From Prosociality to Reciprocity: A Developmental Shift in Children's Friendship Concept

Rongzhi Liu[1], Jan Engelmann[2], & Fei Xu[2]

[1] Department of Psychology, University of Chicago

[2] Department of Psychology, University of California, Berkeley

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Author Note

Correspondence should be addressed to Rongzhi Liu (rongzhi@uchicago.edu).

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Abstract

Friendships are fundamental to children's social and cognitive development. Previous research has shown that children understand the importance of various aspects of friendship, including prosocial behaviors. However, it is an open question whether children believe that prosocial behaviors should be reciprocated between friends. Across two experiments with 4- to 8-year-old participants (total N = 236), we examined how children weighed the importance of reciprocity and prosociality in friendship formation. Children were asked to predict which of two pairs—one in which both individuals provided prosocial behaviors (the reciprocal pair) and one in which only one individual provided prosocial behaviors (the non-reciprocal pair)—would become better friends. We found that younger children consistently favored the non-reciprocal pair, but with age, children became more likely to choose the reciprocal pair. By age 7, children reliably preferred the reciprocal pair, suggesting that they recognize the importance of reciprocity above and beyond prosociality in friendship formation. These findings shed new light on the theoretical debate on the role of reciprocity in friendship, and suggest that reciprocity may be an important component of children's mature concept of friendship.

Keywords: friendship, reciprocity, prosocial behavior, social cognition

Public significance statement: By age 7, children begin to understand that becoming friends is not just about someone being nice to you but also about a mutual give-and-take. This suggests that reciprocity plays a key role in older children's understanding of friendship. This finding can help parents and educators support healthy friendships in childhood.

From Prosociality to Reciprocity: A Developmental Shift in Children's Friendship Concept

Friendships play a crucial role in children's social and cognitive development. High-quality, stable friendships foster psychological well-being, social skills, and academic success; poor peer relationships can lead to loneliness and emotional distress (Berndt et al., 1999; Hartup, 2021; Ladd et al., 1996; Parker & Asher, 1993). Given the significance of friendships, it is essential to understand how children perceive and navigate these relationships. Past research has shown that children are more prosocial toward their friends than other peers and preferentially help and share with their friends (Engelmann et al., 2019; Moore, 2009; Paulus & Moore, 2014). However, relatively little is known about children's concept of friendship, and, in particular, how they view the role of reciprocity in friendship.

Past research has investigated children's concept of friendship using a variety of methods. In interview studies, children were asked, for example, what they expected from a best friend and what they liked about their best friends. From preschool until around 7 years of age, children emphasized superficial properties such as spending time together, engaging in common activities, and sharing resources. It was not until 8 to 9 years of age that children started mentioning deeper properties such as similarity, intimacy, and loyalty (Bigelow, 1977; Bigelow & la Gaipa, 1975; Hayes, 1978; Selman, 1981). More recent studies have used simpler experimental methods to ask children to infer friendships among others based on various cues. These studies revealed a deeper understanding of friendship earlier in development. Preschoolers already used propinquity (i.e., spending time in proximity), similarity, prosocial behaviors, and loyalty cues such as partial sharing to predict friendships (Afshordi, 2019; Liberman & Shaw,

2017, 2019). Six- to 8-year-olds started using more complex loyalty cues, for instance side-taking, to predict friendships (Liberman & Shaw, 2019). Thus, the concept of friendship undergoes considerable developmental change in childhood, starting with simpler concepts during the preschool years and developing into more mature concepts at around age 7 to 8.

Prosocial behavior, in particular, is an important cue children use to infer friendships. Children are more likely to infer that two individuals are friends if one helps, shares with, or invites the other to an activity (Afshordi, 2019; Liberman & Shaw, 2019). Prosocial behaviors are privileged over other friendship cues, such as similarity, stressing their central role in children's concept of friendship (Afshordi, 2019; Liberman & Shaw, 2019). However, prior studies have focused only on one-way prosocial behaviors. Does reciprocity—the mutual exchange of prosocial behaviors, where both individuals take turns helping, sharing, and inviting each other—also play an important role in children's friendship concept? In adults, symmetrical reciprocity is one of the most valued factors in friendship (Hall, 2012), and well-balanced friendships are preferred over unbalanced ones (Walker, 1995). Developmental studies using interview methods have suggested that while younger children (age 4–9) emphasize receiving one-way assistance from their friends, older children (age 6–12) begin to value helping their friends in return, especially when such prosocial behaviors serve their own interests, a type of reciprocity known as "fair-weather reciprocity" (Bigelow & LaGaipa, 1975; Selman, 1981; Youniss & Volpe, 1978).

