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Hostile cognitions and emotions following social exclusion in Japanese adults and young children

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ABSTRACT

Social exclusion heightens negative emotions and hostile cognition toward others; however, its effects on non-Western adults and children remain unclear. These studies examined the effects on Japanese adults (N = 68; 34 female; M_{age} = 21.87 years) and 4- to 6-year-old children (N = 147; 78 female). The results showed that although excluded adults reported higher negative emotions and hostile evaluations of excluders, hostile cognitions toward others did not differ significantly between the inclusion and exclusion conditions. Excluded older children reported higher hostile evaluations toward excluders; however, emotions and hostile cognitions toward others did not differ significantly between the conditions. Although developmental changes in emotions and hostile evaluations were suggested, this research partially contradicts previous Western findings, highlighting the need for cross-cultural research.

Introduction

Social exclusion, the experience of being left out or rejected by others, poses a threat to fundamental human needs and well-being. Numerous studies have documented the negative effects of social exclusion on various psychological aspects from early childhood to adulthood. For example, individuals who are excluded from others report negative effects on their fundamental needs (e.g., Sandstrom et al., 2017; Williams & Nida, 2022), emotions (e.g., Chow et al., 2008; Sandstrom et al.,

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2017), cognition (e.g., Birk et al., 2016; Mermier et al., 2023), and behavior (e.g., DeWall et al., 2009; Lansford et al., 2010). Given the ubiquity of social exclusion across the lifespan and its potential to negatively influence various human aspects, it is important to understand the mechanisms by which social exclusion affects individuals across a wide age range, particularly during early childhood.

To understand social exclusion, experiences of exclusion have been manipulated and measured using various approaches (e.g., experiments, interviews). Experiments in laboratory settings have often been used to examine the causal effects of exclusion (e.g., DeWall & Baumeister, 2006; Williams & Jarvis, 2006). For example, playing computer games (e.g., ball-tossing games) with others has been widely used to simulate the effects of social exclusion (e.g., Sandstrom et al., 2017; Williams & Jarvis, 2006). In such games, participants are either included (e.g., receiving ball tosses in equal amounts) or excluded (e.g., receiving ball tosses unequally in lesser amounts) by other players who are controlled by experimenters. In addition, receiving feedback on participants' work with either inclusive messages (e.g., predicting their future as positive with lasting relationships) or exclusive messages (e.g., predicting their future as being alone and devoid of relationships) from others has also been used to simulate social exclusion's effect (Baumeister et al., 2002; DeWall et al., 2009). The causal effects of exclusion have been determined using these experimental approaches.

By conducting such experiments, researchers have suggested that social exclusion activates people's hostile cognitive tendencies and aggression (Birk et al., 2016; DeWall et al., 2009), with anger playing a key role (Chow et al., 2008). Birk et al. (2016) reported that adults excluded through computer games showed a higher tendency to use aggressive words than adults who were included. Moreover, DeWall et al. (2009) reported that experimentally excluded adults showed higher tendencies to think of even others who were unrelated to previous exclusion as hostile, which mediated their later aggressive responses. Chow et al. (2008) showed that anger, rather than sadness, mediated the relationship between exclusion and later aggressive responses. Regarding the mechanism from exclusion to later aggression, it has been suggested that experiences of exclusion (clearly hostile events) prime individuals to think of other unrelated signals as hostile as well (DeWall et al., 2009). In turn, tendencies to think of others as hostile motivate them to behave aggressively in retaliation or to protect themselves (Bailey & Ostrov, 2008; Crick & Dodge, 1996; Tuente et al., 2019) by ruminating anger (Quan et al., 2019).

Whereas exclusion experiences are associated with later hostile cognition patterns and aggression in adults, the question arises as to what patterns exist in the case of young children. Given that children's hostile cognitive tendencies are suggested to stabilize as early as childhood (Dodge et al., 2022), they may be influenced by their surrounding social situations, such as social exclusion, as early as the preschool stage. Several studies have examined the relation between exclusion and hostile cognitive tendencies in children, albeit using nonexperimental and memory-relying approaches. For example, Dodge et al. (2003) used the interview method, which indirectly determines those who have experienced exclusion by asking children who are disliked by others in school. They reported that children's experiences of exclusion predicted later aggression. The effect was partially mediated by their social information processing (SIP), which included hostile cognitive tendencies toward others. Lansford et al. (2010) replicated and expanded these findings by reporting that these three measures—peer rejection, SIP, and aggression—were related and predicted each other during childhood. These studies revealed the effects of daily long-term exclusion. However, it is difficult to further investigate the causal mechanisms described in adult studies (e.g., exclusion primes later hostile cognitive tendencies) because of the nonexperimental design.

Moreover, although the preschool years are a period of major social skills development in detecting and evaluating social exclusion as hostile (e.g., Hwang & Markson, 2020; Woodward et al., 2022), previous studies regarding social exclusion and hostile cognitive tendencies are limited to elementary school-age children and above (Dodge et al., 2003; Lansford et al., 2010). As one of the few previous studies regarding social exclusion during the preschool years, Hwang and Markson (2020) reported that in the ball-tossing game children in later preschool years significantly evaluated previous players as hostile when experiencing exclusion (receiving one toss out of nine throws) rather than inclusion (receiving three tosses out of nine throws), but children in earlier preschool years did not. Regarding the differential evaluation of includers and excluders, several factors may be at play. The development of theory of mind may enable children to recognize excluders' intentional actions (Testa et al., 2024),

whereas infants' innate preference for fair distribution (Geraci & Surian, 2011) may serve as another mechanism (Hwang & Markson, 2020). The developmental pattern found by Hwang and Markson (2020) suggests that the preschool years constitute the period when the assumption of the causal mechanism suggested in adult studies occurs (i.e., clearly hostile exclusion primes later hostile cognitive tendencies), that is, evaluating former excluders as hostile. However, no studies have examined such causal mechanisms in preschool children. Experiments focusing on exclusion's causal effects on hostile cognitive tendencies in preschool children will contribute to understanding the origins of people's hostile thinking.

The current studies examined whether the experience of exclusion increased later hostile cognitive tendencies in Japanese adults (Study 1) and preschool children (Study 2). Before examining Japanese children, Study 1 focused on adults to confirm whether social exclusion affects hostile cognition in non-Western cultures. Most previous psychological research has been biased toward participants from WEIRD (Western, educated, Industrial, rich, and democratic) backgrounds, although such populations are not typical of all humans (Henrich et al., 2010; Moriguchi, 2022). In fact, Kimel et al. (2017) revealed cultural differences in which Japanese adults (non-Western culture) showed similar levels of anger and sadness after exclusion, whereas European American adults (Western culture) experienced stronger anger than sadness. This suggests that non-Western cultural characteristics, such as viewing oneself as part of social relationships (Markus & Kitayama, 1991), make non-Westerners think of events as more inevitable (Nisbett et al., 2001; Yates & de Oliveira, 2016). This could result in higher levels of sadness (Kimel et al., 2017; Smith & Ellsworth, 1985), which is a less aggressive emotion than anger. Consistent with this suggestion, several studies show that some cognitive responses toward exclusion differ across cultures (e.g., Over & Uskul, 2016; Stengelin et al., 2022). For example, Over and Uskul (2016) showed that children in relationally interdependent communities estimated less pain from exclusion and punished the excluders to a lesser degree than children from independent communities. However, it remains unclear whether cognition of hostility toward exclusion is similar across cultures because previous studies of exclusion effects on later hostile cognition were conducted mainly in Western countries (Birk et al., 2016; DeWall et al., 2009). Further investigations in non-Western cultures are needed because it appears that non-Westerners' tendency to think inevitably could affect the cognition of direct aggression such as hostility.

