

DOI: 10.32604/ijmhp.2023.028166

ARTICLE



How Do Young Children Manage Their Reputation among Peers?

Jingmiao Zhang^{1,2}, Yuning Zhu² and Xiuli Liu^{2,*}

¹School of Educational Science and Technology, Anshan Normal University, Anshan, 114000, China

²School of Psychology, Northeast Normal University, Changchun, 130000, China

*Corresponding Author: Xiuli Liu. Email: liux1515@nenu.edu.cn

Received: 02 December 2022 Accepted: 08 February 2023 Published: 01 June 2023

ABSTRACT

Young children's reputation management is closely related to their social development. The purpose of our study is to examine the interaction between theory of mind and partner choice on children's reputation management. Participants consisted of 270 children who were 3 to 5 years old. First, we measured participants' theory of mind capabilities using the unexpected location task and unexpected content task and then randomly divided the participants into the control group, non-partner-choice group, and partner-choice group. We measured reputation management by comparing children's willingness to share and sharing behavior between these groups. The findings are as follows: (1) Children from ages 3 to 5 demonstrated reputation management, and their reputation management followed a significant developmental trend. The reputation management of 4-to 5-year-old children was significantly better than that of 3-year-old children. (2) Scores on the theory of mind tasks positively predicted children's reputation management. (3) Partner choice affected children's reputation management. In the partner-choice group, children's reputation management was more apparent. (4) Partner choice did moderate the relationship between theory of mind and children's reputation management. In the partner-choice group, theory of mind had a stronger predictive effect on children's reputation management.

KEYWORDS

Theory of mind; partner choice; reputation management; children

Introduction

"Gifts of roses, hand there is lingering fragrance". Altruistic behavior is not only altruistic, but also beneficial to the altruist [1]. Studies have found that when there are reputation cues in the situation, people change their behavior and become more altruistic [2–4]. As a result, adults strategically change their behavior in front of observers to achieve a desired reputation, a process that Milinski and Manfred have called reputation management. Generally, reputation is said to consist of two interrelated processes [5]. First, individuals must think about "what the observer thinks of me", which requires inferring the observer's mental state [6]. Second, being aware of others' reputational judgments, individuals adjust their behavior in order to be viewed in a more positive light, even damaging their own interests [7-10]. In recent years, developmental studies have shown that children also display significant reputation management [11-17]. By exploring the development of children's reputation management and its influencing factors, we can know more about altruistic behavior.

Currently, researchers agree that young children can manage their reputation [13,16–19]. However, their opinions differ on the developmental characteristics and critical age of children's reputation management. Some researchers believe this is a complicated social behavior that begins after the age of 5 [13,15,16], while others think that children as young as 3 or 4 years old exhibit simple reputation management [17,19,20]. One purpose of our study is to understand the characteristics and development of 3- to 5-year-old children's reputation management. This



helps to accurately explore the relationship between theory of mind, partner choice, and reputation management.

Theory of mind has been given more frequent attention in research as an important cognitive factor influencing children's reputation management [21–25]. The hypothesis of multiple forces holds that theory of mind can help children weigh the advantages and disadvantages of different motivations and find a balance between selfinterest and the welfare of others [7]. Generally, there are competing motivations in situations that may influence one's reputation, so young children's decision-making behavior in these circumstances is affected by their theory of mind. However, no existing study has measured the relationship between theory of mind and typical young children's reputation management. Therefore, an additional goal of our study was to determine whether theory of mind affects children's reputation management.

Researchers generally believe that partner choice and children's reputation management are closely related [25-27]. Indirect reciprocity and competitive altruism explain the influence of partner choice on reputation management in terms of motivation. Indirect reciprocity says that people are more willing to help altruistic individuals, and they judge an individual's altruism by the reputation people spread [8]. Competitive altruism emphasizes that in order to win the favor of partners, individuals not only need to be altruistic, but also to be more altruistic than competitors [28]. That is, individuals want to be favored by potential partners to gain benefits, so they engage in more complex reputation management in hopes of being viewed in a positive light [8,28]. So, we concluded that when a clear partner choice cue is added to the reputation situtation, the individual will behave more in line with social expectations. Recent experiments have supplied compelling evidence for this concept [29,30]. For example, the experimenter invited 8year-old children to join a advadic sharing game in which both children simultaneously decided how many rewards to share with each other. The children either knew that one of them would be picked for a subsequent collaborative game or had no such knowledge. The results found that children were more generous in the sharing game when it could affect their chances of being chosen for a subsequent game [29]. However, the influence of partner choice on young children's reputation management is not clear because previous studies often invited older children or adults. A third question this study aims to answer is whether partner choice can influence young children's reputation management.