According to some theorists, the specific type of reciprocity matters: Friendships are characterized precisely by the absence of *short-term* reciprocity. This theory distinguishes between two types of cooperative relationships that both involve reciprocity, exchange relationships and communal relationships (Clark, 1981; Clark & Mills, 1979, 1993). In exchange

relationships (e.g., relationships among business partners and co-workers), partners provide benefits to each other with the expectation of receiving benefits in return. In contrast, in communal relationships (e.g., relationships among family members and friends), partners care for each other's welfare and provide support when needed. Based on this distinction, immediate reciprocity is expected in exchange relationships but may backfire in communal relationships. In communal relationships, immediate reciprocity can signal that a favor is given to repay a previous favor, rather than out of genuine concern for the other's welfare. Indeed, one study showed that adults liked someone they were in an exchange relationship with more if she immediately reciprocated a favor, but liked someone they were in a communal relationship with more if she did not immediately reciprocate (Clark & Mills, 1979).

Past research has examined the role of reciprocity exclusively in *friendship maintenance*. Little is known about the importance of reciprocity in *friendship formation*. One possibility is that although short-term reciprocity might be absent in the later stages of friendships, it plays a crucial role in the early stages of friendships. In friendship formation, the exchange of favors, benefits, and support within a relatively short amount of time might help build trust and establish a mutual understanding that both individuals will support each other when needed—an essential foundation for communal relationships. This hypothesis is supported by past studies on how cooperative relationships are formed over time. Using both computer simulations (Roberts & Sherratt, 1988) and behavioral experiments with adults (Roberts & Renwick, 2003), researchers found that a strategy called "raise the stakes" facilitates the formation of cooperative relationships. Individuals start by making a small investment in their first interaction with a partner, and gradually increase their investment in subsequent interactions if the partner

reciprocates or exceeds the initial investment. Thus, immediate reciprocity of gradually increased investments allows individuals to build trust and form cooperative relationships.

The present research investigates whether children view short-term reciprocity—the mutual exchange of prosocial behaviors within a short amount of time—as an important factor in friendship formation. While prior studies have not addressed this question, a body of research has examined children's general understanding of reciprocity *outside* of friendships, specifically in their interactions with strangers. From a young age, children reciprocate others' prosocial behaviors and expect others to reciprocate their prosocial behaviors. By 3.5 years of age, children show contingent reciprocity: they share more with puppets who have previously shared with them (Warneken & Tomasello, 2013). By 5.5 years of age, contingent reciprocity can be observed in dyadic interactions where children take turns allocating resources between themselves and their partners (House et al., 2013; House, 2017). Furthermore, children's contingent reciprocity is specific to intentional prosocial behaviors that are directed toward themselves. For example, 3.5-year-olds reciprocated more generously toward an individual when the individual benefited them intentionally than when the individual benefited them unintentionally or when the individual benefited others (Vaish et al., 2018). Children also expect others to reciprocate their prosocial behaviors, and strategically adjust their prosocial behaviors based on others' ability to reciprocate. For instance, 5-year-olds shared more with puppets who could reciprocate on a subsequent trial (Sebastián-Enesco & Warneken, 2015), and shared more when they were observed by another child who could reciprocate later (Engelmann et al., 2013). These studies demonstrated young children's understanding of *generalized reciprocity* (i.e., deciding *whether* or not to reciprocate), but not necessarily *direct reciprocity* (i.e., choosing to

whom to reciprocate). Indeed, when given a choice, young children did not consistently choose to reciprocate their benefactor compared to neutral individuals. It was not until around age 7 that children began to understand the norm of directly reciprocating the individual who had helped them (Chernyak et al., 2019). Thus, children start reciprocating with strangers from an early age, and their reciprocation becomes more selective and targeted by age 7. However, less is known about how children perceive reciprocity in friendships, particularly in friendship formation.