In Study 2, we focused on Japanese preschool children's gradual development of evaluation skills regarding excluders (Hwang & Markson, 2020; Woodward et al., 2022) to provide deeper insight into how more general hostile cognitive tendencies develop and whether tendencies emerge that are comparable to the adult group. Specifically, given that previous studies on children have not investigated the causal effects of exclusion on later hostile cognitive tendencies and lacked investigation in early childhood, we intended to examine the causal effects experimentally by referring to recent studies conducted with young children. Moreover, owing to the development of children's evaluation skills toward excluders during the preschool years (Hwang & Markson, 2020), we compared the effects between the older and younger age groups in preschoolers.

To manipulate participants' exclusion and inclusion experiences, we used the ball-tossing paradigm in both studies because it has been frequently used in previous adult and preschooler research. This allowed us to match the quality of exclusion between studies as much as possible. This was followed by measurements of (a) a manipulation check (e.g., participants' perceived amount of received ball throws), (b) hostile evaluations of the game players, (c) hostile cognitive tendencies, and (d) emotions experienced during the game (for details, see Method). The measurement of (a) was conducted to verify whether the manipulation of the paradigm had worked, the measurement of (b) was conducted to determine whether the players were evaluated as more hostile in the exclusion condition than in the inclusion condition, and the measurement of (c) was conducted to determine the effect of exclusion on participants' hostile cognitive tendencies in unrelated contexts, which was the main focus of the current studies. Finally, the measurement of (d) was conducted to determine whether the emotional responses of anger and sadness were higher in the exclusion condition, as in Kimel et al. (2017).

In Study 1, we predicted that participants in the exclusion condition would report relatively higher hostile evaluations of players [measurement (b)] and hostile cognitive tendencies [measurement (c)] than participants in the inclusion condition. In Study 2, in addition to the predictions of Study 1, we predicted that the reports of hostile evaluations of players in the exclusion condition would be higher

for older children than for younger children. Furthermore, we predicted that hostile cognitive tendencies in the exclusion condition would also be higher for older children primed by previous evaluations of excluders. Regarding emotional responses [measurement (d)], we predicted that anger and sadness would be higher in the exclusion condition than in the inclusion condition in both studies.

Study 1

Method

Participants

The sample size was determined based on a study by DeWall et al. (2009), who investigated the relation among exclusion, hostile cognition, and aggression in 30 to 50 adults. A total of 68 undergraduate and graduate students (M_{age} = 21.87 years, SD = 3.83; 34 female) participated in the study. Participants with non-response items on the questionnaires (n = 1), manipulation failure due to operational errors (n = 1), previous participation experience with falsely taught fictional others as real (n = 4), or previous participation experience with similar ball-tossing tasks (n = 2) were excluded from the analysis. Therefore, 60 participants were included in the final sample (M_{age} = 21.75 years, SD = 3.98; 30 female).

Informed consent was obtained from all participants before they participated in the study, according to the principles of the Declaration of Helsinki. This study was approved by the ethics committee of the Unit for Advanced Studies of the Human Mind at Kyoto University.

Procedure

From the recruitment stage, we announced that the study's objective was to reveal the characteristics of mental visualization images of other people while playing a computer game together. On the day of the experiment, we told the participants to play a ball-tossing game with two other players in different rooms on campus. The game was developed based on Hwang and Markson (2020) with some modifications in PsychoPy (Peirce, 2007). We asked participants to choose one icon (out of five different color options) and decide on the handle name to use during the game. Then, each participant's icon and handle name appeared on the screen, and other players' icons (randomly selected from the other four color options) and names (randomly selected from popular Japanese names, e.g., Sho, Aiko; the name's gender was matched to the participant's gender) also appeared. As a prior explanation of the game, we told the participants to imagine what the players in the game looked like, where the players were, what kinds of personalities they had, and so on during the game. Before starting the game, we told the participants that we had checked whether the other participants were ready, giving them a few minutes to wait.

The game lasted approximately 5 min with 60 tosses. Participants were either excluded or included in the game. The study conditions (exclusion and inclusion) were randomly assigned. In the inclusion condition, participants received one third of the 60 ball tosses. In the exclusion condition, participants received the ball twice in the first half of the time, and then never after that. All the participants played the game individually without an experimenter in the room.

After the game, participants answered the following questions: (a) manipulation check, (b) hostile evaluation of the game players, (c-1) hostile cognitive tendencies (in ambiguous situations), (c-2) hostile cognitive tendencies (in word completion task), and (d) emotion. After the measurements, the participants were debriefed about the purpose of the experiment and told that the players in the game were programmed on a computer.

(a) Percentage of received throws and the feeling of being included (manipulation check)

We asked participants about the subjective percentage of throws they received (0%–100%) and the extent to which they felt included in the game (on a 7-point scale). For the filler question, we asked them the extent to which the ball was fast during the game.

(b) Hostile evaluation toward the game players

We asked participants to what extent they considered each player to be "mean," and the scores were averaged (7-point scale). We used the term "mean" rather than "hostile" because we intended to match the term with a later children's study (Study 2) in which the term was the most common way to assess the cognition of hostility (e.g., van Dijk, de Castro, et al., 2018). For the filler question, we asked whether the player was older or younger than the participants. The scores ranged from 1 to 7.

(c-1) Hostile cognitive tendencies (in ambiguous situations)

We assessed general hostile cognitive tendencies by asking whether participants attributed hostile intentions to provocateurs with ambiguous intentions. Specifically, we used the Social Information Processing–Attribution and Emotional Response Questionnaire (SIP-AEQ; Coccaro et al., 2009). The SIP-AEQ consisted of eight vignettes with negative outcomes and ambiguous provocateur intentions. In each vignette, and four questions about the possible reasons for the provocateur's actions were described. Two of the questions assessed the possibilities of the provocateur's direct hostile intent (e.g., "This person wanted to physically hurt me") and indirect hostile intent (e.g., "This person wanted to make me look bad"). The remaining two questions assessed the provocateur's instrumental non-hostile intent (e.g., "This person wanted to win the match") and neutral or benign intent (e.g., "This person did this by accident"). Participants rated each possibility on a 4-point scale (from *not at all likely* to *very likely*). The scores ranged from 1 to 4 (Cronbach's α = .82).

