

## BRIEF REPORT

# Once Failed, Twice Shy: How Group-Based Competition Influences Risk Preference in Young Children

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Recent developmental research demonstrates that young children tend to be risk-seeking. However, very little is known about the extent to which such a capacity varies with children's group-based experience. Given that between-group competition is a central feature of human social life, this study aimed at examining the influence of group-based competition over risk preference in young children. In total, 234 children from 3 age groups (2–4-year-olds, 5–6-year-olds, and 8–9-year-olds) engaged in an intergroup competition manipulation, which was followed by a prosocial game assessing children's ingroup egalitarianism and a gambling task measuring children's risk preference. We found that children in the intergroup competition condition tended to be risk-averse compared with those who were in the nonintergroup competition condition. Furthermore, we found that an aversion to risk in the intergroup competition condition was driven by such an aversion observed in children from the losing group. In addition, we found a positive relationship between ingroup egalitarianism and risk preference in children from the winning group rather than those from the losing group. Together, our results contribute to the understanding of the effects of group-based experience on children's risk preference and may have important implications for understanding individuals' risky decisions.

**Keywords:** risk preference, ingroup egalitarianism, young children, intergroup competition, group identification

Many human behaviors, from mating, food acquisition, to job seeking and business transaction, entail some degree of risk. Risk preference refers to one's tendency to choose between a risky option and a safe option of an equal expected value (e.g., choosing between a sure gain of ¥15 and a 50:50 chance of gaining either ¥30 or nothing). Considering risk preference has deep roots in human life span development, considerable empirical effort has been devoted to the question of how an individual's risk preference changes across development. One developmental phase that has received much attention in recent years is that of childhood, due in part to the fact that explicit representations of various psychological capacities can be accessed during this period (Bigler & Liben, 2006) and also to the fact that childhood adversity is associated with a heightened risk of health and social problems (McCrory, De Brito, & Viding, 2012). Earlier developmental science literature

suggests that young children make more risky choices (Harbaugh, Krause, & Vesterlund, 2002; Levin & Hart, 2003) and are more influenced by the probability of winning than adults (Harbaugh et al., 2002). Recent developmental research has further shown that risk seeking increases in childhood (Levin, Weller, Pederson, & Harshman, 2007; Rakow & Rahim, 2010; Weller, Levin, & Denburg, 2011). For example, 8–11 year-olds tend to accept risk more often than 5–6 year-olds (Levin et al., 2007) and with increasing risk, children are risk-seeking, while adults and adolescents are risk-averse (Paulsen, Platt, Huettel, & Brannon, 2012).

Although evidence for the development of risk preference in childhood is growing, very little is known about the extent to which this capacity varies with children's group-based experience, given that risk preference is generally confronted by an individual embedded in a social group rather than by a single individual in our real life situations (Masclet, Colombier, Denant-Boemont, & Lohéac, 2009; Shupp & Williams, 2008). It has been revealed that the interactions between two unitary groups are more competitive than the interactions between two individuals (Schopler & Insko, 1992). Between-group competition is therefore thought to be a ubiquitous social context in human society (Stein, 1976). Developmental research demonstrates that children's perception of competition emerges in early childhood (Gratch, 1964; Priewasser, Roessler, & Perner, 2013). Moreover, competitiveness is natural among young children (Friedman, 2013). This then raises an important open question of whether children's risk preference may

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unfold differently depending on their experience during group-based competition.

To address this issue, we designed an experiment in which three age groups (2–4-year-olds, 5–6-year-olds, and 8–9-year-olds) engaged in an intergroup competition manipulation involving an intergroup competition task and a nonintergroup competition task. This was followed by a prosocial game involving a choice between 1/1 option and 1/0 option and a gambling task involving a choice between a risky option and a safe option of an equal expected value. Based on arguments that young children tend to think in terms of winning and is generally characterized by must-win ways (Friedman, 2013), we could expect that failure in the between-group competition would decrease children's tendency to make risky choices.

## Method

### Participants

There were 234 native Chinese-speaking children recruited in the present study. Our sample size was based on previous research (Fehr, Bernhard, & Rockenbach, 2008), but final sample size was further determined by the number of parents provided consent as well as the number of children who attended classes. The participants were divided into three age groups: 60 children (29 boys and 31 girls) aged 2 to 4 ( $M = 40.03$  months,  $SD = 5.713$ ), 78 children (39 boys and 38 girls) aged 5 to 6 ( $M = 68.03$  months,  $SD = 4.904$ ), and 96 children (52 boys and 44 girls) aged 8 to 9 ( $M = 106.06$  months,  $SD = 5.028$ ). Data from five participants in the prosocial game were excluded because of either experimenter errors ( $n = 3$ ) or teachers' presence ( $n = 2$ ). Furthermore, data from one participant in the gambling task was excluded because of his failure in following the instructions. The two younger age groups were recruited from a kindergarten and the older age group was recruited from a primary school in Chengdu, China. Because participants were under 18 years old, informed consents were obtained from their parents. The study was approved by the ethics committees of the two schools.