Across two experiments, we tested the role of reciprocity in children's concept of friendship formation. Specifically, we investigated whether children think short-term reciprocity of prosocial behaviors is an important factor at the beginning stages of friendships, above and beyond one individual behaving prosocially to the other. We define short-term reciprocity at the behavioral level—as the mutual exchange of prosocial behaviors within a short amount of time—without making any assumptions about the underlying motivations for reciprocation. In the General Discussion, we revisit the question of how children may evaluate the motives behind reciprocity in friendship formation (e.g., the motive of receiving benefits in return vs. the motive of genuine concern for the other; Clark, 1981; Clark & Mills, 1979, 1993). Past research has shown that young children use one-way prosocial behaviors to infer friendships, and that this cue is privileged over other cues to friendship, such as similarity (Afshordi, 2019; Liberman & Shaw, 2019). Therefore, examining how children weigh the importance of reciprocal prosocial behaviors vs. one-way prosocial behaviors would be a stringent test of children's understanding of the role of reciprocity in friendship formation. We tested this question with 4- to 8-year-olds, since this is when children start to show reciprocal behaviors and expect others to reciprocate in cooperative relationships (e.g., Sebastián-Enesco & Warneken, 2015; Warneken & Tomasello,

2013). Prior research has also revealed important changes in children's friendship concept (Afshordi, 2019; Liberman & Shaw, 2017, 2019) and understanding of reciprocity in their own friendships (Bigelow & LaGaipa, 1975; Selman, 1981; Youniss & Volpe, 1978) within this developmental window. In the experiments, children were shown 3 individuals who had just met in a new social environment. They observed the interactions between the protagonist and each of the other individuals, and predicted which pair would become better friends. Crucially, in one pair of individuals, donor and recipient roles alternated: each provided 3 prosocial behaviors toward the other (the reciprocal pair); in the other pair, donor and recipient roles did not alternate: only one individual provided 6 prosocial behaviors toward the other (the non-reciprocal pair). This allowed us to test the specific effect of reciprocity, while controlling for the total number of prosocial behaviors across the two pairs. In Experiment 1, children predicted with whom the protagonist would become better friends. In Experiment 2, to preclude children from adopting the protagonist's perspective alone, we asked participants to predict which pair of children would become better friends. We hypothesized that with age, children would be more likely to predict that the reciprocal pair would become better friends than the non-reciprocal pair.

Experiment 1

Methods

Transparency and Openness

For Experiments 1 and 2, we reported how we determined our sample size, all data exclusions and reasons for these exclusions, all manipulations, and all measures. All data, analysis code, and research materials are available at

https://osf.io/ag86y/?view_only=bed27d5e8ef4498b8dac476cec8a12eb. Data were analyzed using R, version 4.4.1. This study's design and its analysis were not pre-registered.

Participants

One hundred and sixteen children between the ages of 4 and 8 years (52 girls and 64 boys; mean age = 6.62; range = 4.00 to 8.99; *SD* = 1.49) participated in the experiment. An a priori power analysis (G*Power, Faul et al., 2009) for exact binomial tests suggested that a minimum of 108 participants is required to detect the effect size observed in a prior study on children's relative weighing of prosociality and similarity in friendship (Cohen's g = .09, Afshordi, 2019), with 80% power at $\alpha = .05$. We stopped recruiting after we have reached the minimum sample size. Although we did not collect demographic data on race or ethnicity, we recruited children in a county with a diverse racial and ethnic population (32.13% Asian, 28.07% White, 23.4% Hispanic or Latino, 9.48% Black, 5.72% Mixed race, 0.79% Native Hawaiian and Other Pacific Islander, 0.25% American Indian and Alaska Native). The median household income of the county was $119, 931 (U.S. Census Bureau, 2024). Two additional children participated but were excluded due to experimenter error ($n = 1$) or not finishing the experiment ($n = 1$).

Eighty-nine children were recruited and tested in person at a children's museum, and 27 children were recruited and tested online via Zoom, a video conferencing software. Parents of the participants provided written informed consent prior to the experiment session. Children tested in person received a small gift and a certificate for their participation, and those tested online received an electronic certificate. The study was approved by the Institutional Review Board at the [authors' University].

Design and Procedure

The study employed a 2 (Trial type: *reciprocal vs. recipient* trial or *reciprocal vs. provider* trial) x 2 (Character gender: female or male) within-subject design. In *reciprocal vs. recipient* trials, the protagonist was the recipient of all 6 prosocial behaviors in the non-reciprocal interaction. In *reciprocal vs. provider* trials, the protagonist was the provider of all 6 prosocial behaviors in the non-reciprocal interaction. Participants completed a *reciprocal vs. recipient* block and a *reciprocal vs. provider* block in counterbalanced orders. Each block consisted of 2 trials, one with female characters and one with male characters, in counterbalanced orders. Each trial used different sets of characters and behaviors.

