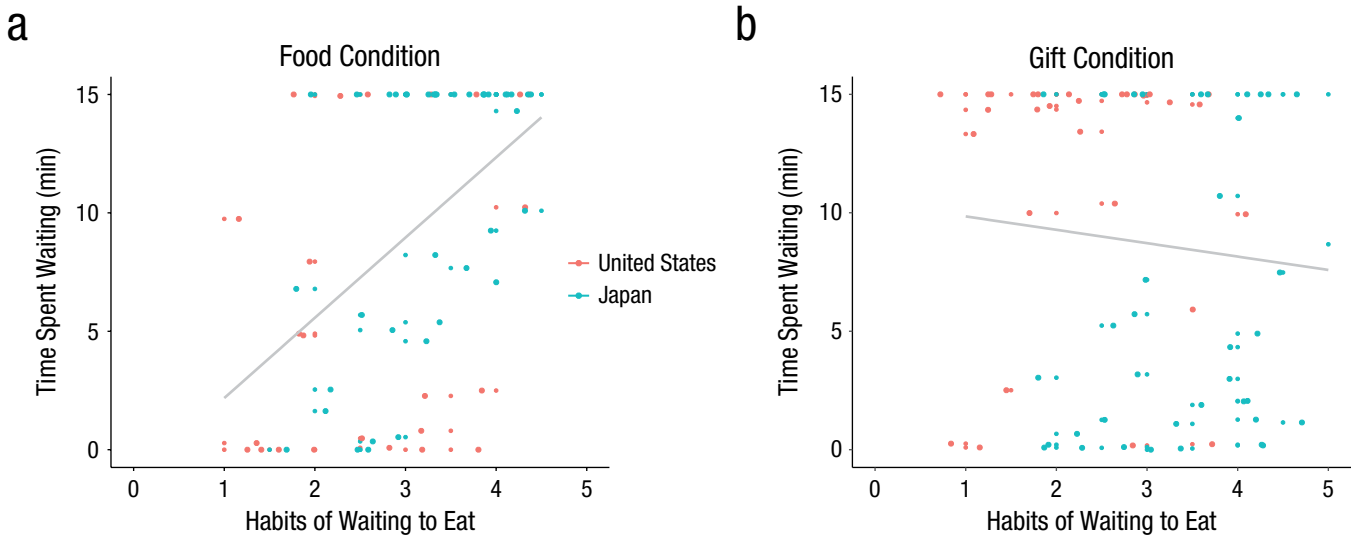

Fig. 2. Scatterplots showing the association between time spent waiting and score on the Habits of Waiting to Eat Questionnaire, separately for Japanese and U.S. participants in the (a) food condition and (b) gift condition. Lines show best-fitting regressions.

control predicted wait times in only the gift condition for Japanese children, hazard ratio = 0.56, $\chi^2(1, N = 134) = 8.00$, $p = .005$, 95% 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, $\chi^2(1, N = 134) = 0.42$, $p = .517$, 95% CI = [0.44, 1.51]. U.S. children showed the reverse pattern numerically—gift condition: hazard ratio = 0.89, $\chi^2(1, N = 134) = 0.21$, $p = .646$, 95% CI = [0.54, 1.46]; food condition: hazard ratio = 0.63, $\chi^2(1, N = 134) = 2.62$, $p = .105$, 95% 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, $\chi^2(1, N = 134) = 0.11$, $p = .736$, 95% CI = [0.78, 1.42] (for a summary of the descriptive statistics, see Table S1 in the Supplemental Material).

U.S. 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, $F(1, 135) = 4.58$, $p = .034$: U.S. 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, results showed that Japanese children resisted eating one marshmallow 3 times longer 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 children in Japan were more likely to have developed habits around waiting to eat than children in the United States. Furthermore, variances in the strength of these habits of waiting to eat across U.S. and Japanese children predicted greater delaying of 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, U.S. children showed the opposite pattern, resisting opening one gift for nearly 4 times longer than they resisted eating one marshmallow. This pattern may also reflect the strength of habits, given differences between U.S. and Japanese cultures when gifts are given and opened (Green & Alden, 1988; Hanna & Srivastava, 2015), which may lead U.S. children to be better 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, U.S. children's higher liking rating for opening gifts compared with eating a marshmallow, relative to Japanese children, is consistent with gift opening representing a more special occasion for U.S. children.