(c-2) Hostile cognitive tendencies (in word completion task)

We also asked about hostile cognitive tendencies using a word completion task that could create either aggressive or non-aggressive words because we expected participants to be less likely to report their hostile thinking toward others in the former (c-1) task owing to moral concerns. However, because the existing word completion task (Carnagey & Anderson, 2005) was developed in English and no measurement existed in Japanese, we originally developed 37 Japanese uncompleted words, referring to Carnagey and Anderson (2005) and ChatGPT. Specifically, 37 words were developed. In total, 14 of these 37 words were considered to be completed with either aggressive or non-aggressive meanings, and 23 of these words were developed that were considered to be completed only with non-aggressive meanings. A preliminary survey of 20 Japanese adults was conducted. They were asked to create as many words as possible by filling in each blank. Based on the earned responses and discussion with Japanese colleagues, finally 13 incomplete words that were completed with either aggressive or non-aggressive meanings and 13 incomplete words that were completed with *only* non-aggressive meanings were selected for the Japanese version of the word completion task (26 words in total).

We assessed participants' general hostile cognitive tendencies by using the Japanese version of the word completion task based on the preliminary selection described above. We first coded the responses with aggressive or non-aggressive meanings (1 point for aggressive meaning and 0 points for non-aggressive meaning). A second coder coded 20% of the responses (312 of 1560 total responses) for inter-rater reliability; the inter-rater agreement was good (96.47%). Any coding disagreements were resolved. There were no cases of aggressive words being created among the 13 uncompleted words that were preliminarily assumed to be completed only with non-aggressive meanings. The remaining 13 words (i.e., those preliminarily assumed to be completed with either aggressive or non-aggressive meanings) returned both aggressive and non-aggressive meanings in the responses, as expected. The scores ranged from 0 to 13.

(d) Emotions during the game

Based on Kimel et al. (2017), we asked participants to report the level of 20 emotions, which included sadness (e.g., depressed, lonely, sad; Cronbach's α = .87) and anger (e.g., frustrated, angry; Cronbach's α = .69), they felt during the game (7-point scale). In addition to sadness and anger as our main interest areas, we identified eight happiness emotions (e.g., happiness, joy; α = .90) from the 20 emotions to examine potential extensions of the findings. To test whether the questions regarding anger, sadness, and happiness consisted of three factors, we conducted a confirmatory factor anal-

ysis. An adequate fit was indicated (for details, see online supplementary material). The scores ranged from 1 to 7.

Debriefing

After the participants completed all the measures, we asked them to report five positive events that had occurred recently. This question was intended to foster positive thoughts. Last, we thanked participants for their participation and debriefed them on the purpose of the study and explained that the ball-tossing game was programmed completely by computer.

Analytic strategies

All analyses were performed using R (Version 4.0.0) and RStudio (Version 2023.12.1+402). To examine the effects of condition (inclusion or exclusion) on "percentage of throws received," "feeling of being included," "hostile evaluation toward the players," and "hostile cognitive tendencies," we used the Welch two-sample *t* test. We chose the Welch two-sample *t* test because Welch's *t* test is known to control the rates of Type I error even when the assumption of equal variances is not met (Delacre et al., 2022), and that could avoid repeating the test (e.g., the test of variances and the *t* test) on the same data (Rasch et al., 2011). To examine the effects of conditions and emotions on "emotions during the game," we used analysis of variance (ANOVA).

Results

(a) Percentage of received throws and the feeling of being included (manipulation check)

We conducted a Welch two-sample *t* test to examine the differences in scores between conditions. The results revealed that excluded participants reported significantly lower percentages of receiving throws (M_{excluded} = 10.70, *SD* = 4.50) than included participants (M_{included} = 35.20, *SD* = 6.94), $t(49.77) = 16.23$, $p < .01$, $d = 4.19$. In addition, excluded participants reported significantly lower feelings of being included (M_{excluded} = 2.00, *SD* = 0.53) than included participants (M_{included} = 4.73, *SD* = 1.04), $t(42.89) = 12.85$, $p < .01$, $d = 3.32$.

(b) Hostile evaluation toward the game players

We conducted a Welch two-sample *t* test to examine the differences in scores between conditions. The results revealed that excluded participants reported significantly higher hostile evaluations of the players (M_{excluded} = 5.22, *SD* = 1.01) than included participants (M_{included} = 2.08, *SD* = 1.07), $t(57.80) = 11.70$, $p < .01$, $d = 3.02$ (Fig. 1).

(c-1) Hostile cognitive tendencies (in ambiguous situations)

We conducted a Welch two-sample *t* test to examine the differences in scores between conditions. The results revealed no significant differences between the exclusion (M_{excluded} = 1.75, *SD* = 0.44) and inclusion (M_{included} = 1.86, *SD* = 0.38) conditions, $t(56.83) = 1.09$, $p = .28$, $d = 0.28$ (Fig. 1).

(c-2) Hostile cognitive tendencies (in word completion task)

We conducted a Welch two-sample *t* test to examine the differences in scores between conditions. The results revealed no significant differences between the exclusion (M_{excluded} = 2.40, *SD* = 1.90) and inclusion (M_{included} = 2.20, *SD* = 1.45) conditions, $t(54.13) = 0.46$, $p = .65$, $d = 0.12$ (Fig. 1).

(d) Emotions during the game

We conducted a 2 (Condition: exclusion or inclusion) × 3 (Emotion: anger, sadness, or happiness) ANOVA to examine differences in scores. There was a significant main effect of condition, $F(1, 58) = 19.45$, $p < .01$, $\eta_p^2 = .25$, emotion, $F(2, 116) = 5.46$, $p < .01$, $\eta_p^2 = .09$, and the interaction effects, $F(2, 116) = 48.07$, $p < .01$, $\eta_p^2 = .45$. Excluded (vs. included) participants reported higher levels of anger (M_{excluded} = 4.03, *SD* = 1.53 vs. M_{included} = 2.25, *SD* = 1.14), $t(53.76) = -5.13$, Bonferroni-corrected $p < .01$, $d = -1.32$, and sadness (M_{excluded} = 4.41, *SD* = 1.66 vs. M_{included} = 2.02, *SD* = 0.98), $t(47.17) = 6.80$,