At the beginning of each trial, participants were shown pictures of 3 children of the same gender (Protagonist, Child A, and Child B), and were told they had just met at an elementary school. Participants then heard stories about these children and were asked to predict which child (Child A or Child B) the Protagonist would become better friends with.

The experimenter presented and described the interactions between the Protagonist and Child A, and between the Protagonist and Child B (Figure 1). In *reciprocal vs. recipient* trials, the Protagonist and Child A each showed 3 prosocial behaviors toward the other, in alternating order, while the Protagonist received 6 prosocial behaviors from Child B. In *reciprocal vs. provider* trials, the Protagonist and Child A each showed 3 prosocial behaviors toward the other, in alternating order, while the Protagonist provided 6 prosocial behaviors to Child B.

The interactions of the two pairs of children were shown side-by-side on the screen (the sides of the reciprocal vs. non-reciprocal pairs were counterbalanced). For each pair, the interactions consisted of 2 helping behaviors (e.g., cleaning spilled juice), 2 sharing behaviors

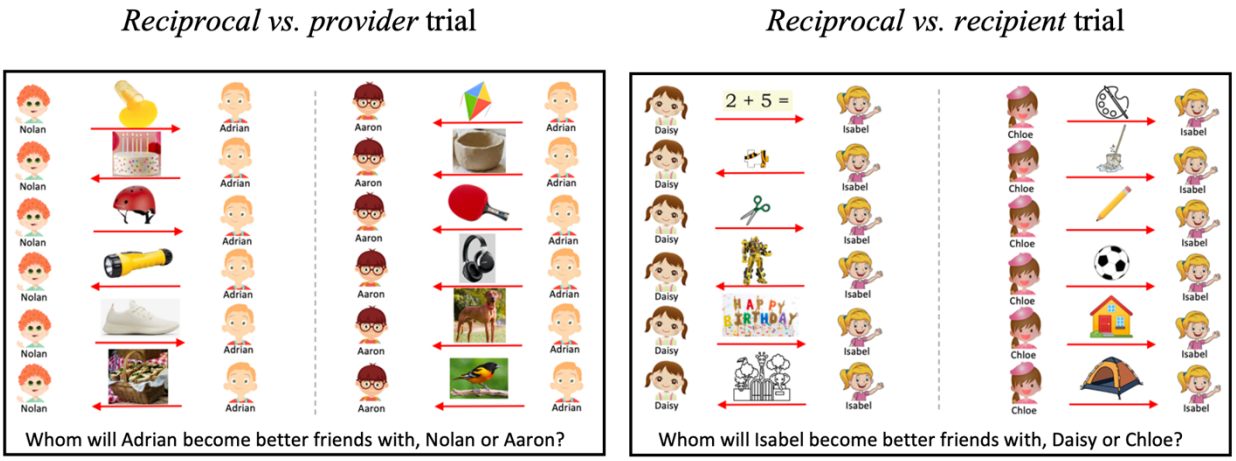
(e.g., lending a helmet), and 2 invitations (e.g., an invitation to a picnic), in a fixed order. We chose these behaviors since by 4 years of age, children use helping, sharing, and invitations to predict friendships among others (Afshordi, 2019; Liberman & Shaw, 2017, 2019). Each interaction occurred on a different day, from Monday to Saturday. For each interaction, the experimenter showed pictures of the children and a picture representing the interaction (e.g., spilled juice), along with a red arrow indicating the provider and recipient of the behavior (Figure 1). Then, the experimenter described the interaction, e.g., "On Monday, Adrian spilled some juice on the ground. Nolan helped Adrian clean it up." After describing all 6 interactions for each pair, the experimenter summarized the number of friendly behaviors, e.g., "So Nolan was nice to Adrian 3 times, and Adrian was nice to Nolan 3 times."

After describing and summarizing the interactions of both pairs, the experimenter reminded participants about the number of interactions, e.g., "Remember, Nolan was nice to Adrian 3 times and Adrian was nice to Nolan 3 times. Adrian was nice to Aaron 6 times." Then the experimenter asked participants to predict whether the Protagonist would become better friends with Child A or Child B, e.g., "Whom will Adrian become better friends with, Nolan or Aaron?" The experimenter never provided feedback on participants' answers.

We predict that older children would be more likely than younger children to predict that the reciprocal pair would become better friends in both types of trials. In addition, given that children prefer same-gender peers when forming friendships (Shutts et al., 2013), we also explored whether their predictions would vary depending on whether the characters were of the same gender as themselves or a different gender.

