Preschool Children' s Contribution-Based Distribution Behavior in Different Involvement Contexts: The Role of Social Relationships

Authors: Chen Rongrong, Yi Lingyu, Zheng Hao, Wang Yanjun, Mai Xiaoqin, Mai Xiaoqin

Date: 2024-10-15T00:00:00+00:00

Abstract

To investigate the influence of social relationships on preschool children' s contribution-based distribution behavior, two experiments were designed to examine children' s distribution behavior when confronted with different social relationships and contribution levels in non-involved (third-party distribution, Experiment 1) and involved (first-party distribution, Experiment 2) contexts. Employing linear mixed-effects models and Bayesian analysis, Experiment 1 revealed that age and social relationships jointly influence children' s contribution-based distribution behavior. When children faced two distribution recipients with different social relationships, the condition where the stranger contributed more and the good friend contributed less was more susceptible to age-related effects compared to the condition where the good friend contributed more and the stranger contributed less. 4.89 years may represent the developmental node at which social relationships begin to modulate contribution-based distribution behavior. Experiment 2 found that age and self-contribution were the primary factors influencing distribution behavior. However, the influence of self-contribution gradually diminished with increasing age. 5.50 years may represent the developmental node at which children' s contribution-based distribution behavior undergoes transformation. In summary, in non-involved contexts, children' s contribution-based distribution behavior is modulated by social relationships. As age increases, children increasingly disregard strangers' high contributions and exhibit a tendency to favor low-contributing good friends. Conversely, in involved contexts, younger children tend to favor their own high contributions, but as age increases, they gradually become more equitable in their treatment of self and others. These findings provide a novel perspective for understanding the development of children' s fairness norms and social behaviors.

Full Text

Preschool Children' s Merit-Based Distribution Behavior in Different Involvement Contexts: The Role of Social Relationships

Abstract

To investigate the influence of social relationships on preschoolers' merit-based distribution behavior, we conducted two experiments examining children's distribution decisions when faced with different social relationships and merit levels in non-involved (third-party distribution, Experiment 1) and involved (first-party distribution, Experiment 2) contexts. Using linear mixed-effects models and Bayesian analysis, Experiment 1 revealed that age and social relationships jointly influenced children' s merit-based distribution. When children faced two recipients with different social relationships, the condition where a stranger contributed more while a friend contributed less was more susceptible to age effects than the reverse condition. Age 4.89 years may represent the developmental node at which social relationships begin to influence merit-based distribution behavior. Experiment 2 found that age and self-merit were the primary factors affecting distribution behavior, with the influence of self-merit gradually weakening with age. Age 5.50 years may mark the node at which children' s merit-based distribution behavior undergoes change. In summary, in non-involved contexts, children' s merit-based distribution behavior was moderated by social relationships. As age increased, children increasingly ignored high contributions from strangers and tended to favor low-contributing friends. In involved contexts, younger children showed a bias toward their own high contributions, but with age, they gradually became more impartial toward themselves and others. These findings provide new perspectives for understanding the development of fairness norms and social behavior in children.

Keywords: preschool children, merit-based distribution, social relationships, first-party distribution, third-party distribution

In resource distribution, the principle of fairness has become a social consensus and plays a crucial role in maintaining and promoting cooperation (Hamann et al., 2011; Moore, 2009). However, fair distribution is not limited to equal distribution. When individual contributions differ, distribution based on "more pay for more work" is generally considered a fairer option (Schunk & Zipperle, 2023). Although the merit-based distribution principle is grounded in individual contributions, its evaluation is subjective and uncertain compared to equal distribution. A notable concern is that individuals may exaggerate their own or their favored recipients' efforts and contributions to obtain more resources, potentially exacerbating social inequality (Chernyak, 2024).

The merit-based distribution principle emerges early and gradually develops throughout childhood. Research indicates that children begin to show merit-based distribution tendencies around age 3, and these tendencies develop rapidly

with age (Engelmann & Tomasello, 2019). Preschoolers encounter numerous resource distribution situations in peer interactions, and clarifying the application of distribution principles in early childhood across different contexts is significant for understanding the formation and development of human social behavior (Paulus & Essler, 2020).

Children' s resource distribution behavior typically occurs among peers. This study aims to explore children' s distribution decisions when both social relationship and merit factors are present. Theoretically, evolutionary theory suggests that favoring acquaintances is a strategy for maintaining social alliances and relationships to achieve reciprocal benefits, leading children to preferentially treat individuals with closer social ties (Almaatouq et al., 2016; Lu & Chang, 2018). In contrast, the inequity aversion hypothesis proposes that children tend to avoid unfairness during resource distribution, focusing more on quantitative differences between recipients than on social relationships (Fehr & Schmidt, 1999). Meritocracy argues that distributing resources according to contribution is a reasonable approach to maximizing social welfare and should take precedence over other distribution principles (Siemoneit, 2023). Although existing research has revealed children' s behavioral tendencies in merit-based distribution, it remains unclear whether and how social relationships regulate merit-based distribution behavior. Investigating this question can help understand children' s application of distribution principles in complex social situations, deepen our knowledge of their moral development and social cognitive processes, and reveal the critical role of social relationships.

This study uses two experiments to examine how preschoolers implement merit-based distribution behavior when facing individuals with different social relationships in non-involved (third-party distribution) and involved (first-party distribution) contexts, respectively, and explores developmental trends. In the following introduction, we first review developmental characteristics of preschoolers' merit-based distribution behavior, then analyze the impact of social relationships on this behavior, and finally discuss differences in how social relationships influence merit-based distribution across involved and non-involved contexts.

1.1 Developmental Characteristics of Preschoolers' Merit-Based Distribution Behavior

Damon' s theory of positive justice proposes a stage model of children' s distribution behavior, suggesting that children progress from distributing based on will or desire to using rules of equality, merit, and need. He posited that changes occur between ages 4 and 9, with no significant gender differences (Damon, 1977). However, recent empirical research shows that merit-based distribution behavior emerges in early childhood, with its origins traceable to ages 2–3 (Engelmann & Tomasello, 2019). In both Western and Eastern cultures, 3-year-olds already consciously consider individual contributions as an important factor in resource distribution (Baumard et al., 2012; Chevallier et al., 2015). Even in costly situations, Western children aged 3–5 tend to follow the merit principle

in distribution (Hamann et al., 2014; Kanngiesser & Warneken, 2012; Stack & Romero-Rivas, 2020). In third-party situations, 4- to 5-year-olds typically consider it unfair when distribution ignores individual contributions, while children aged 6 and above can even accept extreme inequality based on merit (Chernyak, 2024).