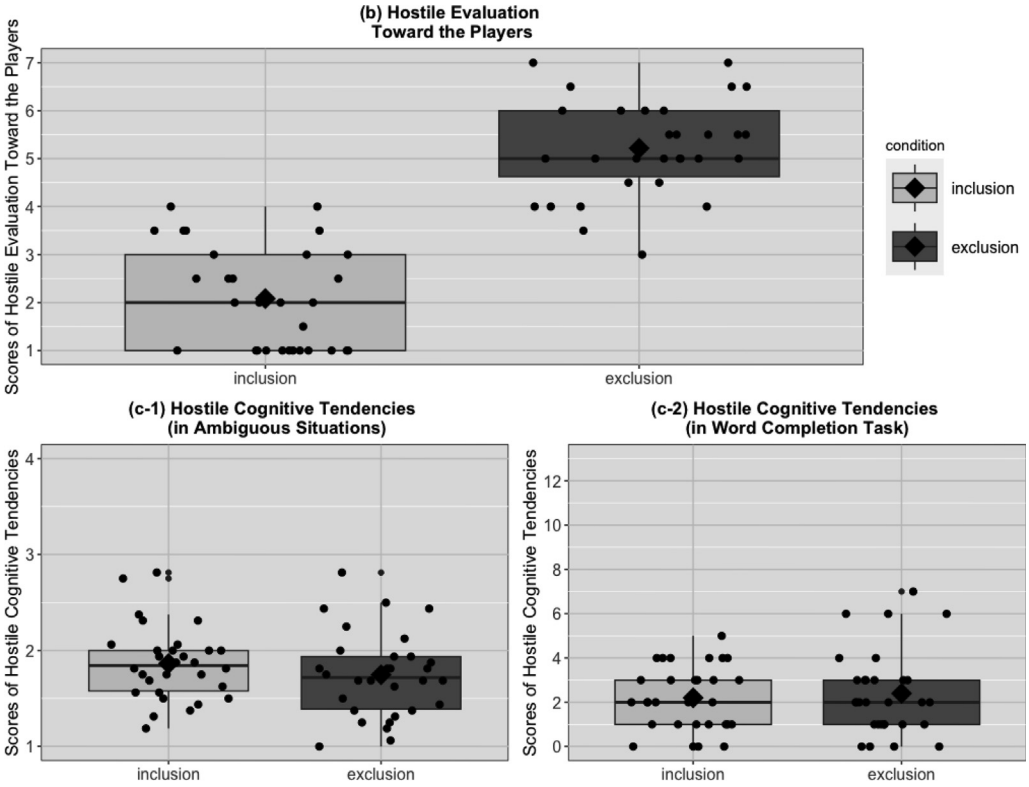

Fig. 1. Results of hostile evaluation (b) and hostile cognitive tendencies (c-1, c-2). Each box plot indicates the median (central line), interquartile range (edge of the box), and data points (black circles). ◆ indicates the average value.

Bonferroni-corrected $p < .01$, $d = -1.75$, and a lower level of happiness ($M_{excluded} = 2.00$, $SD = 0.73$ vs. $M_{included} = 3.23$, $SD = 1.13$), $t(49.80) = -5.03$, Bonferroni-corrected $p < .01$, $d = 1.30$. In each condition, no significant differences were observed between anger and sadness [in inclusion condition: $t(29) = 1.18$, Bonferroni-corrected $p = 1.00$, $d = 0.22$; in exclusion condition: $t(29) = 1.75$, Bonferroni-corrected $p = .55$, $d = -0.32$] Happiness was higher than anger, $t(29) = 3.50$, Bonferroni-corrected $p = .01$, $d = 0.64$, and sadness, $t(29) = 4.17$, Bonferroni-corrected $p < .01$, $d = 0.76$, in the inclusion condition. Happiness was lower than anger, $t(29) = 6.58$, Bonferroni-corrected $p < .01$, $d = -1.20$, and sadness, $t(29) = 6.77$, Bonferroni-corrected $p < .01$, $d = -1.24$, in the exclusion condition (Fig. 2).

Discussion

Study 1 examined whether experiencing exclusion increased hostile cognitive tendencies in Japanese adults. Although hostile evaluations of the players were significantly higher among the excluded participants, generalized hostile cognitive tendencies did not differ significantly between the conditions. Regarding emotions during the game, the excluded participants reported higher sadness, higher anger, and lower happiness levels than the included participants, with no significant difference in the levels of the two emotions. In Study 2, we examined whether similar results can be found in Japanese children.

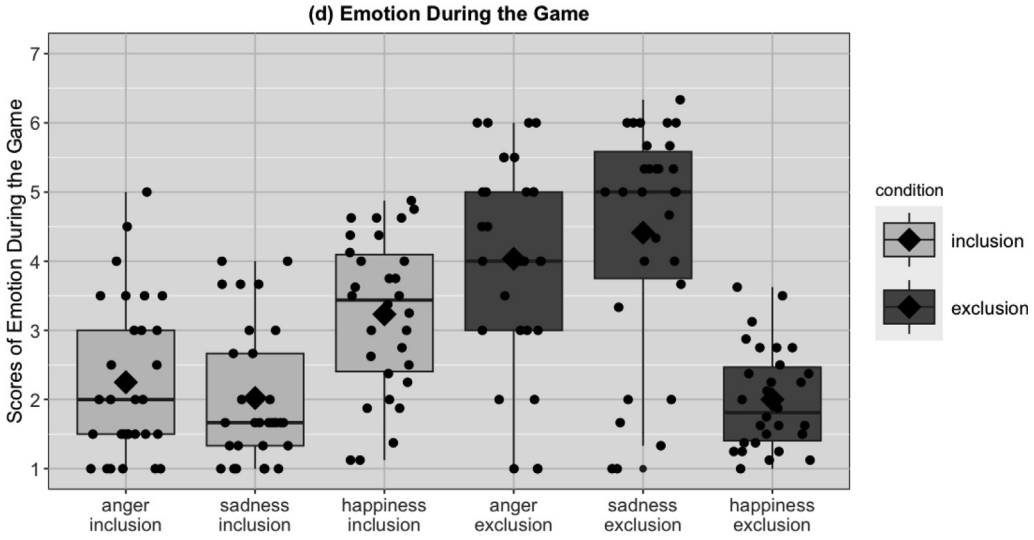

Fig. 2. Result of emotions during the game (d). Each box plot indicates the median (central line), interquartile range (edge of the box), and data points (black circles). ◆ indicates the average value.

Study 2

The second study examined whether experiencing exclusion increased hostile cognitive tendencies in Japanese children. Given that a previous study (Hwang & Markson, 2020) revealed that the skills for detecting social exclusion develop during the preschool years, we included two age groups (4–5 years as the younger group and 5–6 years as the older group) as an independent variable to examine the developmental perspective.

Method

Participants

Given that an a priori power analysis with G*Power indicated that N = 128 (n = 64 for each age group) would provide 80.15% power to detect medium effect size (d = 0.50), 147 children were recruited for the study (M_{age} = 66.61 months, SD = 7.11, range = 53–80; 78 female) from three preschools in Japan. Participants who responded incorrectly to the manipulation check (n = 9; i.e., reporting the amount of ball tosses as "received a lot" in the exclusion condition, reporting the amount of ball tosses as "never received" in the inclusion condition), had incomplete answers to the questions (n = 10), or misunderstood the rules of the game (n = 1; i.e., answering other players' icons as their own) were excluded from the analysis. Therefore, 127 participants were included in the final sample (M_{age} = 66.87 months, SD = 7.06; 63 female).