Figure 1

Example Stimuli in Experiment 1



Results

We used mixed-effects logistic regression to analyze children's choices (reciprocal = 1, non-reciprocal = 0). Our main predictors were trial type, participant's age (as a continuous variable), and their interactions. Our control variables included participants' gender, characters' gender, and their interaction, as well as trial order and testing mode (in-person vs. remote). We used mixed-effects logistic regression to predict children's choices from these predictors, with random intercepts for participants. We used the Akaike information criterion (AIC) as a method of model selection, and simplified the model step by step. The full model ($AIC_{TT \times Age + PG \times CG + TO + TM} = 602.49$) did not fit the data better than the model without the interaction between characters' gender and participant's gender ($AIC_{TT \times Age + PG + CG + TO + TM} = 600.99$, $\chi^2 = 0.50$, $df = 1$, $p = .48$), so the interaction was dropped. Subsequent model comparisons indicated that removing the effects of testing model, trial order, characters' gender, or participant's gender did

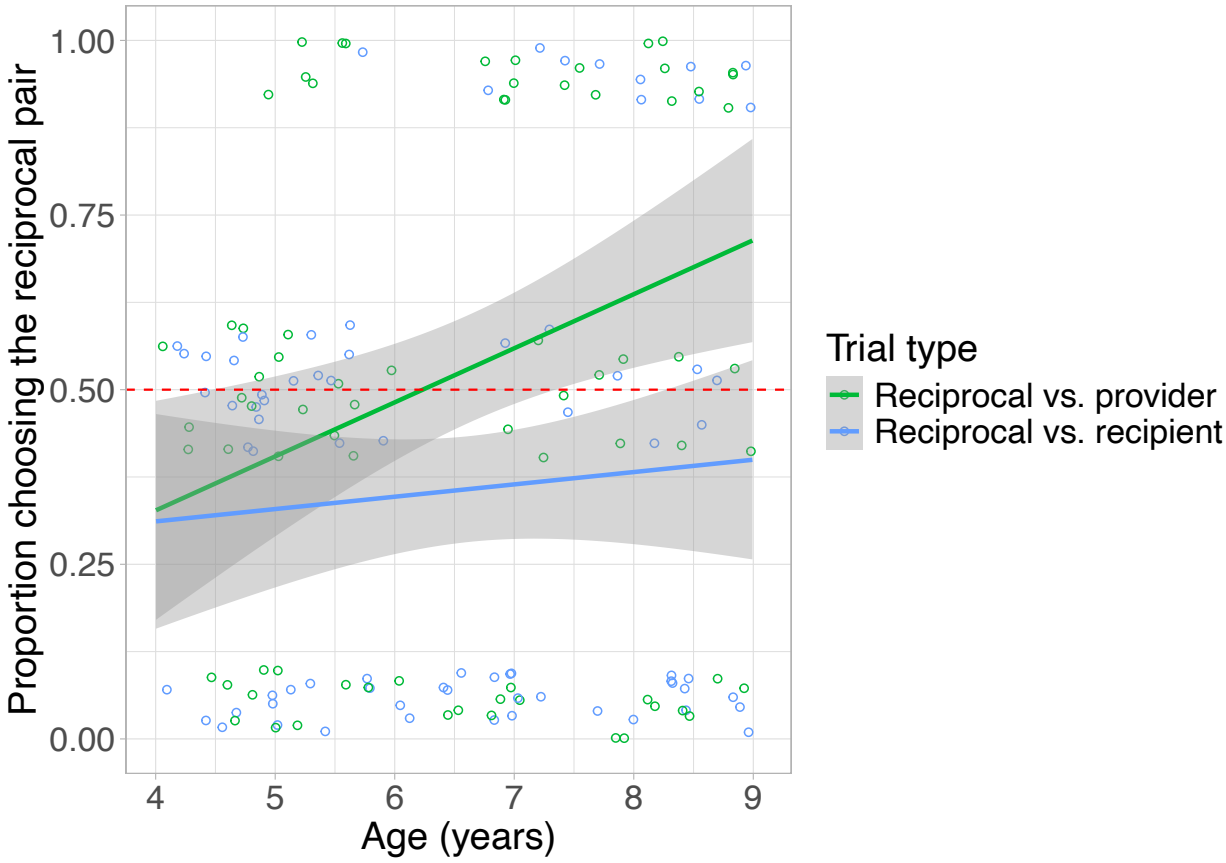
not significantly reduce model fit ($AIC_{TT \times Age + PG + CG + TO} = 598.99$, $AIC_{TT \times Age + PG + CG} = 596.52$, $AIC_{TT \times Age + PG} = 595.10$, $AIC_{TT \times Age} = 593.29$, ps > .31). The model that included the interaction between trial type and age ($AIC_{TT \times Age} = 593.29$) outperformed the model that included only trial type ($AIC_{TT} = 599.88$, $\chi^2 = 10.59$, $df = 3$, $p = .005$), only age ($AIC_{Age} = 612.30$, $\chi^2 = 23.01$, $df = 2$, $p < .001$), or both predictors without their interaction ($AIC_{TT + Age} = 595.95$, $\chi^2 = 4.66$, $df = 1$, $p = .031$), as well as the null model ($AIC_{Null} = 616.25$, $\chi^2 = 28.96$, $df = 3$, $p < .001$). This model was therefore selected as the best-fitting model.