Although the merit distribution principle occupies an important position in children' s distribution behavior, children often combine it with other principles in complex situations. For example, Xiao et al. (2024) found that after individual competition, children aged 3–8 were more inclined to distribute based on merit when they won, but preferred equal distribution when they lost; with age, children' s use of the merit distribution principle gradually increased. Overall, preschoolers begin to demonstrate merit-based distribution behavior around age 3, and in some contexts also combine other distribution rules (Xiao et al., 2024; 徐晓惠等, 2021).

1.2 Social Relationships in Preschoolers' Merit-Based Distribution Behavior

In resource distribution, the social relationship between distributors and recipients is also an important consideration. As preschoolers transition from home environments to kindergarten "mini-societies," they develop diverse social relationships, with peer relationships becoming the most common form of social interaction (Afshordi & Liberman, 2021). Multiple studies have found that children exhibit relational principles in resource distribution, showing favoritism toward socially close individuals. Western research reveals that in self-involved resource-sharing tasks, children tend to allocate more resources to friends and siblings and less to strangers (Lenz & Paulus, 2021; Moore, 2009; Olson & Spelke, 2008; Paulus & Essler, 2020). This relational effect has also been validated in domestic research (Li et al., 2019; Lu & Chang, 2016). For instance, Li et al. (2019) found that Chinese children aged 6–12 placed greater emphasis on social relationships when sharing their own rewards, giving friends more than strangers.

However, in real-world situations, relational and merit information often coexist and sometimes conflict (e.g., a friend contributes little while a stranger contributes much). Therefore, understanding how children weigh these factors becomes an important research direction. Xiao et al. (2021) explored the relationship between group preference and merit behavior in third-party distribution contexts among children aged 6–8, finding that children typically prioritized merit. However, when out-group members contributed more and in-group members contributed less, children reduced resources allocated to the high-contributing out-group members. This study showed that although group relationships affect distribution behavior, overall, children valued merit more than group relationships. Our study focuses on friendship as a social relationship, which has stronger social bonding and contractual nature than in-group relationships and may therefore be assigned higher weight by children. Addi-

tionally, unlike that study which focused on primary school children, our study examines preschoolers in the early stages of merit-based distribution principle and social relationship development. Other research has investigated 4- to 6-year-olds' distribution behavior when friends and strangers have different needs, finding that when friends needed help more than strangers, children allocated more resources to needy friends; when strangers needed more, friend favoritism decreased (Kaya, 2023). These results demonstrate preschoolers' tendency to favor good friends, though this preference weakens when strangers are in greater need. Based on these findings, we propose that social relationships moderate merit-based resource distribution behavior, but this moderating effect may differ across contexts.

We also focus on how the moderating effect of social relationships on merit-based distribution changes with age. Existing research indicates that children' s consideration of social relationships and weighing of merit both strengthen with age (Paulus & Moore, 2015). However, studies have yet to examine children' s resource distribution behavior when facing different social relationships and merit contexts and its developmental changes with age. How and whether children' s trade-offs between social relationship and merit factors change with age remains uncertain. Therefore, it is necessary to design experiments to examine children' s resource distribution in conflicting social relationship and merit contexts and its age-related developmental differences.

1.3 Differences in Preschoolers' Merit-Based Distribution Behavior Across Involvement Contexts

Resource distribution tasks typically distinguish between two contexts: children as third-party distributors in non-involved situations that do not concern self-interest, and children as first-party distributors in involved situations concerning self-interest (刘璐等, 2019). Previous research has found that children show different distribution patterns and developmental characteristics in these two contexts (Rochat et al., 2009; 刘璐等, 2019). Rochat et al. (2009) conducted cross-cultural research examining merit-based distribution behavior in 3- and 5-year-olds, finding that children in involved contexts more easily displayed self-interested tendencies, while in non-involved contexts they were more inclined to distribute according to merit. In non-involved contexts, children act as bystanders in distribution, which does not involve personal interests, allowing them to more objectively evaluate others' contributions and follow more normative distribution principles. However, in involved contexts, when children' s self-interest is directly related to distribution outcomes, distribution behavior is often influenced by egocentric tendencies. In such cases, children may exaggerate their own contributions and neglect others' contributions, thereby deviating from fair distribution principles.

The influence of social relationships may also differ across involved and non-involved contexts. Research shows that in involved contexts, children' s differential treatment of friends versus non-friends may be less pronounced, while

in non-involved contexts, preschoolers are more inclined to favor friends. For example, Paulus and Moore (2015) found that although 3-year-olds did not show significant friend preference in involved contexts, they were more willing to share resources with friends in non-involved contexts. This suggests that social relationships have a greater impact on children' s distribution behavior when self-interest is not involved. To more deeply understand how social relationships influence preschoolers' merit-based distribution behavior in involved versus non-involved contexts, this study addresses this question through both non-involved and involved experimental situations. Non-involved contexts help explore how social relationships affect the implementation of merit distribution principles when self-interest is not at stake, while involved contexts can examine children' s resource distribution behavior when self-interest is concerned.

1.4 Research Questions and Hypotheses

In summary, this study explores preschoolers' merit-based distribution behavior across different social relationship backgrounds through two experimental contexts: involved first-party distribution and non-involved third-party distribution. Given that existing research indicates age 3 is an important developmental node for the emergence of children' s merit distribution preferences and social relationship preferences, and that social relationships at this stage are relatively simple, this study selected preschoolers aged 3–7 as participants. Based on previous research findings, we propose the following exploratory hypotheses: In both involved and non-involved contexts, (1) children' s social relationships influence merit-based distribution behavior; (2) the influence of social relationships on merit-based distribution behavior shows age effects. Specifically, in non-involved third-party contexts, as age increases, children will allocate more resources to high-contributing good friends or to low-contributing good friends. In involved first-party contexts, as age increases, children will gradually overcome egocentrism—that is, when their own contribution is low, children will increasingly tend to allocate more resources to good friends, or when their own contribution is high, they will tend to allocate more resources to good friends.

Experiment 1: Merit-Based Distribution Behavior in Non-Involved Contexts

Experiment 1 aims to explore preschoolers' merit-based distribution behavior in non-involved contexts with social relationships, using a third-party distribution task. Based on previous research, this experiment examines two common social relationships—good friends and strangers (Marshall et al., 2020; Schroeder et al., 2022)—and introduces two core predictor variables: the similarity of social relationships between the two interaction partners (same, different) and the social relationship with the high-contributing recipient (good friend, stranger). In the experimental design, one person contributed more and the other contributed less in each task, creating four conditions: (1) FH_{SL}: friend high contribution, stranger low contribution; (2) SH_{FL}: stranger high contribution,

friend low contribution; (3) FH_{FL}: two friends, one high contributor and one low contributor; (4) SH_{SL}: two strangers, one high contributor and one low contributor. This experiment aims to reveal how children weigh the conflict between social relationships and merit in third-party distribution tasks, thereby understanding their early social cognition and moral judgment processes.