### Experimental Procedures

**Intergroup competition manipulation.** Upon arrival at the waiting room, six participants of each age group were randomly assigned to two equal-sized groups. Each participant was then provided with either a blue or purple ribbon that was tied to his or her right arm according to which group they belonged to (either a blue group or a purple group). After both groups were escorted to the same experimental room by experimenters, they were told that they would be involved in an intergroup competition task.

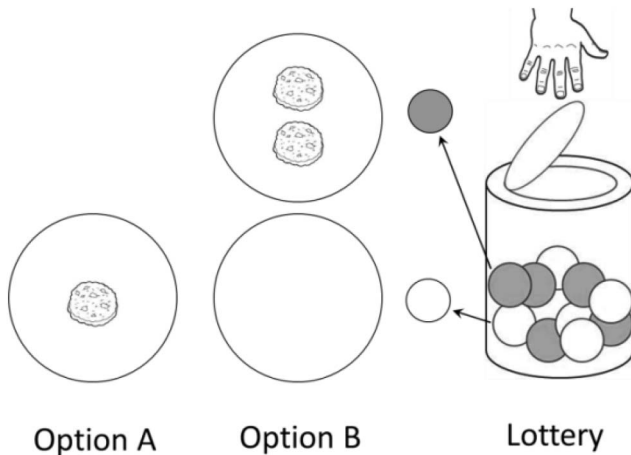
Our experimental protocol concerning the intergroup competition manipulation was similar to the one used in a previous study (Zhu, Guan, & Li, 2015), which includes the intergroup competition task and the nonintergroup competition task. Before the intergroup competition task, experimenters explained the rule of the task to participants and showed the prize (a box of Cartoon Jellies) that a winning group would get. The explanation was repeated when necessary to ensure that participants fully understood it. Then, each group was led by an experimenter to a table separately in the same room. The two tables were 6 m away from each other.

On each table, there were three spoons and two containers (one contained 30 ping-pong balls and the other was empty; between-container distance was 40 cm). During intergroup competition task, members of each group engaged in their teamwork simultaneously in which each member transferred ping-pong balls with a spoon from one container to the other within 20 s. Both groups engaged in such tasks simultaneously. The experimenters were present during the task and recorded the total number of balls successfully transferred by all members of each group. When intergroup competition was completed, these two groups were identified to be either a winning or a losing group according to outcomes of the between-groups rivalry. Finally, each member of the winning group was rewarded a piece of Cartoon Jelly in front of members from the losing group who received no reward.

By contrast, treatment in the nonintergroup competition task was identical to the intergroup competition task described above with one exception—no intergroup competition manipulation was involved. No information about outcomes of the between-groups competition or the prize was delivered to each group in this control group. Furthermore, to control for the potential implicit competition arising from the observation on other group's performance, neither group were allowed to observe each other's performance.

**Ingroup bias measurement.** After the intergroup competition task, we used a so-called "prosocial game" to measure children's ingroup preference to confirm that our intergroup competition manipulation succeeded in creating ingroup bias. The prosocial game has been demonstrated to be suitable for measuring ingroup bias in young children (Fehr et al., 2008). Specifically, each child was asked to choose between the option (1,1)—one bar of chocolate for herself and one for a partner—and the option (1,0)—one for herself and none for a partner. Participants engaged in two prosocial games in which the partner was either from their own group or from the competing group. In this game, the option (1,1) could increase the partner's welfare at no cost to themselves, thereby comparing such egalitarian choices toward ingroup and outgroup partners could allow us to check the validity of our intergroup manipulation. In addition, children's egalitarian choices toward their ingroup partners allowed for assessing ingroup egalitarianism, which has been argued to be an important index of individuals' ingroup attitudes (Rutland, Killen, & Abrams, 2010).

**Risk preference measurement.** To measure children's risk preference, we used a simplified version of gambling task in which children were asked to choose between a sure small prize and equal chances of winning a larger prize or no prize (see Figure 1). This task is similar to the one described in previous work that has been demonstrated to be especially suitable for measuring risk preference in young children (Levin & Hart, 2003). Before this task, only children under the intergroup competition condition were asked about their group performance (i.e., winning or losing) to elicit their intergroup competition experience. Then, they made a choice between Option A (a certain win of one prize) and Option B (50% chance of winning two prizes or no prize). All prizes were wrapped in a yellow bag. Participants were instructed not to open the prizes until they left the classroom, and not to interact with other participants when they finished the gambling task to prevent possible prior knowledge effects.