The best-fitting model revealed a main effect of trial type ($\chi^2 = 16.16$, $p < .001$) and a main effect of age ($\chi^2 = 5.42$, $p = .020$), which are qualified by an interaction between trial type and age ($\chi^2 = 4.57$, $p = .033$). To unpack this interaction, we conducted simple slope tests. Children's choice for the reciprocal pair increased with age in the *reciprocal vs. provider* trials ($b = 0.41$, $SE = 0.13$, $z = 3.14$, $p = .002$), but did not change in the *reciprocal vs. recipient* trials ($b = 0.10$, $SE = 0.13$, $z = 0.73$, $p = .46$). As can be seen in Figure 2, in *reciprocal vs. recipient* trials, children chose the reciprocal pair below or at chance level (.5) across all ages. However, in *reciprocal vs. provider* trials, their choices shifted from below chance in younger children to above chance in older children. We then used the Johnson-Neyman "regions of significance" approach (Johnson & Neyman, 1936) to estimate the exact age at which children changed from choosing reciprocal pairs significantly below chance to at chance, and the exact age at which they changed from choosing reciprocal pairs at chance to significantly above chance in *reciprocal vs. provider* trials. We estimated marginal means between ages 4 and 9 by .01-year increments, and found that children younger than 4.51 years of age chose the reciprocal pairs

below chance, and at 7.32 years of age, children's choices became significantly higher than chance.

Figure 2

Proportion of Trials Children Chose the Reciprocal Pair in Experiment 1



Note. The dashed line indicates chance performance (.5), and the error bars indicate 95% CIs.

Discussion

In Experiment 1, we showed 4- to 8-year-olds that a protagonist engaged in reciprocal prosocial behaviors with one individual and non-reciprocal prosocial behaviors with the other

individual. Then children were asked to predict with whom the protagonist would become better friends. In the *reciprocal vs. provider* trials (where the protagonist is the provider of prosocial behaviors in the non-reciprocal pair), children's predictions showed a clear developmental pattern. As children became older, they were more likely to predict that the reciprocal pair would become better friends. Specifically, while younger children were more likely to choose the non-reciprocal pair, by around age 7, children reliably chose the reciprocal pair. These findings provide the first evidence that children start to understand the importance of reciprocity in friendship formation by 7 years of age.

In contrast, in the *reciprocal vs. recipient* trials (where the protagonist is the recipient of prosocial behaviors in the non-reciprocal pair), children's predictions did not change significantly with age. Across ages 4 to 8, children were either more likely to expect the non-reciprocal pair to become better friends, or did not show a preference between the two pairs. What explains this difference between the two types of trials? One possibility is that this discrepancy reflects a conceptual distinction. Children might only value reciprocity more than one-way prosociality when the protagonist always provides prosocial behaviors in the non-reciprocal pair. In contrast, when the protagonist always receives prosocial behaviors in the non-reciprocal pair, consistently receiving prosocial behaviors might serve as a stronger cue for friendship than reciprocity. Another possibility is that our specific methodology could account for this difference. Since we asked children to predict with whom *the protagonist* would become better friends, they might have put themselves in the protagonist's shoes, which in turn might have prompted selfish motives. That is, if children thought they were the protagonist, in the *reciprocal vs. provider* trials, they received help from the individual in the reciprocal pair but not

from the individual in the non-reciprocal pair. This might explain children's preference for the reciprocal pair. However, in the *reciprocal vs. receiver* trials, children received prosocial behaviors from both individuals, and even more from the individual in the non-reciprocal pair, so it might be harder for children to overcome their selfish motives and recognize the importance of reciprocity.