2.2.1 Participants

This experiment used stratified cluster sampling to recruit 120 preschoolers from small, medium, and large classes at a municipal kindergarten in Nanjing, with 40 students from each class (M = 5.32 years, SD = 0.84, age range = 45–81 months; 59 boys). Power analysis was conducted using the simr package in R (Baayen et al., 2008). Analysis of linear mixed models (LMM) and generalized linear mixed models (GLMM) indicated that a sample size of 107 was required to detect a medium effect size of d = 0.42 for the three-way interaction effect of age and the two variables. The final sample size of 120 in this study could achieve an effect size of d = 0.52. This experiment was approved by the Ethics Committee of the Department of Psychology at Renmin University of China and received consent from the kindergarten. The kindergarten communicated with children' s guardians, and parents signed informed consent forms before the experiment.

2.2.2 Procedure

The experiment was conducted in a quiet room by a trained female experimenter who administered the test one-on-one and recorded the entire session. Pictures were presented as animations on a tablet. Before the experiment, children were told they would play a "listen to stories, distribute gold coins" game and were asked to watch the animations carefully, listen to the stories, and then decide how to distribute gold coins (Figure 1 [Figure 1: see original paper]). Each experimental session consisted of three phases: social relationship manipulation, contribution manipulation, and resource distribution task. Phase 1 introduced two cartoon characters to the child, with characters matching the child' s gender. A good friend was defined as a child the participant knew well and interacted with frequently, while a stranger was an unfamiliar, unknown child. Questions were asked to ensure the child understood their social relationship with each character. Phase 2 manipulated characters' contributions through story contexts. Two cartoon characters picked apples for a sick farmer, with the high-contributing character picking 4 baskets of apples and the low-contributing character picking 2 baskets. The farmer offered 6 gold coins as a reward. Phase 3 was the third-party distribution task. Children were asked how to distribute the 6 gold coins, placing them into boxes with corresponding cartoon images in front of them, and were finally asked to provide reasons for their distribution. Each child experienced all four conditions (FH_{SL}, SH_{FL}, FH_{FL}, SH_{SL}) once, with presentation order balanced across participants using a Latin square design. The entire process took approximately 15 minutes.

2.2.3 Data Coding and Statistical Methods

Data analysis was conducted using R 4.3.1 and the lmerTest package (Kuznetsova et al., 2017) for mixed-effects analysis, combined with the brms package (Bürkner, 2017) for Bayesian analysis. We examined main effects of age, similarity of social relationships between interaction partners, and social relationship with the high-contributing recipient, as well as all possible interaction effects between age and the two social relationship variables. Outcome variables were distribution quantity and distribution pattern. Additionally, we analyzed the relationship between children' s actual distribution patterns and their stated reasons. Specific coding and analysis details are as follows:

(1) **Distribution Quantity.** The number of gold coins allocated to the high-contributing character was defined as merit-based distribution quantity, ranging from 0 to 6. In LMM analysis, age was treated as a continuous variable and centered. Participant ID was included as a random effect, with the outcome variable being the number of coins allocated to the high-contributing character. Additionally, we ran the same LMMs using Bayesian analysis. Normal distributions were used as priors, with intercept prior distribution as normal(mean = 0, sd = 10) and slope prior distribution as normal(mean = 0, sd = 10). Models used 4 chains with 2000 iterations each, including 1000 warmup iterations. Sensitivity analyses were conducted using different prior standard deviations (5, 15, 20). Furthermore, when prior distributions were changed to Cauchy distributions, results remained consistent with those using normal distributions. To further explore developmental characteristics of how social relationship differences affect children' s distribution behavior, we used the Johnson-Neyman method to determine significance at specific age values. Specifically, we calculated simple slopes of merit-based distribution quantity across different social relationships and identified nodes where these slopes became significant along the age dimension. This method allowed us to clarify how the influence of social relationship differences on children' s distribution behavior changes across age stages, particularly identifying the age turning point where significant differences begin to emerge.

(2) **Distribution Pattern.** Following previous research (Xiao et al., 2024; Zhang et al., 2023), we distinguished three distribution patterns: high-merit preference (allocating more to the high-contributing character, quantity > 3), equality preference (equal distribution, quantity $= 3$), and low-merit preference (allocating more to the low-contributing character, quantity < 3). To explore children' s behavioral pattern tendencies across the four conditions, we used GLMMs and Bayesian methods to analyze developmental characteristics of children' s distribution patterns.

(3) **Distribution Reasons.** Children' s stated reasons for distribution were coded following previous research (Sigelman & Waitzman, 1991). Coding categories were: (i) Equality—reasons related to fairness or equality, such

as “everyone should get the same amount”; (ii) Social Relationship—reasons related to recipients, such as “he is my good friend” ; (iii) Merit—reasons related to contribution, such as “he picked more apples” ; (iv) Other—reasons that could not be coded, such as “I just like to distribute this way” or statements emphasizing two or more preferences simultaneously. Fisher’ s Exact Test was used to compare relationships between behavioral patterns and reason categories.

2.3.1 Influence of Social Relationships on Merit-Based Distribution Quantity in Non-Involved Contexts

We first examined developmental characteristics of children’ s merit-based distribution quantity and social relationship effects. Model 1 was built with the number of coins allocated to the high-contributing character as the outcome variable, with age (centered), similarity of social relationships between interaction partners, and social relationship with the high-contributing character as fixed effects, and participant ID as a random effect. LMM analysis examined the effect of age on merit-based distribution quantity. Results showed a significant age effect (b = -0.17, SE = 0.05, t = -3.55, $P < 0.001$), with the number allocated to high-contributing individuals decreasing with age. The effect of social relationship with the high-contributing recipient was significant (b = -0.11, SE = 0.04, t = -2.71, P = 0.0070), with significantly more resources allocated when friends were high contributors compared to strangers. These results demonstrate that both age and social relationship with the high-contributing recipient influence merit-based distribution quantity. The effect of similarity of social relationships between partners was not significant (P = 0.18). Bayesian analysis similarly revealed significant age effects (βmean = -0.17, 95% CI = [-0.26, -0.07]) and significant effects of social relationship with the high-contributing recipient (βmean = -0.12, 95% CI = [-0.21, -0.03]), while the effect of similarity between social relationships was not significant.

To test interaction effects between age and the two social relationship variables, Model 2 was built. Results indicated a marginally significant three-way interaction between age and the two factors (b = 0.20, SE = 0.10, t = 1.97, P = 0.050). The two-way interaction between age and social relationship with the high-contributing recipient was significant (b = -0.17, SE = 0.05, t = -3.71, P = 0.010), suggesting that the condition where strangers contributed more was more susceptible to age effects when social relationships differed, as shown in Figure 2 [Figure 2: see original paper]. The two-way interaction between age and similarity of social relationships was not significant (P = 0.28). Bayesian analysis confirmed the significant three-way interaction (βmean = 0.20, 95% CI = [0.00, 0.40]) and the significant two-way interaction between age and social relationship with the high-contributing recipient (βmean = -0.18, 95% CI = [-0.32, -0.04]), while the two-way interaction between age and similarity of social relationships was not significant. Sensitivity analyses using different prior standard deviations (5, 10, 15) did not affect results. Additionally, when prior

distributions were changed to Cauchy distributions, results remained consistent.