Reputation management is affected by theory of mind and partner choice. Engelmann et al. argued that the prerequisite for exhibiting reputation management is one's ability to understand what others think of them, known as theory of mind [15]. Individual reputation management is also influenced by social relationships based on partner choice. Cage et al. have found that partner choice affects reputation management in both autistic and typical individuals but has a greater impact on typical individuals [31]. They asserted that the difference in reputation management between autistic and typical individuals may be due to their difference of theory of mind and motivation. Based on them and the hypothesis of multiple forces [7], we hypothesized that partner choice moderates the influence of theory of mind on reputation management. Theory of mind of children at different ages makes it possible for the experiment to take place. The final purpose of our study is to determine whether partner choice moderates reputation management in typical groups with varying levels of theory of mind.

We proposed four hypotheses for this study: (1) Threeto five-year-old children can manage their reputation; (2) children's theory of mind affects their reputation management; (3) partner choice affects children's reputation management; (4) partner choice moderates the influence of theory of mind on children's reputation management.

Method

Participants and procedure

We contacted a kindergarten in a city in northeast China and asked teachers to distribute information about the study to children and their guardians. We received verbal consent from each child's guardian.

A total of 270 children (159 boys and 111 girls) participated in our study. There were 90 children (54 males) aged 3 years (M = 3.61 years, SD = 0.30 years), 90 children (54 males) aged 4 years (M = 4.55 years, SD = 0.32 years), and 90 children (51 males) aged 5 years (M = 5.57 years, SD = 0.34 years).

We chose a quiet room in the kindergarten as the experimental site and a trained female graduate student majoring in psychology as the experimenter. First, the experimenter developed rapport with the child and then began the formal experiment. Children were asked to complete three tasks: the two theory of mind tasks and the sharing task. In the sharing task, young children of each age group were randomly assigned to the control group, non-partner-choice group, or partner-choice group. There were 30 children of each age in each group.

Measures

(1) Theory of mind tasks

Unexpected location task

Adapted from the classic unexpected location task [32], the experimenter and child watched an animated video that showed the following: Doudou was playing with a bear in the living room. Later, Doudou put the bear on the sofa and went out to play by herself. When Doudou was gone, her mother put the bear in Doudou's bedroom. When Doudou came back inside, she wanted to play with the bear again.

After the video ended, the experimenter asked, "Where does Doudou think the bear is? Where is it actually?" and "Where would Doudou find her bear? In the living room or Doudou's bedroom?".

Unexpected content task

Adapted from the classic unexpected content task [33], the experimenter showed the child a cookie box and asked, "What do you think is in the box?" After the child answered, the experimenter opened the box and showed the child what was inside—pencils, not cookies. The experimenter asked, "What's in the box?" and "If your best friend, [name of the child's best friend], comes and does not look inside the box, what does he/she think is in it—cookies or pencils?".

(2) Sharing task

First, the experimenter showed the child five stickers and said that she would give them to the child. She then told them that she would be going to another kindergarten in a few days. The experimenter told the child that he or she could take all the stickers home or give some away to a child in the other kindergarten. Next, the experimenter gave the child a white envelope and a yellow envelope, and said, "You can put the stickers you want to take home in the white envelope and put any stickers you want to share with the child in another kindergarten in the yellow envelope". To assess whether the child understood the rules, the experimenter asked three questions: (a) "How many stickers do you have?" (b) "Which envelope is for you?" (c) "Which envelope is for another child?".

Control group

In the control group, the experimenter explained that the child had the freedom to decide whether or not to give stickers to another child and how many stickers to give. She instructed them to place any stickers they wished to give away into the yellow envelope and to put the envelope into a paper bag. She told them that because the bag was filled with yellow envelopes, no one would know how many stickers they put into their envelope. Then, the experimenter left the room so the child could complete the task without being observed. When she returned, she thanked the child, asked them to keep the activity a secret, and took them back to class.

Non-partner-choice group

Based on previous research [16,19,20], we manipulated reputation management in our experiment by adding an observer. The observer said they knew the child's classmates thought of the child as "a good kid who is generous," and the child confirmed that the observer could see their behavior.