**Figure 1.** The gambling task. On the left side of the table were three white dishes (diameter = 16 cm) representing two options—Option A for a sure small prize (a dish containing 1 piece of cookie) and Option B for a gamble with equal probability of winning a larger prize (a dish containing two pieces of cookies) or nothing (an empty dish). On the right side of the table was a nontransparent jar containing five yellow balls (in white) and five green balls (in gray). Those who chose Option B were asked to pick a ball from the jar—a green ball for a larger prize and a yellow ball for zero prize.

## Results

### Manipulation Check for Group Induction

We first checked the validity of our group induction. A logistic regression analysis predicting children's egalitarian choices in the prosocial game as a function of partner memberships (outgroup = 0, ingroup = 1), controlling for competitive outcomes, gender, and age groups, showed a highly significant difference in the egalitarian choice (1,1) between ingroup and outgroup partners across all age groups ( $\beta = .96$ ,  $p < .001$ , odds ratio [OR] = 2.62). This suggests that participants are more willing to share resources with ingroup partners than out-group partners, thereby confirming the validity of our group induction.

**Effects of intergroup competitive outcomes on children's ingroup egalitarianism.** We next asked whether competitive outcomes affected children's ingroup preference. A logistic regression predicting children's egalitarian choices as a function of competitive outcomes (losing = 0, winning = 1, nonintergroup competition = 2), controlling for gender and age groups, showed a significantly positive effect of competitive outcomes (winning vs. losing:  $\beta = 1.33$ ,  $p < .05$ , OR = 3.79; nonintergroup competition vs. losing:  $\beta = 1.44$ ,  $p = .02$ , OR = 4.20). This indicated that children from the losing group ( $n = 60$ ) exhibited weaker ingroup identification than those from the winning ( $n = 61$ ) and control groups ( $n = 107$ ; Figure 2a). There was also a significantly positive age group effect ( $\beta = 1.07$ ,  $p = .006$ , OR = 2.90), implying that children's ingroup egalitarianism increased with age. However, we did not find a significant effect of gender ( $\beta = -.09$ ,  $p > .25$ , OR = .92).

**Effects of intergroup competition on children's risk preference.** We found that children under the intergroup competition condition (80.0%) were more likely to shun away from

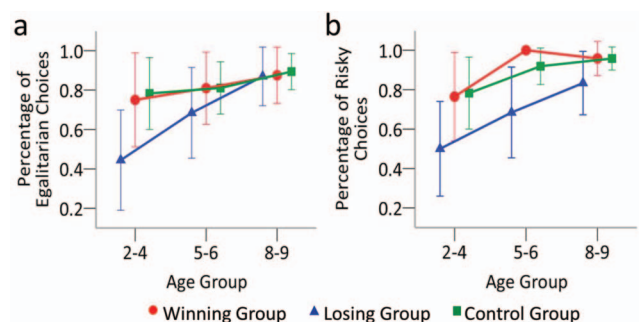
risk than those who were under the nonintergroup competition condition (90.7%). Our subsequent analysis showed that children who lost the intergroup competition were less likely to choose risky choices than those who won the intergroup competition (risky choices: 68.3% vs. 90.7%), while percentage of risky choices observed in the winning group was similar to that observed in the control group (risky choices: 91.9% vs. 90.7%).

Our logistic regression analysis revealed a highly significant main effect of competitive outcomes on risky choices when controlling for age groups and sex (winning vs. losing:  $\beta = 1.78$ ,  $p = .002$ , OR = 5.60; nonintergroup competition vs. losing:  $\beta = 1.49$ ,  $p = .001$ , OR = 4.45) (Figure 2b). This further suggests that children who lost the intergroup competition tended to be risk-averse compared with those who were from the other two groups. Moreover, to test for age and sex effects, we conducted two separate logistic regressions on risky choices as a function of age and sex. We found a significantly positive age effect ( $\beta = .95$ ,  $p < .001$ , OR = 2.60), indicating that children's risk-seeking increases with age. However, we did not find a significant effect of sex ( $\beta = -.34$ ,  $p > .250$ , OR = .71), suggesting that the effects observed above were similar across sex groups.

**Relationship between ingroup egalitarianism and risk preference.** Three separate logistic regressions predicting risk preference (risky choices = 1, nonrisky choices = 0) as a function of ingroup egalitarianism (egalitarian choices = 1, nonegalitarian choices = 0) were conducted to examine the link between ingroup egalitarianism and risk preference in each of three groups (the winning, losing, or control groups). We found a significantly positive relationship between ingroup egalitarianism and risk preference in both the winning and control groups (the winning group:  $\beta = 1.50$ ,  $p < .05$ , OR = 4.50; the control group:  $\beta = 2.02$ ,  $p = .007$ , OR = 7.50). However, such a relationship was not significant in the losing group ( $\beta = .77$ ,  $p = .12$ , OR = 2.17), implying that such a relationship is sensitive to group status.