The Johnson–Neyman method was used to further analyze the age node at which significant differences in social relationships with the high-contributing recipient emerged when social relationships differed. Results showed that when children were older than 4.89 years, the difference in merit-based distribution quantity between the friend-high/stranger-low condition and the stranger-high/friend-low condition became significant, indicating that 4.89 years is the important age node at which social relationships begin to influence merit-based distribution.

Figure 3 [Figure 3: see original paper] shows the Johnson–Neyman plot. As age increases, the simple slopes of predicted distribution quantity based on social relationship with the high-contributing recipient change when social relationships differ.

2.3.2 Influence of Social Relationships on Merit-Based Distribution Patterns in Non-Involved Contexts

The number and proportion of children showing each distribution pattern across the four conditions are shown in Table 1 .

Table 1 Number and proportion of distribution patterns across four conditions in Experiment 1 non-involved context

Condition	High-Merit Preference	Equality Preference	Low-Merit Preference
FH_{SL}	83 (69.17%)	36 (30.00%)	1 (0.83%)
SH_{FL}	74 (61.67%)	33 (27.50%)	13 (10.83%)
FH_{FL}	83 (69.17%)	35 (29.17%)	2 (1.67%)
SH_{SL}	85 (70.83%)	29 (24.17%)	6 (5.00%)

To exploratorily analyze how children' s distribution patterns changed with age, we examined age effects on high-merit preference, equality preference, and low-merit preference separately. Age was used as a predictor variable, with outcome variables coded as yes/no (coding high-merit/low-merit/equality preference as yes = 1 and the other two preferences as no = 0) for three GLMM analyses. Results showed that with age, children increasingly preferred equality (b = 1.43, SE = 0.43, z = 3.33, $P < 0.001$) and low-merit distribution (b = 0.73, SE = 0.33, z = 2.23, P = 0.026), while preference for high-merit distribution decreased (b = -1.67, SE = 0.45, z = -3.69, $P < 0.001$). Bayesian models found similar results: equality (βmean = 1.16, 95% CI = [0.46, 1.91]), low-merit (βmean = 0.68, 95% CI = [0.12, 1.28]), and high-merit (βmean = -1.34, 95% CI = [-2.11, -0.62]). These findings indicate that with age, children' s preference for merit-based distribution declines, with increasing preference for equal distribution and greater susceptibility to social relationships.

To investigate whether these changes were related to social relationship variables, we included the three-way interaction between age and the two social relationship variables in GLMMs. Results showed that neither the three-way interaction nor any two-way interactions were significant (Ps $>$ 0.13). Bayesian models similarly found no significant interaction effects.

2.3.3 Relationship Between Distribution Patterns and Reason Types in Non-Involved Contexts

The number and proportion of distribution patterns and reason types are shown in Table 2 . Fisher' s Exact Test was used to compare relationships between behavioral patterns and reason categories. Results showed that children with high-merit preference used merit reasons (vs. the other three categories) significantly more frequently than children with equality preference and low-merit preference (Ps $<$ 0.001). They used fairness reasons (vs. the other three categories) significantly less frequently than children with equality preference (P $<$ 0.001), with no significant difference from low-merit preference (P = 1). They used social relationship reasons (vs. the other three categories) significantly less frequently than children with equality preference (P = 0.0036), with no significant difference from low-merit preference (P = 1). They used other reasons (vs. the other three categories) significantly less frequently than children with equality preference (P $<$ 0.001) but significantly more frequently than children with low-merit preference (P $<$ 0.001). Low-merit preference did not differ significantly from equality preference in merit usage (P = 1) but used fairness and other reasons less frequently (Ps $<$ 0.001), with no significant difference in social relationship usage (P = 1).

Table 2 Number and proportion of distribution patterns and explanation types in non-involved context

Pattern	Merit	Equality	Social Relationship	Other
High-Merit Preference (FH_{SL})	72 (83.13%)	3 (8.43%)	2 (2.70%)	1 (1.18%)
High-Merit Preference (SH_{FL})	70 (94.59%)	3 (8.43%)	2 (2.70%)	1 (1.18%)
High-Merit Preference (FH_{FL})	79 (95.18%)	1 (1.20%)	3 (3.61%)	0.25 (0.29%)
High-Merit Preference (SH_{SL})	79 (92.94%)	4 (4.71%)	3 (3.38%)	0.25 (0.29%)
Equality Preference (FH_{SL})	26 (72.22%)	2 (5.56%)	18 (48.57%)	25 (86.21%)

Pattern	Merit	Equality	Social Relationship	Other
Equality Preference (SH_{FL})	26 (78.79%)	4 (12.12%)	8 (22.86%)	1 (3.45%)
Equality Preference (FH_{FL})	18 (48.57%)	8 (22.86%)	1 (1.92%)	1 (1.96%)
Equality Preference (SH_{SL})	25 (86.21%)	1 (3.45%)	13 (25.00%)	16 (31.37%)
Low-Merit Preference (FH_{SL})	9 (22.22%)	3 (9.09%)	9 (28.57%)	3 (10.34%)
Low-Merit Preference (SH_{FL})	1 (100%)	1 (100%)	6 (18.42%)	1 (100%)
Low-Merit Preference (FH_{FL})	1 (100%)	1 (100%)	1 (100%)	4 (100%)
Low-Merit Preference (SH_{SL})	1.75 (100%)	0	11.75 (21.99%)	54

2.4 Summary

Experiment 1 results indicate that in non-involved contexts, preschoolers' age and social relationships moderate merit-based distribution behavior. When children face two recipients with different social relationships, the condition where strangers contributed more and friends contributed less was more susceptible to age effects than the condition where friends contributed more and strangers contributed less. Age 4.89 years may represent a "watershed" moment when social relationships begin to influence merit-based distribution behavior. When children were older than 4.89 years, distribution quantities differed between these two conditions. This result suggests that as children age, they increasingly favor low-contributing friends and ignore high contributions from strangers. We also found that children' s preference for merit decreased with age. However, in non-involved contexts, children act only as bystanders without self-interest involvement. When children' s distribution decisions involve self-interest, do social relationships remain important? Experiment 2 continues to examine this question.

Experiment 2: Merit-Based Distribution Behavior in Involved Contexts

Experiment 2 examines children's reactions in involved contexts. As distributors, children' s own contribution can be either high or low, while recipients can have different social relationships (friend, stranger). This creates four conditions: (1) MH_{FL}: self high contribution, friend low contribution; (2) ML_{FH}: self low contribution, friend high contribution; (3) MH_{SL}: self high contribution, stranger low contribution; (4) ML_{SH}: self low contribution, stranger high contribution. We deeply analyze how children balance self-interest and social relationships in involved contexts to understand the changing trends of their multiple social motivations in distribution decisions.