First, the experimenter determined whether the child understood the phrase "a good kid who is generous". If the child did not understand, she gave specific examples such as sharing food and toys with other children. When the child understood, the experimenter told them, "I heard from your class that you are a good kid who is generous. I will tell the class how many stickers you gave to another child today". Then they asked the child to complete the sharing task. When they were finished, the experimenter thanked the child, asked them to keep the activity a secret, and took them back to class.

Partner-choice group

Based on previous research [18,30], in the partner-choice group, the experimenter told each child that she would give erasers—in our pre-experiment, most children preferred erasers to stickers—to the most generous child in the class when she returned in a few days.

Like in the non-partner-choice group, the experimenter ensured that the child understood the phrase "a good kid who is generous". Next, the experimenter told the child, "I heard from your class that you are a good kid who is generous. I will tell the class how many stickers you gave to another child today". Then the experimenter showed the child a box with six erasers and told them, "I will come back to the kindergarten in a few days, and I will share the erasers with the most generous kids in your class". After the child completed the sharing task, the experimenter told them that she suddenly remembered she would be unable to come back to the kindergarten for several days because of family affairs, apologized to the child, and gave the child three

Data Analysis

(1) Theory of mind tasks

When we scored the unexpected locations task, if the child's answer was "in the living room," they passed the task and earned 1 point. If the child's answer was "in the bedroom," they did not pass the task and earned 0 points. Scores ranged from 0 to 1.

erasers. Finally, the experimenter thanked the child, asked

them to keep the activity a secret, and took them back to class.

When we scored the unexpected content task, if the child's answer was "cookies" they passed the task and scored 1 point; if the child's answer was "pencils" they did not pass the task and scored 0 points. Scores range from 0 to 1. (2) Sharing task

In our study, the control group did not provide any information related to reputation and partner choice. The control group served to measure children's sharing behavior in situations that do not impact their reputation and to test whether children's sharing behavior is related to their theory of mind. As we all know, in real life, children would share even when there are no reputation cues and partner choice cues in the situation. So we measured the sharing behavior of children in the control group as a baseline. In addition, before analyzing the relationship between theory of mind and reputation management, we need to eliminate the interference between theory of mind and sharing behavior. Whether theory of mind is related to sharing behavior, there is no clear answer, some researchers think related [34,35], some think not related [36,37]. Therefore, we should first examine the relationship between theory of mind and sharing behavior, that is, the correlation between theory of mind and sharing behavior of children in the control group. Alternatively, the non-partner-choice group only offered reputation-related information. The non-partner-choice group served two purposes. By comparing the results of this group with those of the control group, we hoped to gain a better understanding of the occurrence and developmental characteristics of children's reputation management. The second purpose was to measure children's desire to manage their reputations in non-partner-choice situations. Finally, the purpose of the partner-choice group was to measure young children's reputation management in the context of partner choice. It allowed us to explore the influence of partner choice on reputation management by comparing the reputation management of children in this group with that of children in the non-partner-choice group.

The child's decision regarding whether to share the stickers was recorded as their willingness to share and the number of stickers each child placed in the envelope to give

TABLE 1

Willingness to share of children aged 3 to 5

Age	Group	Sharing willingness	X^2	Þ
3	Non-partner-choice	73.30%	8.15	0.004
	Control	36.70%		
4	Non-partner-choice	80.00%	4.80	0.03
	Control	53.30%		
5	Non-partner-choice	86.70%	2.46	0.12
	Control	70.00%		

to other children was recorded as their sharing behavior [17,19].

Results

Three-to five-year-old children's reputation management

To text "(1) 3- to 5-year-old children can manage their reputation" hypothesis we measured the willingness to share and sharing behaviour of children ages 3 to 5 in the non-partner-choice group and control group.

The willingness to share and sharing behavior of children ages 3 to 5 in the non-partner-choice group and control group are shown in Table 1. A chi-square test was used to analyze 3to 5-year-old children's willingness to share in different situations. If the child was willing to share, this was coded as 1, and if the child was not willing to share, this was coded as 0. The results showed that there were significant differences between the groups in 3-year-old children's willingness to share. There were significant differences between the groups in 4-year-old children's willingness to share well. Because the percentage of 5-year-old in the control group who were willing to share reached 70, this may indicate a ceiling effect. Therefore, although the percentage of 5-year-old who were willing to share was higher in the non-partner-choice group than in the control group, there was no significant difference between the groups in 5-year-old children's willingness to share. Another chi-square test was used to further analyze whether there was a difference in willingness to share between 3-year-old children and 4-year-old children in the non-partner-choice group, and there was no significant difference found, X^2 (1) = 0.37, p > 0.05. The results showed that 3-year-old and 4year-old children manage their reputation by altering their willingness to share and that there was no difference in reputation management between 3-year-old and 4-year-old children. When the situation had the potential to affect their reputation, 3- to 5-year-old children showed a strong willingness to share.