A total of 60 children were in the younger group (M_{age} = 60.72 months, SD = 3.98, range = 53–68; 33 female), which was the second grade of preschool (i.e., those grades consisting of 4-year-olds in April, at the beginning of the academic year in Japan). A total of 67 children were in the older group (M_{age} = 72.39 months, SD = 3.95, range = 64–80; 30 female), which was the final grade of preschool (i.e., those grades consisting of 5-year-olds in April). The overlap in the month age between the two groups is because in some cases the early-born children in the younger group who participated in the latter part of the study period caught up with the late-born children in the older group who participated in the former part of the study period, which lasted several months. However, the groups in this study were receiving a grade-specific curriculum. Although the month age overlapped, the environment of each group was different.

Informed consent was obtained from caregivers and preschools before the children were involved in the study, according to the principles of the Declaration of Helsinki. This study was approved by the ethics committee of the Unit for Advanced Studies of the Human Mind at Kyoto University.

Procedure

On the day of the experiment, we instructed the participants to play a ball-tossing game with two players of similar age. The game was developed based on Hwang and Markson (2020) with some modifications in PsychoPy (Peirce, 2007). We asked them to choose one icon (out of five different color options) for use during the game. We did not let them decide on the handle name as in Study 1 because of individual variations in the participants' literacy skills.

Before the game, the children practiced throwing the balls by playing with famous Japanese characters. In the practice phase, the children received the ball two times out of five throws and thus had two chances to throw the ball. After the practice phase, the children's icons appeared on the screen, and the icons of the other players (randomly selected from the other four color options) also appeared. The game lasted approximately 1 min with 20 throws. Participants were either excluded or included during the game. The study conditions (exclusion and inclusion) were randomly assigned. In the inclusion condition, the participants received one third of the 20 ball throws. In the exclusion condition, the participants received the ball three times in the first half of the game and subsequently never. The experimenter moved to a position where the participants' screens were not visible and observed the children playing from a distance. After completing the game, the participants answered the following questions.

(a) Amount of received throws (manipulation check)

We asked participants about the extent of throws they received during the game (on a 4-point scale). Specifically, we created four illustrations that ranged in the number of balls (i.e., zero, one, three, or eight), with each illustration representing the number of throws received (i.e., "never received," "received not much," "received a little," "received a lot"). We asked the participants to choose the one closest to their thoughts.

(b) Hostile evaluation toward the players

We asked participants whether the other players were nice or mean. The order of the words ("nice" and "mean") was randomized across children.

(c) Hostile cognitive tendencies (in ambiguous situations)

We used a task developed by van Dijk, Poorthuis, et al. (2018) that involved four hypothetical stories to assess children's hostile cognition. Each story consisted of two illustrations, one each for the setting and provocation scenes: (a) being physically harmed, (b) not sharing candy, (c) a block tower being knocked over, and (d) a seat being blocked. Each story had a new character, gender-matched to the participant, with a neutral facial expression. We read each story in a randomized order to the children and asked two questions: (1) why the event occurred (open-ended question) and (2) whether the provocateur was mean (close-ended question).

The coding consisted of two steps. First, we coded the responses to question (1), an open-ended question, whether children attributed hostility to the provocateurs (e.g., coded as "mean" when the children indicated the event occurred because of the provocateurs' hostility and coded as "not mean" or "unclear" when the children did not clearly indicate the provocateurs' hostility). A second coder coded 20.31% of the responses (104 of 512 total responses) for inter-rater reliability. Inter-rater agreement was good (85.58%). Any coding disagreements were resolved. Second, the coding results for question (1) were compared with the responses to question (2), which was a close-ended question (i.e., whether the provocateur was mean). In each story, if there was a response of "mean" for either response to questions (1) and (2), the children's hostile cognition was counted as 1 point, and if not the hostile cognition was counted as 0 points. The sum of the scores across the four stories was computed to obtain the hostile cognitive tendencies score (score range: 0–4). The mean inter-story correlation was $r = .24$, which was sufficient according to the criterion ($r \geq .15$) of Clark and Watson (1995).

(d) Emotions during the game

We asked the participants about the level of emotions (anger, sadness, and happiness) experienced during the game (on a 4-point scale). We included happiness as part of the questions to balance asking about a series of negative emotions. We used the facial illustrations developed by Gabel et al. (2019). Each emotion had four illustrations; each represented the intensity of the emotion using changes to the shape of the eyebrows and mouth (for details, see Gabel et al., 2019). Participants were asked to choose the one closest to their emotions.

Debriefing

After the participants answered all questions, they were asked to play the game once more with different players. This time, the game was designed as an inclusion condition for all participants and was intended to foster positive thoughts.

Analytic strategies

All analyses were performed using R (Version 4.0.0) and RStudio (Version 2023.12.1+402). To examine the effects of condition (inclusion or exclusion) and age group (younger or older) on "amount of received throws," "hostile cognitive tendencies in ambiguous situations," and "emotions during the game," we used ANOVA. To examine the effects of conditions and age groups on "hostile evaluation toward the players" (which was a categorical variable), we used the chi-square test.

Results

(a) Amounts of received throws (manipulation check)

We conducted a 2 (Condition: exclusion or inclusion) × 2 (Age Group: younger or older) ANOVA to examine the differences in scores. The results revealed a significant main effect of condition, $F(1, 123) = 31.89$, $p < .01$, $\eta_p^2 = .21$. However, the main effect of age group, $F(1, 123) = 0.15$, $p = .70$, $\eta_p^2 < .01$, and the interaction effect, $F(1, 123) = 0.33$, $p = .57$, $\eta_p^2 < .01$, were not significant. Overall, the excluded participants reported significantly lesser amounts of receiving throws ($M_{excluded} = 1.53$, $SD = 0.56$) than the included participants ($M_{included} = 2.40$, $SD = 0.70$), $t(121.53) = 7.69$, $p < .01$, $d = 1.36$.

(b) Hostile evaluation toward the game players

Overall, 32.26% of children in the exclusion condition (20 of 62 children) attributed the players' intent as hostile, whereas 6.15% of children in the inclusion condition attributed the players as hostile (4 of 65 children). Pearson's chi-square test revealed a significant difference between the conditions and age groups, $\chi^2(3) = 19.82$, $p < .01$, Cramer's $V = 0.40$ (Fig. 3). Excluded older children evaluated previous players as hostile (43.75%; 14 of 32 children) compared with included older children (5.71%; 2 of 35 children), Bonferroni-corrected $p < .01$, whereas younger children did not show a significant difference between the conditions (20.00%, 6 of 30 children in the exclusion condition; 6.67%, 2 of 30 children in the inclusion condition), Bonferroni-corrected $p = 1.00$.