3.2.1 Participants

We recruited a new sample of 120 preschoolers from small, medium, and large classes at a municipal kindergarten in Nanjing using stratified cluster sampling, with 40 students from each class (M = 5.26 years, SD = 0.92, age range = 43-81 months; 62 boys). This experiment was approved by the Ethics Committee of the Department of Psychology at Renmin University of China and received consent from the kindergarten. The kindergarten communicated with children' s guardians, and parents signed informed consent forms before the experiment.

3.2.2 Procedure

Experiment 2 followed the same basic procedure as Experiment 1, differing only in story context materials and character settings. The procedure still consisted of three phases: social relationship manipulation, contribution manipulation, and resource distribution task (Figure 4 [Figure 4: see original paper]). In Phase 1, children first selected one character from many cartoon images as their own representation, then were introduced to another cartoon character who could be either a good friend or a stranger. Questions were asked to ensure the child understood their social relationship with the character. Cartoon characters matched the child's gender. In Phase 2, children completed a "difference-finding game" with a cartoon character. The game rules were introduced, and children played with four other children of different social identities. Different contributions were created by manipulating children' s relative performance in the "difference-finding" game. Phase 3 was the first-party distribution task. Children needed to distribute 6 reward gold coins into their own box and another child' s box in front of them, and were finally asked to provide reasons for their distribution. Each child experienced all four conditions (MH_{FL}, ML_{FH}, MH_{SL}, ML_{SH}) once, with presentation order balanced across participants using a Latin square design.

3.2.3 Data Coding and Analysis

Data analysis was essentially the same as in Experiment 1, focusing on main effects of conditions and interaction effects of age, social relationship, and contribution. Analysis of outcome variables—resource distribution quantity, distribution pattern, and distribution reasons—was consistent with Experiment 1.

3.3.1 Influence of Social Relationships on Merit-Based Distribution Quantity in Involved Contexts

We first examined developmental characteristics of children' s merit-based distribution quantity and social relationship effects. Model 1 was built with the number of coins allocated to the high-contributing character as the outcome variable, with age (centered), social relationship, and self-merit as fixed effects, and participant ID as a random effect. LMM analysis examined the effect of age on merit-based distribution quantity. Results showed a significant self-merit effect (b = -0.19, SE = 0.069, t = -2.80, P = 0.0054) and a marginally significant social relationship effect (b = -0.13, SE = 0.069, t = -1.82, P = 0.069). The age effect was not significant (P = 0.39). Bayesian analysis found no age or social relationship effects but did find a significant contribution effect (βmean = -0.19, 95% CI = [-0.33, -0.05]).

To test interaction effects between age and the two variables, Model 2 was built, focusing on the three-way interaction between age, contribution, and social relationship. Neither frequentist nor Bayesian methods found a significant three-way interaction. To explore relationships between the two social relationship variables and age, we removed the non-significant three-way interaction to build Model 3. Model 3 results showed a significant interaction between age and self-merit (b = 0.22, SE = 0.074, t = 2.96, P = 0.0032) (Figure 5a [Figure 5: see original paper]). The interaction with social relationship was not significant (P = 0.77). Bayesian analysis similarly confirmed the significant interaction between age and self-merit (βmean = 0.22, 95% CI = [0.08, 0.36]) and the non-significant interaction with social relationship. Sensitivity analyses using different prior standard deviations (5, 10, 15) did not affect results. Additionally, when prior distributions were changed to Cauchy distributions, results remained consistent.

The Johnson–Neyman method was used to further analyze the age node at which contribution produced significant differences. Results showed that before age 5.50 years, conditions of self high contribution and self low contribution differed significantly, indicating that 5.50 years is an important age node at which children' s merit-based distribution changes (Figure 5b).

Figure 5 [Figure 5: see original paper] shows Experiment 2 distribution quantity results. (a) Interaction effect between age and contribution, and (b) Johnson–Neyman plot showing simple slopes of predicted distribution quantity by different contribution levels as age increases.

3.3.2 Influence of Social Relationships on Merit-Based Distribution Patterns and Reasons in Involved Contexts

The number and proportion of children showing each distribution pattern across the four conditions are shown in Table 3 . To analyze how children's distribution patterns changed with age, we first examined age effects on high-merit preference, equality preference, and low-merit preference separately. Age was used as a predictor variable, with outcome variables coded as yes/no (0, 1 coding) for three GLMM analyses. Results showed that with age, children' s preference for equality was marginally significant (b = 0.38, SE = 0.20, z = 1.93, P = 0.053), while preferences for high and low merit were not significant (Ps > 0.13). Bayesian results found no significant age effects on any of the three preferences.

Next, we included the two-way variables of social relationship and self-merit in GLMMs. Results showed that the interaction between age and self-merit significantly influenced high-merit preference (b = 0.58, SE = 0.24, z = 2.42, P = 0.016) and marginally significantly influenced low-merit preference (b = -0.82, SE = 0.41, z = -1.95, P = 0.051), but did not influence equality preference (P = 0.36). The interaction between age and social relationship was not significant for any preference (Ps > 0.41). Bayesian model analysis similarly found that the interaction between age and self-merit influenced high-merit preference (βmean = 0.56, 95% CI = [0.08, 1.04]) but did not significantly influence low-merit or equality preferences.

Table 3 Number and proportion of distribution patterns across four conditions in Experiment 2 involved context

Condition	High-Merit Preference	Equality Preference	Low-Merit Preference
MH_{FL}	57 (47.50%)	58 (48.33%)	4 (3.33%)
ML_{FH}	55 (45.83%)	54 (45.00%)	11 (9.17%)
MH_{SL}	60 (50.00%)	51 (42.5%)	7 (5.83%)
ML_{SH}	46 (38.33%)	50 (41.67%)	23 (19.17%)

3.3.3 Relationship Between Distribution Patterns and Reason Types in Involved Contexts

The number and proportion of distribution patterns and reason types are shown in Table 4 . Fisher' s Exact Test compared relationships between behavioral patterns and reason categories. Results showed that children with high-merit preference used merit reasons (vs. the other three categories) significantly more frequently than children with equality preference and low-merit preference (Ps < 0.001). They used fairness reasons (vs. the other three categories) significantly less frequently than children with equality preference (P < 0.001), with no significant difference from low-merit preference (P = 1). They used social relationship reasons (vs. the other three categories) marginally significantly more

frequently than children with low-merit preference (P = 0.052), with no significant difference from equality preference (P = 1). They used other reasons (vs. the other three categories) significantly less frequently than children with equality preference (P = 0.023) and low-merit preference (P < 0.001). Low-merit preference did not differ significantly from equality preference in merit usage (P = 0.14) but used fairness (P < 0.001), social relationship (P = 0.054), and other reasons less frequently (P < 0.001).