The average number of stickers shared were 0.93 (3-yearold/non-partne-choice), 0.67 (3-year-old/control), 2.33 (4year-old/non-partne-choice), 0.77 (4-year-old/control), 2.23 (5-year-old/non-partne-choice), and 0.97 (5-year-old/ control). An ANOVA analysis was used to analyze the

sharing behavior of 3- to 5-year-old children in different situations. The age and group were independent variables, and the number of stickers that children shared was the dependent variable. It was a 3 (age: 3, 4, 5) \times 2 (group: nonpartner-choice group, control group) experimental design. The results showed that the effect of group was significant, $F(1,174) = 33.32, p < 0.001, \eta_p^2 = 0.16$. The number of stickers shared by those in the non-partner-choice group was significantly higher than those shared by the control group, p < 0.001. The effect of age was significant, F(2,174)= 8.36, p < 0.001, $\eta_{p}^{2} = 0.09$. The number of stickers 5-yearold children shared was significantly higher than that of 3year-old children, p < 0.05, and the number of stickers shared by 4-year-old children was significantly higher than that of 3-year-old children, p < 0.05. There was no significant difference between 4- and 5-year old children in the number of stickers shared, p > 0.05. There was significant interaction between group and age, F(2,174) =4.82, p < 0.05, $\eta_p^2 = 0.05$. The results of the simple-effects analysis showed that the number of stickers given to other children by 5-year-old children in the non-partner-choice group was significantly higher than that in the control group, p < 0.001. The number of stickers given by 4-yearold children in the non-partner-choice group was significantly higher than that in the control group, p < p0.001. There was no significant difference between the nonpartner-choice group and the control group in the number of stickers shared by 3-year-old children, p > 0.05. The number of stickers given by 5-year-old children to other children was significantly higher than that of 3-year-old children in the non-partner-choice group, p < 0.001, and the number of stickers shared by 4-year-old children was also significantly higher than that of 3-year-old children in the non-partner-choice group, p < 0.001. There was no significant difference in the number of stickers given to other children between 4-year-old and 5-year-old children in the non-partner-choice group, p > 0.05. The results showed that both 4-year-old and 5-year-old children managed their reputation by adjusting the number of stickers they shared, and that this behavior does not vary between 4-year-old and 5-year-old children.

In summary, 3- to 5-year-old children all showed reputation management behavior, and their reputation management gradually matured as age increased. 3-yearolds could only manage their reputation at the level of willingness to share, while 4- to 5-year-old not only displayed a strong willingness to share, but also managed their reputation by increasing the number of stickers they shared with other children. Because 3-year-old children's reputation management was not embodied by their sharing behavior, we used 4- to 5-year-old children's sharing behavior to analyze the relationship between theory of mind, partner choice, and reputation management.

The effect of theory of mind on reputation management

To text "(2) children's theory of mind affects their reputation management" hypothesis we used Pearson correlation analysis, and the results showed that there was a significant

TABLE 2

Score of theory of mind and the number of stickers children shared in different groups

Group	Theory of mind	Number of stickers (sheet)
Control	1.07	0.87
	(0.86)	(0.85)
Non-partner-choice	1.47	2.28
	(0.81)	(1.65)
Partner-choice	1.22	3.13
	(0.85)	(1.61)

correlation between scores on the unexpected content task and the unexpected location task, p < 0.001, r = 0.55. This indicates that scores on the two tasks reflect the children's theory of mind consistently. The total score of theory of mind was obtained by adding the scores of the two tasks, which ranged from 0 to 2. The score of theory of mind and the number of stickers children shared in each group are shown in Table 2.

The results of Pearson correlation analysis showed that there was no significant correlation between the number of stickers shared and the score of theory of mind in the control group, p > 0.05, r = -0.15. The results ruled out the possibility of a significant correlation between children's theory of mind and their sharing behavior in control group, and avoided the interference of the experimental results. There was a marginally significant correlation between the number of stickers shared and the score of theory of mind in the non-partner-choice group, p = 0.055 > 0.05, r = 0.25, and there was a significant correlation between the number of stickers shared and the score of theory of mind in the partner-choice group, p < 0.001, r = 0.59.