In an exploratory fashion, we examined the effects of month age and condition on hostile evaluation toward the previous players to discover the developmental patterns more continuously. By conducting logistic regression analysis, the results indicated that the effects of month age ($p = .36$), condition ($p = .56$), and interaction ($p = .80$) were not significant (for details, see supplementary material).

(c) Hostile cognitive tendencies (in ambiguous situations)

We conducted a 2 (Condition: exclusion or inclusion) × 2 (Age Group: younger or older) ANOVA to examine the differences in scores. We found that the main effects of condition, $F(1, 123) = 0.001$, $p = 1.00$, $\eta_p^2 < .01$, age group, $F(1, 123) = 0.07$, $p = .79$, $\eta_p^2 < .01$, and interaction effect, $F(1, 123) = 0.04$, $p = .84$, $\eta_p^2 < .01$, were not significant (Fig. 3).

(d) Emotions during the game

We conducted a 2 (Condition: exclusion or inclusion) × 2 (Age Group: younger or older) × 3 (Emotion: anger, sadness, or happiness) ANOVA to examine the differences in scores. We found a significant

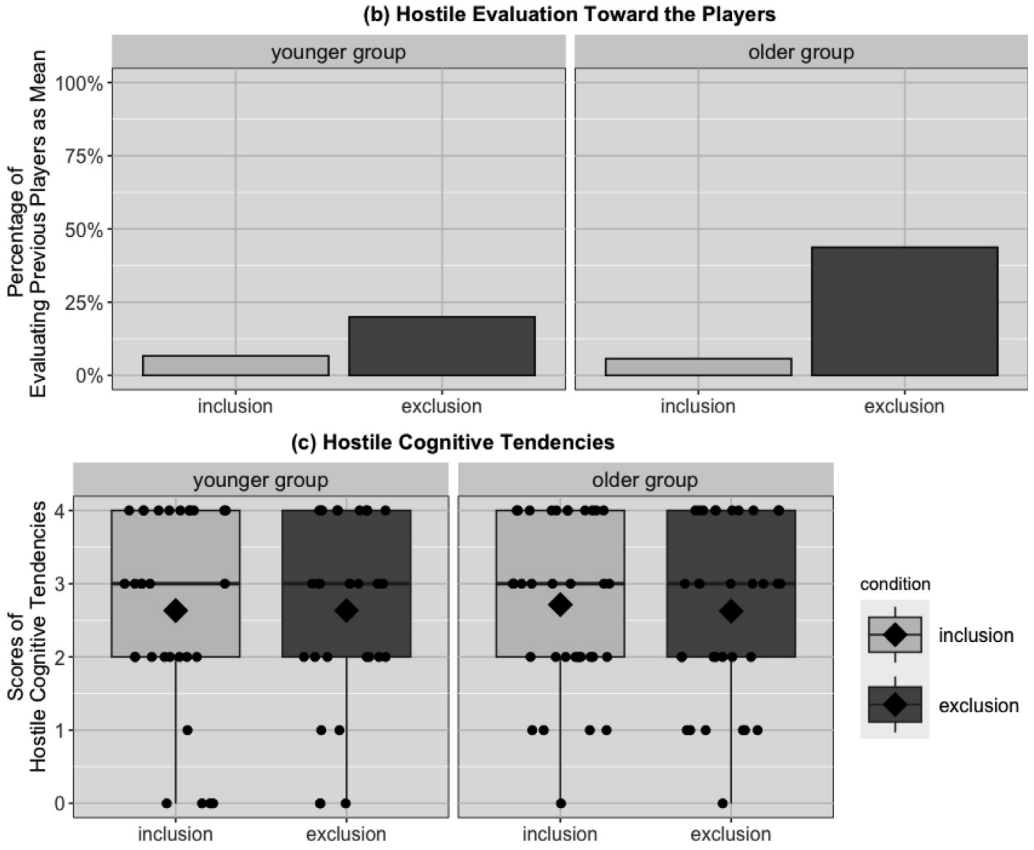

Fig. 3. Results of hostile evaluation (b) and hostile cognitive tendencies (c). Each bar graph in panel (b) indicates the percentage of children who evaluated the previous players as mean. Each box plot in panel (c) indicates the median (central line), interquartile range (edge of the box), and data points (black circles). ◆ indicates the average value.

main effect of emotion, $F(2, 246) = 269.24$, $p < .01$, $\eta_p^2 = .69$, but the other main effects for condition, $F(1, 123) = 0.15$, $p = .70$, $\eta_p^2 < .01$, and age group, $F(1, 123) = 2.05$, $p = .16$, $\eta_p^2 = .02$, were not significant (Fig. 4). In addition, the interaction effects between condition and age group, $F(1, 123) = 0.15$, $p = .70$, $\eta_p^2 < .01$, and between age group and emotion, $F(2, 246) = 1.51$, $p = .22$, $\eta_p^2 = .01$, and the three-way interaction among condition, age group, and emotion, $F(2, 246) = 1.01$, $p = .37$, $\eta_p^2 < .01$, were not significant except for the interaction between condition and emotion, $F(2, 246) = 8.26$, $p < .01$, $\eta_p^2 = .06$. Overall, regardless of age group, both included and excluded participants reported significantly higher happiness ($M_{included} = 2.65$, $SD = 0.72$; $M_{excluded} = 2.19$, $SD = 0.96$) than anger [$M_{included} = 0.15$, $SD = 0.51$, $t(64) = 24.17$, Bonferroni-corrected $p < .01$, $d = 3.00$; $M_{excluded} = 0.40$, $SD = 0.93$, $t(61) = 8.64$, Bonferroni-corrected $p < .01$, $d = 1.10$] and sadness [$M_{included} = 0.28$, $SD = 0.70$, $t(64) = 19.87$, Bonferroni-corrected $p < .01$, $d = 2.46$; $M_{excluded} = 0.58$, $SD = 0.90$, $t(61) = 7.64$, Bonferroni-corrected $p < .01$, $d = 0.97$]. Both included and excluded participants reported no significant difference between anger and sadness [in inclusion condition: $t(64) = -1.59$, Bonferroni-corrected $p = .70$, $d = -0.20$; in exclusion condition: $t(61) = -1.56$, Bonferroni-corrected $p = .75$, $d = -0.20$]. Across the conditions, the included participants reported higher happiness than the excluded participants, $t(113.01) = -3.01$, Bonferroni-corrected $p = .02$, $d = -0.54$, but no differences in sadness, $t(115.03) = 2.13$, Bonferroni-corrected $p = .22$, $d = 0.38$, and anger, $t(93.27) = 1.86$, Bonferroni-corrected $p = .40$, $d = 0.33$.