Table 4 Number and proportion of distribution patterns and explanation types in involved context

Pattern	Merit	Equality	Social Relationship	Other
High-Merit Preference (MH_{FL})	47 (82.46%)	3 (5.26%)	7 (12.28%)	1 (2.17%)
High-Merit Preference (ML_{FH})	42 (76.36%)	8 (14.55%)	5 (9.09%)	3 (6.52%)
High-Merit Preference (MH_{SL})	40 (66.67%)	8 (13.33%)	12 (20.00%)	5 (10.86%)
High-Merit Preference (ML_{SH})	37 (80.43%)	1 (2.17%)	5 (10.86%)	0.25 (0.54%)
Equality Preference (MH_{FL})	15 (25.43%)	33 (55.93%)	11 (18.64%)	34 (66.67%)
Equality Preference (ML_{FH})	6 (11.11%)	41 (75.93%)	7 (12.96%)	1 (1.96%)
Equality Preference (MH_{SL})	1 (1.92%)	38 (73.08%)	13 (25.00%)	13 (25.00%)
Equality Preference (ML_{SH})	1 (1.96%)	34 (66.67%)	16 (31.37%)	7 (13.06%)
Low-Merit Preference (MH_{FL})	3 (75.00%)	2 (50.00%)	1 (25.00%)	1 (25.00%)
Low-Merit Preference (ML_{FH})	9 (81.82%)	0	2 (18.18%)	0
Low-Merit Preference (MH_{SL})	6 (85.71%)	0	1 (14.29%)	0

Pattern	Merit	Equality	Social Relationship	Other
Low-Merit Preference (ML_{SH})	18 (78.26%)	1 (4.35%)	4 (17.39%)	0

3.4 Summary

Experiment 2 examined children' s merit-based distribution behavior and the moderating role of social relationships when children were involved as first parties in the distribution process. Results showed that age and self-merit were the main factors influencing distribution behavior, with no moderating effect of social relationships found. As children aged, their bias toward their own contributions gradually weakened, trending toward equal distribution. Age 5.50 years may be an important developmental node for changes in children' s merit-based distribution behavior. These results demonstrate that younger children tend to favor their own high contributions, but with age, they become increasingly impartial toward themselves and others.

General Discussion

This study used two experiments to investigate the influence of social relationships on preschoolers' merit-based distribution behavior in both non-involved and involved contexts. In non-involved contexts, as age increased, children increasingly ignored high contributions from strangers and tended to favor low-contributing friends. In involved contexts, however, no moderating effect of social relationships on merit-based distribution behavior was found. Instead, results showed that the influence of self-merit gradually weakened with age. These findings provide empirical support for understanding children' s application of distribution principles across different contexts and the development of their social interactive behaviors.

Results from the non-involved third-party context reveal that children' s social relationships influence the application of resource distribution principles. This finding aligns with Xiao et al. (2021) regarding 6- to 8-year-olds' favoritism toward low-contributing in-group members, suggesting similar mechanisms underlying the role of in-group/out-group relationships and friend/stranger relationships in merit-based distribution. According to social identity theory, favoring friends represents efforts to gain or maintain positive identity (Tajfel & Turner, 1979). This result also aligns with Aristotle' s view that "legislators value friendship over justice." Previous research has also revealed that social relationships can shape erroneous moral judgments (Earp et al., 2021). Studies on children have found that friendship can influence children' s fairness decisions across cultures (Corbit et al., 2023). Both theoretical and empirical research reveal children' s favoritism toward good friends in social interactions, which may reflect the early development of reciprocal strategies in preschoolers. Re-

ciprocal strategies are an evolutionary adaptation mechanism; by maintaining important social relationships, children can obtain more resources and support in future interactions. Emotional bonds and sense of responsibility in friendships motivate children to prioritize friends, expecting this investment to yield long-term returns (Howes, 1996). Friendship, as a long-term reciprocal relationship, becomes an important factor in children' s social cognition and decision-making processes, thereby influencing their trade-offs and choices in resource distribution. This further demonstrates the importance of friendship as a social relationship in children' s early socialization processes.

We also found that the moderating effect of social relationships in third-party contexts changed with age, with children increasingly favoring low-contributing friends as they grew older. Our study found that when children were older than 4.89 years, significant differences emerged in merit-based distribution quantity between the friend-low/stranger-high and friend-high/stranger-low conditions. The reason for this age trend may be children' s gradually increasing valuation of friendship during the 3- to 7-year developmental period (Gallagher, 2013). With increased opportunities and time for interaction with friends, children' s emotional connections with friends become closer. At ages 3–4, children' s social relationship cognition is relatively rudimentary, often focusing on direct interactions and personal interests, and they may not yet fully understand the complexity of social relationships. With age, particularly between 5–7 years, as children' s social cognitive abilities grow (e.g., theory of mind), they begin to develop more mature social skills and can identify and understand relationships between themselves and others (McClelland & Morrison, 2003; Perner et al., 1999).

However, in involved first-party contexts, we found no influence of social relationships on merit-based distribution behavior or age effects. This may be because during the preschool stage, children prioritize self-interest over social relationships. Another possible explanation is that our first-party context was relatively complex, requiring children to consider self-interest, merit, and social relationships simultaneously, which places high demands on cognitive resources. Preschoolers' cognitive control abilities are not yet mature, making it difficult for them to integrate social relationships into their considerations in this context. Previous research has found that stronger inhibitory control and theory of mind abilities make children more likely to exhibit self-disadvantaging behaviors (Xie et al., 2019). Future research could expand the age range and measure children' s cognitive control and theory of mind abilities to investigate the role of social relationships and their developmental trajectory in first-party contexts.

Our study did not find that merit effects increased with age; instead, we found a weakening trend of merit effects with age in non-involved third-party contexts. This contradicts previous research suggesting that children' s emphasis on merit increases with age (Baumard et al., 2012; Kenward & Dahl, 2011; Noh, 2020). However, other studies have found that while Chinese children aged 3–4 tend to allocate more resources to the most contributing peer, children aged 7–8 show

decreased emphasis on individual contributions (徐晓惠等, 2021). Another study of Nigerian children did not find use of the merit distribution principle in third-party contexts, instead finding a tendency toward equal distribution (Angarita Cáceres & Viciana, 2022). This may be because our study was based on a social relationship background, making social relationship variables an important factor that cannot be ignored. In complex social situations, children' s distribution behavior is influenced by multiple factors, including social relationships, situational demands, and personal motivations. With age, children begin to consider broader social factors when evaluating others' contributions. This shift may lead to changes in children' s merit judgments in third-party contexts, reflecting changes in their internal conflicts when weighing different motivational factors. Notably, both in first-party and third-party contexts, our study found that children increasingly preferred equal distribution with age. Previous research on children's distribution behavior has revealed that children resist distribution outcomes with quantitative differences even at the cost of self-interest (McAuliffe et al., 2017), reflecting their aversion to unequal distribution. Research on Chinese children' s distribution behavior in relatively complex situations similarly found tendencies toward equal distribution (Zhang et al., 2023). This suggests cross-contextual and cross-cultural variability in children' s merit-based distribution behavior (张雪等, 2014). Future research could examine differences in how children weight merit factors across cultural backgrounds.