The effect of partner choice on reputation management

To text "(3) partner choice affects children's reputation management" hypothesis we used independent sample *t*-test, and the results showed that there were significant differences between the non-partner-choice group and partner-choice group in the number of stickers children shared, t = 2.86, df = 118, p < 0.05, d = 0.52. Through comparing the average number of stickers shared in the

experimental conditions, it was clear that children in the partner-choice group shared more stickers than children in the non-partner-choice group. The results indicate that partner choice has a positive effect on children's reputation management.

The moderating effect of partner choice

To text "(4) partner choice moderates the influence of theory of mind on children's reputation management" hypothesis we analyzed the moderating effect of partner choice using the bootstrap method. The number of stickers the children shared was the dependent variable; the theory of mind score was the independent variable. Moreover, the experimental condition (non-partner–choice group was coded 0; partnerchoice group was 1) was the moderator, and the children's age was the control variable. Results are shown in Table 3. The results showed that the moderating effect of partner choice on the relationship between theory of mind and reputation management was significant, p < 0.001. The moderating effect was 0.63.

Simple slope results are shown in Fig. 1. The results showed that in the non-partner–choice group, 4- to 5-year-old children's theory of mind could predict their reputation management significantly, $B_{simple} = 0.26$, t = 2.14, p < 0.05. In the partner-choice group, 4- to 5-year-old children's theory of mind could also predict their reputation management significantly, $B_{simple} = 0.59$, t = 5.07, p < 0.001. The results showed that compared with the non-partner–choice group, theory of mind had a stronger positive predictive effect on children's reputation management in the partner-choice situation. When there are clear partner choice cues in the situation, the reputation management of young children



FIGURE 1. Moderating effect of partner choice on the relationship between theory of mind and children's reputation management.

TABLE 3

The moderating effect of partner choice on the relationship between theory of mind and children's reputation management

Predictive variable	В	S. E.	t	p	F
Z _{theory of mind}	0.26	0.12	2.14	0.034	9.85 ($p < 0.001$)
Partner choice	0.63	0.16	3.91	< 0.001	
Age	-0.21	0.17	-1.23	0.220	
Z _{theory of mind} * partner choice	0.33	0.16	1.99	0.049	
R ²	0.26				

with higher theory of mind was stronger than children with lower theory of mind.

Discussion

Developmental characteristics of 3- to 5-year-old children's reputation management

In our study, 3- to 5-year-old children displayed obvious reputation management behavior, and their reputation management varied significantly based on their age. 4- to 5year-old children showed more advanced reputation management than 3-year-old children. 3-year-old only managed their reputation by being willing to share, while 4and 5-year-old not only showed a strong willingness to share, but also managed their reputation by increasing the number of stickers they shared with other children.

Three-year-old children's reputation management was not as developed as the older children's. This may be due to several reasons. First, 3-year-old are still in the early stages of explicit theory of mind development, and their immature explicit theory of mind could affect their understanding of reputation. Furthermore, at the age of 3, children's temporal-cognitive ability is also in its early stages of development [38], so children may not deeply understand the impact of their current reputation on their later life. Thirdly, the development of cognitive skills related to reputation management could also affect children's reputation management. For example, 3-year-old children's concept of numbers is immature [39], and this could have their ability to create and maintain a positive reputation in our study. Overall, the immaturity of 3-year-old children's reputation management was likely due to their limited cognitive development.

In terms of reputation management, 4-year-old children seem to be in a transitional stage. Rapp et al. found that although 4-year-old children showed obvious reputation management behavior, it was not flexible; they could not adjust their reputation management behavior according to different situations [17]. In our study, compared with 3year-old children, 4-year-old children displayed more mature reputation management behavior, both in willingness to share and sharing behavior.

The results suggest that 5-year-old were able to manage their reputation more adequately than the younger children, which is consistent with previous empirical studies [13,14,16,18]. At 5 years old, children's understanding of false beliefs is more developed, so they can understand that people may hold different beliefs regarding the same event or the same experience. This could explain why they had a deeper understanding of reputation than younger children. 5-year-old also tend to be more socially experienced and have more developed cognitive skills that enable them to recognize the important role of reputation. There was no difference between 4- and 5-year-old in terms of the number of stickers they shared, which may be due to the simplicity of the reputation situation in this experiment. Future research should utilize more complex tasks to explore the development of children's reputation management.