## Discussion

In this study, we examined the influence of the between-group competition over risk preference in young children. We found that children in the intergroup competition condition tended to be risk-averse compared with those who were in the noncompetition condition. Our subsequent analysis showed that this competition-



**Figure 2.** Mean percentage of (a) egalitarian choices in the prosocial game (with the ingroup partner) and (b) risky choices as a function of age groups and competitive outcomes. Error bars represent 95% confidence intervals. See the online article for the color version of this figure.



induced risk aversion was driven by a dramatic decrease in risky decisions made by children from the losing group, indicating that children in the losing group tend to be risk-averse relative to those from the other two groups. Consistent with previous findings (Nesdale & Flesser, 2001; Yee & Brown, 1992), our results imply that young children are sensitive to group status. Moreover, these findings go beyond them. Prior literature demonstrates that a single young child was insensitive to gain or loss task framing (Reyna & Ellis, 1994), whereas our observations suggest that they were instead sensitive to the group-based loss. More important, according to a dual system model (Steinberg, 2010), individuals' risky decisions reflect an imbalance or a dynamic competition between self-control and impulsivity. One possible explanation for the modulating effects of the between-groups competition on risk preference in young children is that the failure experience may enhance children's self-control capacity, which subsequently makes them shun away from risky options so that they could avoid losing once again. This actually underscores the need to consider the modulating role of group-based experience in the development of risk preference in children (Defoe, Dubas, Figner, & van Aken, 2015).

A body of literature demonstrates that intergroup competition reduces the within-group conflict and positively affect the cooperation levels (Bornstein, Gneezy, & Nagel, 2002) as well as ingroup identification (Tajfel & Turner, 1979). Strong ingroup identification is thought to reduce uncertainty (Hogg, 2007) because peers as the source of social support serve as "cushion" in the case of losses (Hsee & Weber, 1999). This "cushion effect" suggests a positive relationship between ingroup identification and risk preference. Our results confirm it by showing a significantly positive relationship between ingroup egalitarianism and risk preference in the winning group. However, such a relationship was relatively weak in the losing group. It has been revealed that negative information (e.g., losing) about the group performance would reduce the ingroup liking (Bigler, Brown, & Markell, 2001; Nesdale & Flesser, 2001) and the failure in group-based competition impairs young children's self-evaluation and performance in the subsequent task (Rhodes & Brickman, 2008). As a result, one possible explanation for the weak predictive power of ingroup egalitarianism in the losing group may reflect these negative consequences. Further clarification on this issue requires future studies exploring the role of emotion induced by the between-groups competitive outcomes in risk preference, because emotions often drive people's decision away from cognitive assessment of risky situations (Loewenstein, Weber, Hsee, & Welch, 2001).

Additionally, consistent with prior findings (Fehr et al., 2008), we found that parochial egalitarianism was already present in early childhood and increased with age (an ingroup-outgroup gap: 5.3% of 2–4-year-olds, 13% of 5–6-year-olds, and 23.4% of 8–9-year-olds). Moreover, the age-related decrease in sensitivity of ingroup egalitarianism to competitive outcomes (a win-loss gap: 30.6% of 2–4-year-olds, 12.6% of 5–6-year-olds, and 0.5% of 8–9-year-olds) may reflect the fact that older children are less sensitive to negative feedback (Humphreys et al., 2015) and more matured to consider efforts and merits than younger children (Almås, Cappelen, Sørensen, & Tungodden, 2010).

Finally, the present study is not without any limitations. We found that older children tended to be risk-seeking compared with younger children. Because we did not manipulate reward proba-

bilities associated with risky choices, it is still unclear whether the effect we see regarding the greater preference for risky options in older children, regardless of experimental conditions, is a function of understanding probabilities better than younger children—a 50/50 chance of a high reward outcome is a pretty good chance—or if intergroup competition condition does not modulate risk preference in older children. Moreover, a closely related issue is that we only offered one shot gambling task, making it difficult to ascertain whether and how risk preference unfolds as a function of age and group-based competition. Building on these considerations, we believe that it is important to take them into account in future studies (e.g., including more trials with varied risk probabilities (e.g., 33% or 10%).

In summary, we explored the extent to which risk preference varies with group-based competition in young children. We found that the failure experience during intergroup competition would make children show weaker preferences for risky choices. Our findings endorse a view that between-groups experience can shape children's risky decisions and may stimulate more empirical and theoretical work on this topic in future studies.

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