Cultural habits not only shaped whether children delayed for different rewards but also 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 the work by Casey et al., 2011, and Duckworth et al., 2013) and if they were more sensitive to social conventions. These relationships appeared to depend on cultural customs and associated contexts, although the three-way interactions among culture, delay, and mental processes were not significant. Still, within cultures, sensitivity to social conventions predicted children's delaying of gratification only in contexts in which cultural customs support delaying gratification (waiting to eat in Japan and waiting to open gifts in the United States), 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 et al., 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 in which 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, whereas 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 three-way correlational interactions. Another important question for future work concerns the generalizability of habits around delaying gratification. We 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.

Transparency

Action Editor: Vladimir Sloutsky
Editor: Patricia J. Bauer
Author Contributions

K. Yanaoka, S. Saito, and Y. Munakata conceptualized the study. K. Yanaoka, R. M. Guild, and G. Dostart collected the data. K. Yanaoka analyzed the data. K. Yanaoka, L. E. Michaelson, S. Saito, and Y. Munakata wrote the original draft of the manuscript. R. M. Guild and J. Yonehiro reviewed and edited the manuscript. All the authors approved the final manuscript for submission.

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.

Funding

This study was supported by a Grant-in-Aid for Japan Society for the Promotion of Science Fellows (No. JP19J00130) and a grant from The Maekawa Foundation (2019–2020) to K. Yanaoka; by Global Education Office, Graduate School of Education, Kyoto University, and Japan Society for the Promotion of Science KAKENHI (Grant No. JP20H01786) to S. Saito; and by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (Grant No. R01-HD078532) to Y. Munakata.

Open Practices

All data and materials have been made publicly available via OSF and can be accessed at https://osf.io/23zvb/. The design and analysis plans for the study were preregistered at https://osf.io/m7vgf/. This article has received the badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

ORCID iDs

Kaichi Yanaoka https://orcid.org/0000-0003-2014-1663
Laura E. Michaelson https://orcid.org/0000-0003-0321-025X
Satoru Saito https://orcid.org/0000-0002-0403-3606

Acknowledgments

We thank Diego Placido, Jesse Niebaum, and Hilary Traut for their helpful comments on an earlier version of this article.

Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/09567976221074650

Notes

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 U.S. children indicated high and similar levels of liking to eat a marshmallow (Japan: $M = 4.18$, $SD = 1.08$; United States: $M = 4.44$, $SD = 1.37$), $t(58.30) = -0.89$, $p = .379$. 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 one in three 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 Child Behavior Questionnaire on the basis of our preregistered approach to select primary and secondary subscales according to demonstrated internal reliability.

References

Akasawa, N., & Arao, C. (2004). Study on the dietary education for dietary habit of preschool children. *The Annual Report of the Faculty of Education, University of Iwate*, *63*, 135–148. https://doi.org/10.15113/00011400

Ayduk, O., Mendoza-Denton, R., Mischel, W., Downey, G., Peake, P. K., & Rodriguez, M. (2000). Regulating the interpersonal self: Strategic self-regulation for coping with rejection sensitivity. *Journal of Personality and Social Psychology*, *79*, 776–792. https://doi.org/10.1037//0022-3514.79.5.776

Baldwin, A. S., Rothman, A. J., Hertel, A. W., Linde, J. A., Jeffery, R. W., Finch, E. A., & Lando, H. A. (2006). Specifying the determinants of the initiation and maintenance of behavior change: An examination of self-efficacy, satisfaction, and smoking cessation. *Health Psychology*, *25*(5), 626–634. https://doi.org/10.1037/0278-6133.25.5.626

Barbieri, M. S., & Griguolo, M. (1993). Context and quantitative dimension of social conventional transgressions: Is it more serious at home or at school? *European Journal of Psychology of Education*, *8*(2), 105–117. https://doi.org/10.1007/BF03173156

Beatty, S. E., Kahle, L. R., Utsey, M., & Keown, C. F. (1993). Gift-giving behaviors in the United States and Japan: A personal values perspective. *Journal of International Consumer Marketing*, *6*(1), 49–66. https://doi.org/10.1300/J046v06n01_04

Casey, B. J., Somerville, L. H., Gotlib, I. H., Ayduk, O., Franklin, N. T., Askren, M. K., Jonides, J., Berman, M. G., Wilson, N. L., Teslovich, T., Glover, G., Zayas, V., Mischel, W., & Shoda, Y. (2011). Behavioral and neural correlates of delay of gratification 40 years later. *Proceedings of the National Academy of Sciences, USA*, *108*(36), 14998–15003. https://doi.org/10.1073/pnas.1108561108

Cooper, R. P., Ruh, N., & Mareschal, D. (2014). The goal circuit model: A hierarchical multi-route model of the acquisition and control of routine sequential action in humans. *Cognitive Science*, *38*(2), 244–274. https://doi.org/10.1111/cogs.12067

Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society: Series B*, *34*, 187–220.