This study explores how social relationship contexts influence children' s behavior in merit-based resource distribution, reflecting multiple motivations in the distribution process involving trade-offs among relationships, merit, equality, and self-interest. According to "multiple motivations" theory, children' s resource distribution behavior results from competition and balance among different motivations (陈童, 伍珍, 2017). Our findings reveal developmental changes in children' s merit-based distribution across age stages, supporting the view that age influences children' s ability to weigh multiple motivations (Li et al., 2016). In this study, there were clear social relationships between recipients and children, and this complex social context may affect children' s consideration of merit factors. Social relationships are often accompanied by emotional commitment, moral responsibility, concern for partners' welfare, and reduced uncertainty about others' behavior, all of which can promote altruistic behavior (Simpson & Willer, 2015). Therefore, when distributing resources, children may be more inclined to maintain relationships with friends rather than relying solely on absolute merit values. This further indicates that children' s moral judgments and behaviors consider not only individual contributions but are also influenced by social environments and interpersonal relationships, with social relationships being an important consideration. Children can better consider social relationship factors in third-party contexts when making merit-based distributions. However, in first-party contexts, consideration of relationships is no longer apparent and may even be ignored. We found that when children are involved in distribution, they tend to exaggerate their own contributions and neglect others' contributions. This result aligns with Paulus and Moore (2015),

indicating that preschoolers have not completely overcome egocentric perspectives and focus more on self-interest in contexts involving self-interest, paying less attention to others' contributions. This may be because young children' s understanding of others' emotions and needs is not yet fully developed. They may not have developed sufficient moral frameworks to balance self-interest and others' interests. Therefore, when faced with choices between self-interest and others' interests, children more easily choose decisions most beneficial to themselves. However, as children age, the influence of self-merit gradually weakens, and they increasingly tend toward equal distribution. This result indicates that with age, children gradually learn to consider others' feelings and contributions, thereby demonstrating more fairness and impartiality in resource distribution.

Although this study has important findings, it has certain limitations. First, the age effects revealed by our cross-sectional design may be influenced by inter-individual differences; future research could use longitudinal tracking to further verify these developmental trajectories. Second, this study only included preschoolers, limiting the age range; future research could expand sample size and include broader age ranges. Finally, this study focused on Chinese cultural background, but children from different cultural backgrounds may show different distribution strategies. Research shows that children from different economic and cultural backgrounds exhibit diverse behavioral patterns including egoism, egalitarianism, and altruism in resource distribution (Butovskaya et al., 2022). Engelmann et al. (2021) also found that friendship and merit influence children' s distribution behavior differently across sociocultural backgrounds, reflecting the key role of cultural context in shaping children' s distribution behavior. Therefore, our findings may not be fully applicable to children from other cultural backgrounds. Future cross-cultural comparative research will help further reveal how cultural norms and social expectations influence children' s resource distribution behavior.

Conclusion

This study draws the following conclusions: 1. Social relationships influence preschoolers' merit-based distribution behavior. 2. In non-involved contexts, social relationships and age jointly influence children' s merit-based distribution behavior, but this developmental trend is not observed in involved contexts. 3. In non-involved contexts, children can better consider social relationship factors, but in involved contexts, children primarily consider self-interest. Children' s consideration of different factors changes with age.

References

Afshordi, N., & Liberman, Z. (2021). Keeping friends in mind: Development of friendship concepts in early childhood. *Social Development, 30*(2), 331–342.

Almaatouq, A., Radaelli, L., Pentland, A., & Shmueli, E. (2016). The role of reciprocity and directionality of friendship ties in promoting behavioral change.

In *Social, Cultural, and Behavioral Modeling* (pp. 33–41). Springer, Cham.

Angarita Cáceres, R. G., & Viciana, H. (2022). Merit is not meritorious everywhere: Fairness in first and third-party tasks among Kogi children. *Journal of Cognition and Culture*.

Baayen, R. H., Davidson, D. J., & Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language, 59*(4), 390–412.

Baumard, N., Mascaro, O., & Chevallier, C. (2012). Preschoolers are able to take merit into account when distributing goods. *Developmental Psychology, 48*(2), 492–498.

Butovskaya, M., Rostovtseva, V., Dronova, D., Burkova, V., & Adam, Y. (2022). Variations in limited resources allocation towards friends and strangers in children and adolescents from seven economically and culturally diverse societies. *Scientific Reports, 12*(1), 15232.

Bürkner, P.-C. (2017). brms: An R package for Bayesian multilevel models using Stan. *Journal of Statistical Software, 80*(1), 1–28.

陈童, & 伍珍. (2017). 儿童的分配公平性：心理理论的作用. 心理科学进展, *25*(8), 1299.

Chernyak, N. (2024). The emergence of young children' s tolerance for inequality: With age, children stop showing numerically sensitive fairness. *Journal of Experimental Child Psychology, 238*, 105785.

Chevallier, C., Xu, J., Adachi, K., Henst, J.-B. van der, & Baumard, N. (2015). Preschoolers' understanding of merit in two Asian societies. *PloS One, 10*(5), e0114717.

Corbit, J., McAuliffe, K., Blake, P. R., & Warneken, F. (2023). The influence of friendship on children' s fairness concerns in three societies. *Evolution and Human Behavior, 44*(5), 466–473.

Damon, W. (1977). Measurement and Social Development. *The Counseling Psychologist, 6*(4), 13-15.

Earp, B. D., McLoughlin, K. L., Monrad, J. T., Clark, M. S., & Crockett, M. J. (2021). How social relationships shape moral wrongness judgments. *Nature Communications, 12*(1), 5776.

Engelmann, J. M., Haux, L. M., & Herrmann, E. (2019). Helping in young children and chimpanzees shows partiality towards friends. *Evolution and Human Behavior, 40*(3), 292–300.

Engelmann, J. M., & Tomasello, M. (2019). Children' s sense of fairness as equal respect. *Trends in Cognitive Sciences, 23*(6), 454–463.

Engelmann, J. M., Zhang, Z., Zeidler, H., Dunham, Y., & Herrmann, E. (2021). The influence of friendship and merit on children' s resource allocation in three societies. *Journal of Experimental Child Psychology, 208*, 105116.

Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *The Quarterly Journal of Economics, 114*(3), 817–868.

Gallagher, K. C. (2013). Kindergarten through primary grades: guiding children' s friendship development. *YC Young Children, 68*(5), 26–33.

Hamann, K., Bender, J., & Tomasello, M. (2014). Meritocratic sharing is based on collaboration in 3-year-olds. *Developmental Psychology, 50*(1), 121–128.

Hamann, K., Warneken, F., Greenberg, J. R., & Tomasello, M. (2011). Collaboration encourages equal sharing in children but not in chimpanzees. *Nature, 476*(7360), 328–331.

Howes, C. (1996). The earliest friendships. In *The company they keep: Friendship in childhood and adolescence* (pp. 66–86). Cambridge University Press.

Kanngiesser, P., & Warneken, F. (2012). Young children consider merit when sharing resources with others. *PloS One, 7*(8), e43979.

Kenward, B., & Dahl, M. (2011). Preschoolers distribute scarce resources according to the moral valence of recipients' previous actions. *Developmental Psychology, 47*(4), 1054–1064.

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software, 82*(13), 1–26.

Kaya, B. (2023). Young children' s distributive justice: The role of friendship and need. *Journal of Experimental Child Psychology, 226*, 105548.

Lenz, S., & Paulus, M. (2021). Friendship is more than strategic reciprocity: Preschoolers' selective sharing with friends cannot be reduced to strategic concerns. *Journal of Experimental Child Psychology, 206*, 105101.

Li, J., Wang, W., Yu, J., & Zhu, L. (2016). Young children' s development of fairness preference. *Frontiers in Psychology, 7*.

Li, W., Curtis, R., Moore, C., Wang, Y., & Zeng, X. (2019). To be fair, generous, or selfish: The effect of relationship on Chinese children' s distributive allocation and procedural application. *Social Development, 28*(2), 449–464.

刘璐, 肖雪, 刘丽莎, 徐良苑, 张旭然, & 李燕芳. (2019). 儿童在不同卷入情境下基于资源价值的分配行为特点：内群体偏爱的作用. *心理学报, 51*(5), 584.

Lu, H. J., & Chang, L. (2016). Resource allocation to kin, friends, and strangers by 3- to 6-year-old children. *Journal of Experimental Child Psychology, 150*, 194–206.

Lu, H. J., & Chang, L. (2018). Reciprocity among preschoolers in relation to resource allocation toward siblings, friends, and strangers. *Evolutionary Psychology, 16*(3), 1474704918797031.

Marshall, J., Wynn, K., & Bloom, P. (2020). Do children and adults take social relationship into account when evaluating people' s actions? *Child Development, 91*(5), e1082-e1100.

McAuliffe, K., Blake, P. R., Steinbeis, N., & Warneken, F. (2017). The developmental foundations of human fairness. *Nature Human Behaviour, 1*(2), 1-9.

McClelland, M. M., & Morrison, F. J. (2003). The emergence of learning-related social skills in preschool children. *Early Childhood Research Quarterly, 18*(2), 206-224.

Moore, C. (2009). Fairness in children' s resource allocation depends on the recipient. *Psychological Science, 20*(8), 944-948.

Noh, J. Y. (2020). Children's developing understanding of merit in a distributive justice context. *Journal of Child and Family Studies, 29*(5), 1484-1492.

Olson, K. R., & Spelke, E. S. (2008). Foundations of cooperation in young children. *Cognition, 108*(1), 222-231.

Paulus, M., & Essler, S. (2020). Why do preschoolers perpetuate inequalities? Theoretical perspectives on inequity preferences in the face of emerging concerns for equality. *Developmental Review, 58*, 100933.

Paulus, M., & Moore, C. (2015). Preschool children' s anticipation of recipients' emotions affects their resource allocation. *Social Development, 24*(4), 852-867.

Perner, J., Lang, B., Perner, J., Lang, B., Perner, J., & Lang, B. (1999). Development of theory of mind and executive control. *Trends in Cognitive Sciences, 3*(9), 337-344.

Rochat, P., Dias, M. D. G., Liping, G., Broesch, T., Passos-Ferreira, C., Winning, A., & Berg, B. (2009). Fairness in distributive justice by 3- and 5-year-olds across seven cultures. *Journal of Cross-Cultural Psychology, 40*(3), 416-442.

Schroeder, J., Lyons, D., & Epley, N. (2022). Hello, stranger? Pleasant conversations are preceded by concerns about starting one. *Journal of Experimental Psychology: General, 151*(5), 1141-1153.

Schunk, D., & Zipperle, I. (2023). Fairness and inequality acceptance in children and adolescents: A survey on behaviors in economic experiments. *Journal of Economic Surveys, 37*(5), 1715-1742.

Siemoneit, A. (2023). Merit first, need and equality second: hierarchies of justice. *International Review of Economics, 70*(4), 537-567.

Sigelman, C. K., & Waitzman, K. A. (1991). The development of distributive justice orientations: Contextual influences on children' s resource allocations. *Child Development, 62*(6), 1367-1378.

Simpson, B., & Willer, R. (2015). Beyond altruism: Sociological foundations of cooperation and prosocial behavior. *Annual Review of Sociology, 41*, 43-63.

Stack, J., & Romero-Rivas, C. (2020). Merit overrules theory of mind when young children share resources with others. *PloS One, 15*(1), e0227375.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks-Cole.

王斯, & 苏彦捷. (2013). 从理解到使用：心理理论与儿童不同情境中的分配公平性. 心理学报, *45*(11), 1242.

Xiao, X., Liu, L., Liu, L, S., Xu, L. Y., Zhang, X. R., & Li, Y. F. (2021). Group bias in children' s merit-based resource allocation: The role of Theory of Mind. *Psychological Development and Education, 37*(4), 498–507.

Xiao, X., Zhang, M., & Li, Y. (2024). The effect of competition on children' s merit-based resource allocation: The difference between interpersonal and intergroup competition. *British Journal of Developmental Psychology, 42*(1), 49–71.

Xie, D., Pei, M., & Su, Y. (2019). "Favoring my playmate seems fair": Inhibitory control and theory of mind in preschoolers' self-disadvantaging behaviors. *Journal of Experimental Child Psychology, 184*, 158–173.

徐晓惠, 安静, & 朱莉琪. (2021). 3～8 岁儿童对资源分配中贡献、努力和能力因素的权衡. 心理与行为研究, *19*(1), 30.

Zhang, X., Corbit, J., Xiao, X., & Li, Y. (2023). The influence of social status on children' s merit-based resource allocation: The potential explanation of expectation. *Child Development, 94*(5), 1281–1297.

张雪, 刘文, 朱琳, & 张玉. (2014). 基于贡献原则的幼儿分配公平性. 心理科学进展, *22*(11), 1740.

Note: Figure translations are in progress. See original paper for figures.