We aimed to disambiguate these two possibilities in Experiment 2 by weakening children's selfish concerns. Specifically, we reduced the likelihood that children would adopt the protagonist's perspective alone by asking participants to predict which *pair of children* would become better friends (instead of with whom the protagonist would become better friends, as in Experiment 1). If the difference between the two types of trials emerged because of the specific methodology used in Experiment 1, then the trial difference should disappear in Experiment 2. Moreover, asking participants to predict which pair of children would become better friends more accurately captured children's view of friendship formation as a dyadic rather than a unilateral decision.

Experiment 2

Methods

Participants

One hundred and twenty children between the ages of 4 and 8 years (58 girls and 62 boys; mean age = 6.17; range = 4.00 to 9.00; *SD* = 1.38) participated in the experiment. The sample size was determined by the a priori power analysis and the stopping rule described in Experiment 1. One additional child participated but was excluded due to not finishing the experiment (n = 1).

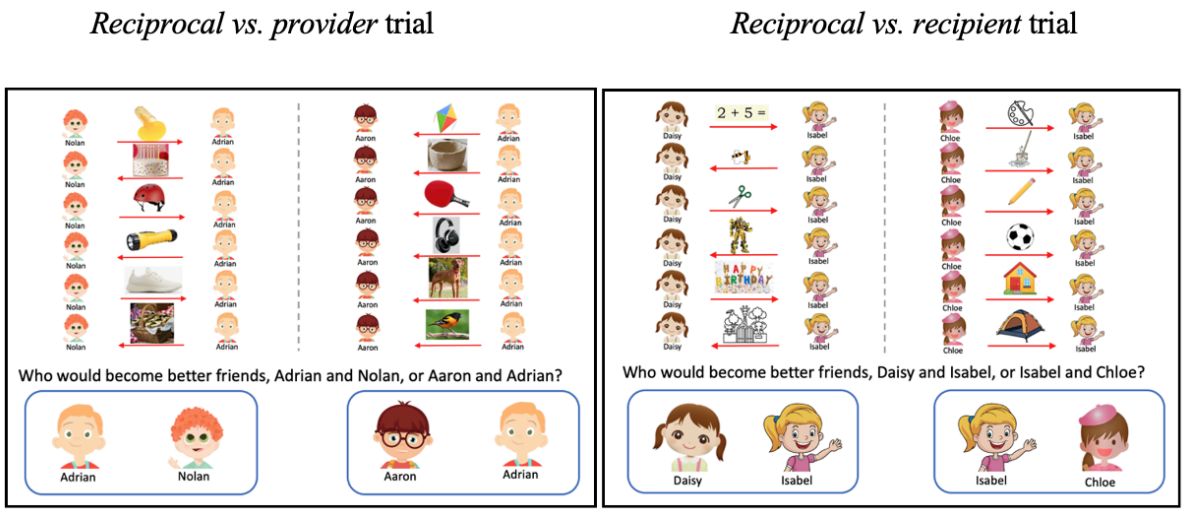
Children were recruited, tested, and compensated in the same manner as in Experiment 1. Ninety-six children were tested in person, and 24 children were tested online via Zoom. The study was approved by the Institutional Review Board at the [authors' University].

Design and Procedure

The design of Experiment 2 was the same as Experiment 1. The procedure was similar to Experiment 1, except that we deemphasized the role of the protagonist. First, at the beginning of each trial, participants were told that they would guess *who would become better friends*, instead of with whom the protagonist would become better friends. Second, after describing the interactions of both pairs, the experimenter asked participants to predict which pair of children would become better friends, e.g., "Who would become better friends, Adrian and Nolan, or Aaron and Adrian?", while showing participants pictures of the two pairs of children (Figure 3). The rest of the procedure was the same as in Experiment 1.