Doebel, S. (2020). Rethinking executive function and its development. *Perspectives on Psychological Science*, *15*(4), 942–956. https://doi.org/10.1177/1745691620904771

Doebel, S., & Munakata, Y. (2018). Group influences on engaging self-control: Children delay gratification and value it more when their in-group delays and their out-group doesn't. *Psychological Science*, *29*(5), 738–748. https://doi.org/10.1177/0956797617747367

Duckworth, A. L., Tsukayama, E., & Kirby, T. A. (2013). Is it really self-control? Examining the predictive power of the delay of gratification task. *Personality and Social Psychology Bulletin*, *39*(7), 843–855. https://doi.org/10.1177/0146167213482589

Galla, B. M., & Duckworth, A. L. (2015). More than resisting temptation: Beneficial habits mediate the relationship between self-control and positive life outcomes. *Journal of Personality and Social Psychology*, *109*(3), 508–525. https://doi.org/10.1037/pspp0000026

Green, R. T., & Alden, D. L. (1988). Functional equivalence in cross-cultural consumer behavior: Gift giving in Japan and the United States. *Psychology & Marketing*, *5*(2), 155–168. https://doi.org/10.1002/mar.4220050205

Hagedorn, J., Hailpern, J., & Karahalios, K. G. (2008). VCode and VData: Illustrating a new framework for supporting the video annotation workflow. In S. Levialdi (General Chair), *Proceedings of the Workshop on Advanced Visual Interfaces* (pp. 317–321). Association for Computing Machinery. https://doi.org/10.1145/1385569.1385622

Hanna, N., & Srivastava, T. (2015). Cultural aspects of gift giving: A comparative analysis of the significance of gift giving in the U.S. and Japan. In S. Sidin & A. Manrai (Eds.), *Proceedings of the 1997 World Marketing Congress. Developments in Marketing Science: Proceedings of the Academy of Marketing Science* (pp. 283–287). Springer. https://doi.org/10.1007/978-3-319-17320-7_78

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology*, *102*, 1318–1335. https://doi.org/10.1037/a0026545

Kidd, C., Palmeri, H., & Aslin, R. N. (2013). Rational snacking: Young children's decision-making on the marshmallow task is moderated by beliefs about environmental reliability. *Cognition*, *126*(1), 109–114. https://doi.org/10.1016/j.cognition.2012.08.004

Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*(2), 490–507. https://doi.org/10.1111/j.1467-8624.1996.tb01747.x

Koomen, R., Grueneisen, S., & Herrmann, E. (2020). Children delay gratification for cooperative ends. *Psychological Science*, *31*(2), 139–148. https://doi.org/10.1177/0956797619894205

Kusanagi, E. (1993). A psychometric examination of the Children's Behavior Questionnaire. *Research and Clinical*

Center for Child Development Annual Report, *15*, 25–33. http://hdl.handle.net/2115/25287

Lamm, B., Keller, H., Teiser, J., Gudi, H., Yovsi, R. D., Freitag, C., Poloczek, S., Fassbender, I., Suhrke, J., Teubert, M., Vöhringer, I., Knopf, M., Schwarzer, G., & Lohaus, A. (2018). Waiting for the second treat: Developing culture-specific modes of self-regulation. *Child Development*, *89*(3), 261–277. https://doi.org/10.1111/cdev.12847

Legare, C. H., Wen, N. J., Herrmann, P. A., & Whitehouse, H. (2015). Imitative flexibility and the development of cultural learning. *Cognition*, *142*, 351–361. https://doi.org/10.1016/j.cognition.2015.05.020

Levy, G. D., Taylor, M. G., & Gelman, S. A. (1995). Traditional and evaluative aspects of flexibility in gender roles, social conventions, moral rules, and physical laws. *Child Development*, *66*(2), 515–531. https://doi.org/10.1111/j.1467-8624.1995.tb00887.x

Luerssen, A., Gyurak, A., Ayduk, O., Wendelken, C., & Bunge, S. A. (2015). Delay of gratification in childhood linked to cortical interactions with the nucleus accumbens. *Social Cognitive and Affective Neuroscience*, *10*(12), 1769–1776. https://doi.org/10.1093/scan/nsv068