Influence of theory of mind on children's reputation management

The results show that theory of mind can positively predict 4to 5-year-old children's reputation management. This is consistent with the results of previous studies and corresponds to the hypothesis of multiple forces [7,21,23,25]. Firstly, in terms of the understanding of reputation, the more mature children's theory of mind is, the better children's understanding of the impact of good reputation on their own is. After passing the first-order false belief task, young children can understand that individuals with different beliefs will behave differently towards the same thing or event. Similarly, they can understand that different reputations can lead to different ways of interacting with the same person. Therefore, children whose theory of mind is more mature will pay more attention to creating and maintaining their good reputation. Secondly, in the process of sharing, young children with more mature theory of mind have a better understanding of their own situation and can more accurately guess the wishes and intentions of the bystander, so as to make the best decision, show the bystander that he/she is willing to share. The children who fail to pass the first-order false belief task are still in the stage of full egocentricity, and their sharing behavior mainly takes into account their own wishes and needs, so they mainly show self-interested sharing behavior, and can not show effective reputation management behavior.

Influence of partner choice on children's reputation management

In our social life, people often prefer to interact with individuals or groups with certain characteristics. The researchers argue that if people benefit from interacting with cooperative individuals, in the long run, a reputation for cooperation will have a huge advantage in individual competition for opportunity [8,28]. Therefore, in order to gain the favor of the opportunity provider, people will pay more attention to the management of their ideal reputation. The results show that partner choice plays an important role in children's reputation management, and 4- to 5-year-old children show more significant reputation management behavior in the situation of partner choice. This supports the idea of indirect reciprocity and competitive altruism [18,26–30]. In partner choice scenarios, young children need to compete with other young children for the reputation of being the "the best kid who is most generous" in order to win the chance to be chosen as an interactive partner. At this point, bystanders not only evaluate their behavior, but also compare their behavior with that of other competitive children. As a result, young children are more generous in sharing activities in order to gain the first place in the reputational competition and the favor of opportunity providers, thus becoming their future partners.

Moderating effect of partner choice

We also found that partner choice moderates the relationship between theory of mind and reputation management in young children. In situations of partner choice, children's theory of mind could predict their reputation management behavior more positively. These results support the point of Engelmann et al. that theory of mind and partner choice have a combined effect on children's reputation management [15]. In the context of non-partner-choice group, young children need only to understand their own situation and the psychological state of the experimenter in order to maintain their reputation as "a good kid who is generous". In the partner-choice scenario, however, children only wanted to maintain their reputation as "a good kid who is generous", but also wanted to play the game again with the experimenter. If young children want to get the chance to play again, they have to win the reputation of being the "the best kid who is most generous". In this situation, young children not only need to understand their own situation and the psychological state of the experimenter, but also need to explain and predict the psychological state of other competitors. Therefore, under the situation of partner choice, young children's situation is more complex and their need for good reputation is more urgent. Partner choice changes the influence of children's theory of mind on their reputation management, children with more mature theory of mind can understand more accurately the psychological state of the opportunity provider and the competitor, and thus display the most generous behavior.

Limitations

Our study had some limitations. First, this study explored the developmental characteristics of 3- to 5-year-old children's reputation management by using the number of stickers they shared with other children as a dependent variable, but we did not control for the development of children's understanding of numbers. Future research should consider using other experimental paradigms that do not involve the concept of numbers or control for participants' understanding of numbers when using this experimental paradigm. Secondly, this study only discusses the influence of explicit theory of mind on children's reputation management. Some researchers believe that children's implicit theory of mind could also influence their reputation management [31]. Future research should continue to explore the influence of implicit theory of mind on children's reputation management.

Overall, we obtained the following results from young children: (1) 3- to 5-year-old children can manage their reputation; (2) children's theory of mind affects their reputation management; (3) partner choice affects children's reputation management; (4) partner choice moderates the influence of theory of mind on children's reputation management. It may help us to comprehend the selfinterested motivation of altruistic behavior by understanding young children's reputation management and its influencing factors.

Acknowledgement: We thank Qiyu Huang, Jing Chen, Kexin Lyu, and Xiaoxia Lin for some critical feedback on this study.

Funding Statement: The authors received no specific funding for this study.