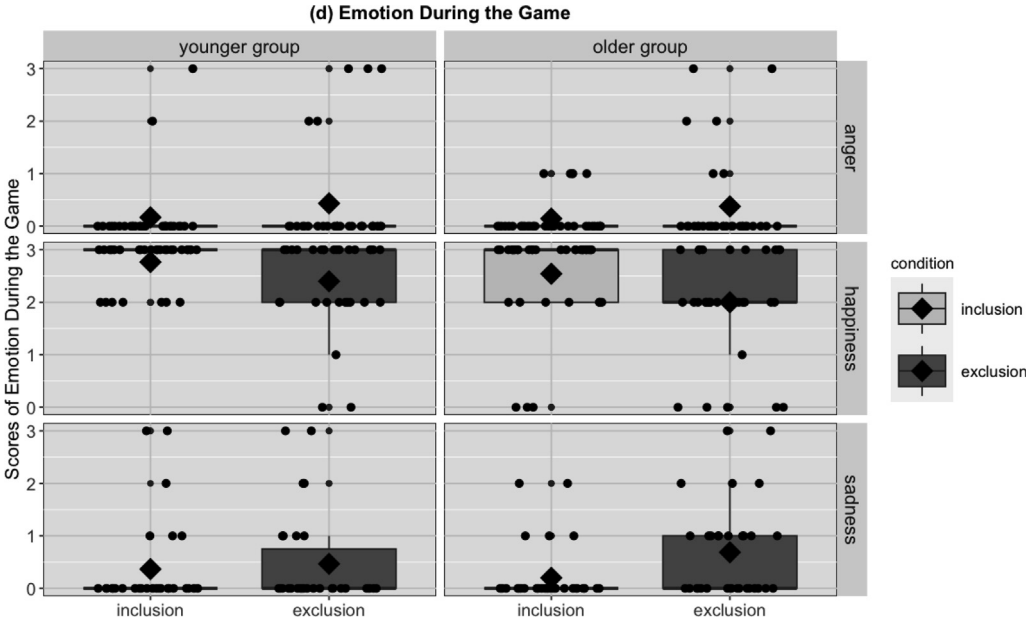

Fig. 4. Result of emotions during the game (d). Each box plot indicates the median (central line), interquartile range (edge of the box), and data points (black circles). ◆ indicates the average value.

Exploratory comparisons between Study 1 and Study 2

As an exploratory analysis, we combined the data of adults (Study 1) and children (Study 2) to directly compare the results across age groups. Specifically, we explored whether developmental trends existed among the main variables that showed significant differences between conditions in Study 1 when including children's and adults' data in the analyses (for details, see supplementary material).

Discussion

Study 2 examined whether experiencing exclusion increased hostile cognitive tendencies in Japanese 4- to 6-year-old children. The results showed that excluded older children evaluated players (who excluded them) as mean, whereas younger children did not. Generalized hostile cognitive tendencies did not differ significantly between the conditions, which is in line with the results of Study 1. There were no significant differences in emotions experienced during the game between the conditions and age groups.

General discussion

This study examined the effects of experiencing social exclusion on later emotions and hostile cognitive tendencies in Japanese adults (Study 1) and 4- to 6-year-old children (Study 2). We manipulated each exclusion and inclusion experience with a ball-tossing game, followed by measurements of the participants' hostile evaluations of the players and generalized hostile cognitive tendencies in unrelated contexts. Moreover, we examined the emotions experienced during the game to determine whether the results of Kimel et al. (2017) were replicated.

Regarding the hostile evaluation of players, Study 1 showed that excluded adults significantly evaluated players (who excluded them) as "mean" compared with included adults. Study 2 showed that the evaluation pattern was only observed in older children. These findings are consistent with those

of Hwang and Markson (2020), who reported that the evaluation of excluders as mean (hostile) developed during early childhood, suggesting that development is common during the early period across cultures. This developmental difference in hostility toward excluders could also explain why excluded children in older preschool years imitate the excluder's actions less than the younger children, suggesting taking distance from the hostile people (Testa et al., 2024). However, even among older children, it is noteworthy that less than half of the excluded children evaluated the excluders as mean, whereas Hwang and Markson (2020; see supplementary material) reported that 81.25% of children in the older group (5–6 years) evaluated excluders as mean. This point suggests that the hostile evaluation toward others in Japanese children is not yet being fully developed, partially owing to cultural factors. Moreover, the analysis of developmental patterns by continuous month age revealed no significant difference regarding their hostile evaluation of players by conditions or month age. This differed from the results from the age group comparisons. This point, in addition to the above finding, may suggest that the group to which they belong plays an important role in developing excluder evaluation rather than the chronological month age. Therefore, further investigation is required such as whether the hostile evaluation of excluders is lower than that in Western children, whether the scores continue to increase after the preschool years, and whether this development is influenced to a greater degree by the group to which they belong.

Regarding hostile cognitive tendencies in unrelated contexts, neither study showed significant differences between the conditions. Given that both the adult and child studies yielded similar results, the results appear to not be dependent on developmental differences between preschool and adulthood. There are several possible explanations for these findings. The first possible factor is that the prior hostile evaluation of the players (i.e., excluders) was insufficient to prime hostile cognitive tendencies afterward. Specifically, the participants in the current research were told that the players in the game were students at the same university (Study 1) or new "friends" of a similar age (Study 2). Given that both terms are relevant to in-groups, it is possible that their hostile evaluation did not fully increase. Nevertheless, adults and older children successfully evaluated the excluders as hostile. Further consideration is recommended to determine whether the magnitude of evaluation was stronger than that in other settings.

The second possible factor is cultural difference. Specifically, Japanese participants may have processed the exclusion events in frames differently from participants in Western countries. Specifically, the results in Study 1, with no significant difference between anger and sadness in the excluded participants, are consistent with Kimel et al.'s (2017) findings in a non-Western culture, whereas Westerners tended to show more anger than sadness. It has been suggested that participants' cultural selves may underlie the processing of notably high sadness after exclusion in non-Western countries. Specifically, non-Western people tend to view themselves as part of social relationships, which makes them consider surrounding variables as crucial for achieving social adaptation (Markus & Kitayama, 1991) and construe events such as exclusion as inevitable (Nisbett et al., 2001; Yates & de Oliveira, 2016). This makes them feel that there is almost nothing that can be done, which heightens their sadness (Smith & Ellsworth, 1985). Such non-aggressive characteristics of sadness may have inhibited later hostile cognitive tendencies compared with the results of previous studies.