Ma, F., Zeng, D., Xu, F., Compton, B. J., & Heyman, G. D. (2020). Delay of gratification as reputation management. *Psychological Science*, *31*(9), 1174–1182. https://doi.org/10.1177/0956797620939940

Michaelson, L. E., & Munakata, Y. (2016). Trust matters: Seeing how an adult treats another person influences preschoolers' willingness to delay gratification. *Developmental Science*, *19*(6), 1011–1019. https://doi.org/10.1111/desc.12388

Michaelson, L. E., & Munakata, Y. (2020). Same data set, different conclusions: Preschool delay of gratification predicts later behavioral outcomes in a preregistered study. *Psychological Science*, *31*(2), 193–201. https://doi.org/10.1177/0956797619896270

Mischel, W., & Ebbesen, E. B. (1970). Attention in delay of gratification. *Journal of Personality and Social Psychology*, *16*(2), 329–337. https://doi.org/10.1037/h0029815

Mischel, W., Ebbesen, E. B., & Raskoff Zeiss, A. (1972). Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology*, *21*(2), 204–218. https://doi.org/10.1037/h0032198

Mischel, W., Shoda, Y., & Peake, P. K. (1988). The nature of adolescent competencies predicted by preschool delay of gratification. *Journal of Personality and Social Psychology*, *54*, 687–696. https://doi.org/10.1037//0022-3514.54.4.687

Mischel, W., Shoda, Y., & Rodriguez, M. I. (1989). Delay of gratification in children. *Science*, *244*(4907), 933–938. https://doi.org/10.1126/science.2658056

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences, USA*, *108*, 2693–2698. https://doi.org/10.1073/pnas.1010076108

Munakata, Y., Yanaoka, K., Doebel, S., Guild, M. R., Michaelson, E. L., & Saito, S. (2020). Group influences on children's delay of gratification: Testing the roles of culture and personal connections. *Collabra: Psychology*, *6*(1), Article 1. https://doi.org/10.1525/collabra.265

Neal, D. T., Wood, W., Labrecque, J. S., & Lally, P. (2012). How do habits guide behavior? Perceived and actual triggers of habits in daily life. *Journal of Experimental Social Psychology*, *48*, 492–498. https://doi.org/10.1016/j.jesp.2011.10.011

Okuda, K., & Kuragano, T. (1998). Children's behavior on between-meals eating and parent's views. *Journal for the Integrated Study of Dietary Habits*, *9*, 56–62. https://doi.org/10.2740/jisdh.9.3_56

Omori, K., & Kurokawa, K. (2012). How do American parents teach table manners to their children during the child-rearing stage? *Journal of Home Economics of Japan*, *63*, 247–255. https://doi.org/10.11428/jhej.63.247

R Core Team. (2013). *R: A language and environment for statistical computing* (Version 3.5.2) [Computer software]. http://www.R-project.org

Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development*, *72*(5), 1394–1408. https://doi.org/10.1111/1467-8624.00355

Schlam, T. R., Wilson, N. L., Shoda, Y., Mischel, W., & Ayduk, O. (2013). Preschoolers' delay of gratification predicts their body mass 30 years later. *The Journal of Pediatrics*, *162*(1), 90–93. https://doi.org/10.1016/j.jpeds.2012.06.049

Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology*, *26*(6), 978–986. https://doi.org/10.1037/0012-1649.26.6.978

Smetana, J. G. (1981). Preschool children's conceptions of moral and social rules. *Child Development*, *52*(4), 1333–1336. https://doi.org/10.2307/1129527

Therneau, T. (2021). *A package for survival analysis in R* (R Package Version 3.2-11). https://CRAN.R-project.org/package=survival

Watts, T. W., Duncan, G. J., & Quan, H. (2018). Revisiting the marshmallow test: A conceptual replication investigating links between early delay of gratification and later outcomes. *Psychological Science*, *29*(7), 1159–1177. https://doi.org/10.1177/0956797618761661

Witkowski, T. H., & Yamamoto, Y. (1991). Omiyage gift purchasing by Japanese travelers in the U.S. *Advances in Consumer Research*, *18*, 123–128.

Wood, W., & Neal, D. T. (2007). A new look at habits and the habit-goal interface. *Psychological Review*, *114*(4), 843–863. https://doi.org/10.1037/0033-295X.114.4.843