Author Contributions: The authors confirm contribution to the paper as follows: study conception and design: Jingmiao Zhang, Yuning Zhu, Xiuli Liu; data collection: Jingmiao Zhang; analysis and interpretation of results: Jingmiao Zhang, Yuning Zhu, Xiuli Liu; draft manuscript preparation: Jingmiao Zhang, Yuning Zhu, Xiuli Liu. All authors reviewed the results and approved the final version of the manuscript.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

References

- Xie XF, Wang YL, Gu SY, Li W. Is altruism just other-benefiting? A dual pathway model from an evolutionary perspective. Adv Psychol Sci [Internet]. 2017;25(9):1441–55. doi:10.3724/SP.J. 1042.2017.01441.
- Tomasello M, Melis AP, Tennie C, Wyman E, Herrmann E. Two key steps in the evolution of human cooperation: the interdependence hypothesis. Curr Anthropol [Internet]. 2012;53(6):673–92. doi:10.1086/668207.
- Yuan M, Zhang M, Yu K. Prosocial reputation and prosocial behavior. Adv Psychol Sci [Internet]. 2016;24(10):1655–62. doi:10.3724/SP.J.1042.2016.01655.
- Silver IM, Shaw A. Pint-sized public relations: the development of reputation management. Trends Cogn Sci [Internet]. 2018;22(4):277–9. doi:10.1016/j.tics.2018.01.006.
- Milinski M. Reputation, a universal currency for human social interactions. Philos Trans R Soc Lond B Biol Sci [Internet]. 2016;371(1687):20150100. doi:10.1098/rstb.2015.0100.
- Shinohara A, Kanakogi Y, Myowa M. Strategic reputation management: children adjust their reward distribution in accordance with an observer's mental state. Cognitive Dev [Internet]. 2019;50(2):195–204. doi:10.1016/j.cogdev.2019.04.003.
- Chen T, Wu Z. Children's distributive justice: the role of theory of mind. Advances in Psychological Science [Internet]. 2017;25(8):1299–309. doi:10.3724/SP.J.1042.2017.01299.
- Liu GF, Xin ZQ. Reputation mechanisms in indirect reciprocity: image, standing, tag and its transmission. Adv Psychol Sci [Internet]. 2011;19(2):233–42. doi:10.3724/SP.J.1042.2011. 00233.
- Yuan ML, Zhang MY, Kou Y. Prosocial reputation and prosocial behavior. Adv Psychol Sci [Internet]. 2016;24(10):1655–62. doi:10.3724/SP.J.1042.2016.01655.
- Zhang XJ, Liu CH. The watching eyes effect on prosociality. Adv Psychol Sci [Internet]. 2017;25(3):475–85. doi:10.3724/SP.J.1042. 2017.00475.
- Hill V, Pillow BH. Children's understanding of reputations. J Genet Psychol [Internet]. 2006;167(2):137–57. doi:10.3200/ GNTP.167.2.137-157.
- Banerjee R. Audience effects on self-presentation in childhood. Soc Dev [Internet]. 2010;11(4):487–507. doi:10.1111/ 1467-9507.00212.
- Engelman JM, Herrman E, Tomasello M. Five-year olds, but not chimpanzees, attempt to manage their reputations. PLoS One [Internet]. 2012;7(10):e48433. doi:10.1371/journal.pone. 0048433.
- Leimgruber KL, Alex S, Santos LR, Olson KR. Young children are more generous when others are aware of their actions. PLoS One [Internet]. 2012;7(10):e48292. doi:10.1371/journal.pone. 0048292.

- Engelmann JM, Rapp DJ. The influence of reputational concerns on children's prosociality. Curr Opin Psychol [Internet]. 2018;20:92–5. doi:10.1016/j.copsyc.2017.08.024.
- Fu G, Heyman GD, Qian M, Guo T, Lee K. Young children with a positive reputation to maintain are less likely to cheat. Dev Sci [Internet]. 2016;19(2):275–83. doi:10.1111/desc.12304.
- Rapp DJ, Engelmann JM, Herrmann E, Tomasello M. Young children's reputational strategies in a peer group context. Dev Psychol [Internet]. 2019;55(2):329–36. doi:10.1037/dev0000639.
- Engelmann JM, Over H, Herrmann E, Tomasello M. Young children care more about their reputation with ingroup members and potential reciprocators. Dev Sci [Internet]. 2013;16(6):952–8. doi:10.1111/desc.12086.
- Kelsey C, Grossmann T, Vaish A. Early reputation management: three-year-old children are more generous following exposure to eyes. Front Psychol [Internet]. 2018;9(698):201. doi:10.3389/ fpsyg.2018.00698.
- Zhao L, Heyman GD, Chen L, Lee K. Telling young children they have a reputation for being smart promotes cheating. Dev Sci [Internet]. 2018;21(3):e12585. doi:10.1111/desc.12585.
- Begeer S, Banerjee R, Lunenburg P, Terwogt MM, Stegge H, Rieffe C. Brief report: self-presentation of children with autism spectrum disorders. J Autism Dev Disord [Internet]. 2008;38(6):1187–91. doi:10.1007/s10803-007-0503-0.
- 22. Cage E, Bird G, Pellicano E. Reputation management in children on the autism spectrum. J Autism Dev Disord [Internet]. 2016;46(12):3798-811. doi:10.1007/s10803-016-2923-1.
- Chevallier C, Molesworth C, Happé F. Diminished social motivation negatively impacts reputation management: autism spectrum disorders as a case in point. PLoS One [Internet]. 2012;7(1):e31107. doi:10.1371/journal.pone.0031107.
- Izuma K, Matsumoto K, Camerer CF, Adolphs R. Insensitivity to social reputation in autism. Proc Natl Acad Sci U S A [Internet]. 2011;71(42):e77. doi:10.1016/j.neures.2011.07.327.
- 25. Scheeren AM, Begeer S, Banerjee R, Meerum TM, Koot HM. Can you tell me something about yourself?: self-presentation in children and adolescents with high functioning autism spectrum disorder in hypothetical and real life situations. Autism Int J Res Pract [Internet]. 2010;14(5):457–73. doi:10. 1177/1362361310366568.
- Barclay P, Willer R. Partner choice creates competitive altruism in humans. Proc R Soc B: Bio Sci [Internet]. 2007;274(1610):749– 53. doi:10.1098/rspb.2006.0209.
- 27. Sylwester K, Roberts G. Reputation-based partner choice is an effective alternative to indirect reciprocity in solving social