The third possible factor, applied solely to Study 2, is the potential ceiling effect on the measurement of hostile cognition. Specifically, Study 2 measured hostile cognition through four hypothetical stories with ambiguous provocateurs' intent and calculated the scores. The results showed an overall mean score of 2.66 (SD = 1.23; see also supplementary data), which was approximately 1 point higher than that in previous studies using similar materials such as Yamamoto et al. (2023; Table 1) and van Dijk, Poorthuis, et al., 2018, suggesting that a ceiling effect might have made it difficult to detect differences across conditions. A possible explanation for this high score may be the interviewers. Specifically, in Study 2 the person who asked children about their hostile cognitions (as well as the other assessments) was an unfamiliar adult, whereas in Yamamoto et al. (2023) children's caregivers asked them about their cognitions. Okanda et al. (2012) suggested that Japanese children show a "yes bias" when asked by strange adults rather than their parents. Although we did not ask children questions in the manner of "yes–no" queries and instead asked them whether the provocateur was mean or not (close-ended question), the response of "mean" might be compatible with responding as "yes." In addition, one paper suggests that the difficulties in obtaining meaningful data in young children by

direct interview questions may be because their post-exclusion feelings could be inadvertently affected by receiving the interviewer's attention (Zadro et al., 2013). Therefore, the measurement approach using interviews might partially explain the results, which warrants further investigation.

Regarding emotions during the game, Study 1 showed that the excluded adults reported significantly higher anger and sadness than the included adults. Study 2 showed that the children reported no significant differences in sadness and anger between the conditions. The difference in the results of Study 1 and Study 2 may reflect two possible explanations. The first possibility is developmental differences in children's processing of social situations and the labeling of their emotions. Although it has been shown that children aged 3 to 6 years can report negative emotions in experimentally induced situations (Durbin, 2010), this study examined situations that were not exactly similar to socially exclusive situations (e.g., receiving a disappointing toy and being criticized for their drawings). Specifically, the negative outcomes in Durbin (2010) were designed more explicitly (e.g., children received the negative feedback immediately, visually, or verbally) than in the ball-tossing paradigm (e.g., children needed to notice statistically that the amount of throws is strange compared with other players before determining the feedback as negative). Such differences suggest that children may have required more complex processing and a longer time to interpret exclusive situations as negative before labeling their emotions.

The second possibility is the methodological difference between Study 1 and Study 2. Specifically, the adults in Study 1 self-reported their emotions using a questionnaire, whereas the children in Study 2 reported their emotions directly to the experimenter. Given that the children were told that the ball-tossing game was prepared by the experimenter in front of them, they might have hesitated to tell the experimenter that the game evoked negative feelings. This is consistent with findings that the Japanese emphasize social harmony (Markus & Kitayama, 1991) and tend to express negative emotions less (e.g., Lewis et al., 2010; Safdar et al., 2009). Further studies are required to examine whether methodological changes in how emotions are reported are related to subsequent outcomes.

It is also possible that the cultural characteristics mentioned above may be present in adults as well as in children. Specifically, adults in the explicit self-reported measures may also have suppressed reporting negative emotions to a greater extent than in the Western context (e.g., Cheung & Park, 2010). Therefore, further studies are required to examine their emotions using measurements such as behavioral responses during games to provide more valuable insights (Quadrelli et al., 2023; Testa et al., 2024).

The results of the current studies showed that experimental exclusion did not increase later hostile cognition in unrelated situations, indicating that such social experiences might not robustly influence cognition. However, this might not be the case when the period of exclusion is extended. For example, children who have been maltreated during childhood (McElwain et al., 2008; Zajac et al., 2020; Zhu et al., 2020) or victimized by peers (Kawabata et al., 2013) tend to exhibit higher hostile cognitions. Therefore, importantly, even if short-term experimental exclusions have negligible effects, long-term exclusion may have significant effects. Perhaps repeating hostile cognitions toward excluders many times through multiple exclusion experiences (i.e., relatively long-term exclusion) may lead to more generalized hostile cognitions toward unrelated others rather than a single exclusion experience.

Although this study expands our knowledge on social exclusion of adults and children and subsequent cognitions, several limitations should be considered. First, the duration of exclusion differed between Study 1 and Study 2. Specifically, adults in Study 1 experienced exclusion for approximately 5 min, whereas children in Study 2 experienced exclusion for approximately 1 min. Although each duration was determined based on ethical concerns and previous studies, this difference makes it difficult to generalize the results. Future studies should compare the lengths of experiments under several conditions. Second, it should be noted that these studies were conducted in laboratory settings, which means that exclusions induced in the research are not exactly equivalent to those in the real world. The study outcomes, such as hostile thinking and emotions after social interactions, might not necessarily be generalizable to daily life. In addition, the participants' gender was also controlled, which could also affect individuals' social cognition (e.g., Rajchert et al., 2023). Future studies should further explore these findings through other approaches such as observation. Third, no power analysis was performed in Study 1. Instead, we referred to the sample sizes of a previous study (DeWall et al.,

2009) because our primary interest was in the children (Study 2). However, this could have made analysis based on precise and adequately estimated data difficult and led to unexplored issues regarding individuals' hostile cognitions and their mechanisms. Future studies should examine whether the current conclusions can be confirmed under the sample size estimated by exact power analysis. Fourth, we should note the potential impact of each variable's variances and other characteristics. In Study 1, we conducted Welch's *t* test to examine the differences between the conditions because it was considered the better and robust way to avoid the possibilities of problematic two-step testing. However, on the other hand, this could lead to missing detection of potential variables' characteristics that could sometimes lead to worse performance on the test (e.g., Ahad & Yahaya, 2014). Therefore, it is necessary to keep this possibility in mind and to continue considering better statistics. Fifth, the number of represented balls in the manipulation check in Study 2 was not evenly distributed (i.e., zero, one, three, or eight). We selected each number to better represent each verbal instruction (i.e., "never received," "received not much," "received a little," or "received a lot"); however, this inequality could have caused the children to experience difficulty in mentally separating one from three and three from eight. Future studies should select illustrations with an even distribution of balls. Sixth, cultural comparisons were not performed. Future studies should compare the results with those of Western cultures to confirm whether differences exist across countries.

In conclusion, the current studies investigated the effects of social exclusion on later hostile cognitive tendencies and emotions in Japanese adults (Study 1) and young children (Study 2). The results showed that although developmental changes may be possible reasons for emotions and hostile evaluation toward excluders, hostile cognitions toward others (unrelated to the previous context) were inconclusive, suggesting that these were affected by experimental exclusion regardless of the age group. These findings partially contradict previous results from Western cultures and provide insights into the effects of social exclusion from cross-cultural and developmental perspectives to better understand its dynamics.

CRediT authorship contribution statement

Nozomi Yamamoto: Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Ryuta Kuwamizu:** Writing – review & editing, Formal analysis, Data curation. **Yusuke Moriguchi:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Data availability

The data that support the findings of this study are openly available on the Supplemental Data and Open Science Framework (https://osf.io/ns3rv/?view_only=482b70b639d0417bbcdbae9192b4e704).

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Author contributions

N.Y. and Y.M. developed the concept for this study. N.Y. and R.K. collected and coded the data. N.Y., R.K., and Y.M. performed data analysis and interpretation. N.Y. drafted the manuscript. R.K. and Y.M. revised the manuscript. All authors approved the final version of the manuscript for submission.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2025.106200.

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