dilemmas. Evol Hum Behav [Internet]. 2013;34(3):201-6. doi:10.1016/j.evolhumbehav.2012.11.009.

- Tan Chenhao W, Wang Y, Cui Y, Wang P. The profit sacrificing tendency of reputation-profit game. Adv Psychol Sci [Internet]. 2016;24(12):1907–16. doi:10.3724/SP.J.1042.2016.01907.
- Herrmann E, Engelmann JM, Tomasello M. Children engage in competitive altruism. J Exp Child Psychol [Internet]. 2019;179(10):176–89. doi:10.1016/j.jecp.2018.11.008.
- Warneken F, Sebastián-Enesco C, Benjamin NE, Pieloch KA. Pay to play: children's emerging ability to use acts of generosity for selfish ends. J Exp Child Psychol [Internet]. 2019;188(10):104675. doi:10.1016/j.jecp.2019.104675.
- Cage E, Pellicano E, Shah P, Bird G. Reputation management: evidence for ability but reduced propensity in autism. Autism Res [Internet]. 2013;6(5):433–42. doi:10.1002/aur.1313.
- Wimmer H, Perner J. Beliefs about beliefs: representation and constraining function of wrong beliefs in young children' understanding of deception. Cognition [Internet]. 1983;13(1):103–28. doi:10.1016/0010-0277(83)90004-5.
- Hogrefe GJ, Wimmer H, Perner J. Ignorance versus false belief: a developmental lag in attribution of epistemic states. Child Dev [Internet]. 1986;57(3):567–82. doi:10.2307/1130337.
- Yagmurlu B. Relations among sociocognitive abilities and prosocial behavior. J Child Fam Stud [Internet]. 2014;23(3):591–603. doi:10.1007/s10826-013-9726-1.
- Kogut T, Slovic P, Västfjäll D. The effect of recipient identifiability and neediness on children's sharing behavior. J Behav Decis Making [Internet]. 2016;29(4):353–62. doi:10. 1002/bdm.1879.
- Rochat P, Dias MDG, Liping G, Broesch T, PassosFerreira C, Winning A, et al. Fairness in distributive justice by 3- and 5year-olds across seven cultures. J Cross Cult Psychol [Internet]. 2009;40(3):416–42. doi:10.1177/0022022109332844.
- Imuta K, Henry JD, Slaughter V, Selcuk B, Ruffman T. Theory of mind and prosocial behavior in childhood: a meta-analytic review. Dev Psychol [Internet]. 2016;52:1192–205. doi:10.1037/ dev0000140.
- Wang XY, Yang HY, Wang LJ, Shi YM. A research on 4-6 yearold children's future time cognitive teaching. Psychol Sci [Internet]. 2006;29(5):1063–7. doi:10.16719/j.cnki.1671-6981. 2006.05.009.
- 39. Chen YH. The developmental characteristics and psychological mechanisms of the magnitude representation and number concept in children. Psychol Dev Edu [Internet]. 2015;31(1):21–8. doi:10.16187/j.cnki.issn1001-4918.2015.01.04.