Figure 3

Example Stimuli in Experiment 2



Results

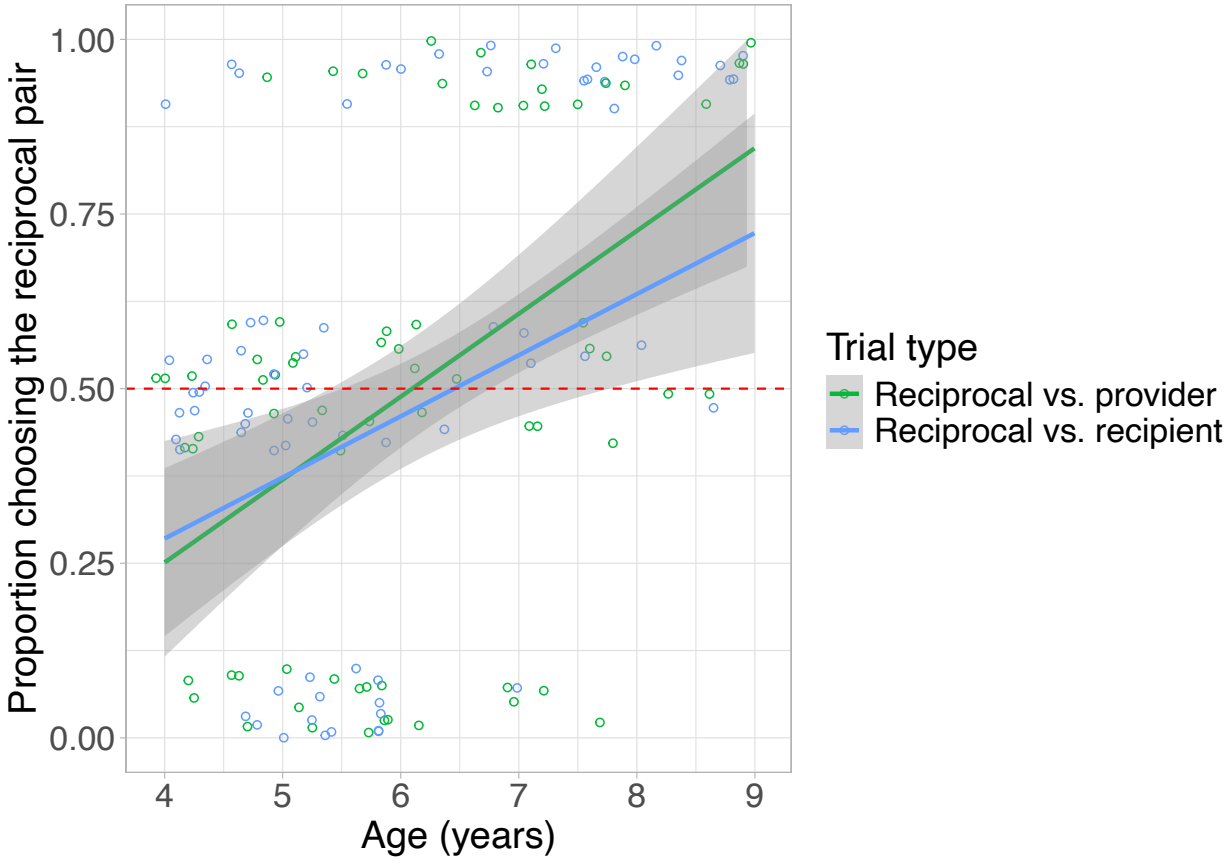
We used mixed-effects logistic regression to predict children's choices (reciprocal = 1, non-reciprocal = 0) from the same main predictors and control predictors as in Experiment 1, with random intercepts for participants. We used the same criterion for model selection as in Experiment 1. The full model ($AIC_{TT \times Age + PG \times CG + TO + TM} = 577.33$) did not fit the data better than the model without the interaction between characters' gender and participant's gender ($AIC_{TT \times Age + PG + CG + TO + TM} = 575.83$, $\chi^2 = 0.50$, $df = 1$, $p = .48$), so this interaction was dropped. Subsequent comparisons showed that removing the effects of testing model, trial order, characters' gender, or participant's gender did not significantly reduce model fit ($AIC_{TT \times Age + PG + CG + TO} = 573.88$, $AIC_{TT \times Age + PG + CG} = 571.02$, $AIC_{TT \times Age + PG} = 569.87$, $AIC_{TT \times Age} = 567.93$, ps > .35). The model that included the interaction between trial type and age ($AIC_{TT \times Age} = 593.29$) did not perform better than the model that did not include the interaction term ($AIC_{TT + Age} = 567.85$, $\chi^2 = 1.92$, $df = 1$, $p = .17$), so the interaction term was dropped. The model that only included trial type ($AIC_{TT} = 585.19$) did not perform better than the null model ($AIC_{Null} = 584.11$, $\chi^2 = 0.91$, $df = 1$, $p = .34$). In contrast, the model that only included age ($AIC_{Age} = 566.76$) provided a better fit than both the model including trial type and age ($AIC_{TT + Age} = 567.85$, $\chi^2 = 0.92$, $df = 1$, $p = .34$) and the null model ($\chi^2 = 19.34$, $df = 1$, $p < .001$), and was therefore selected as the best-fitting model.

According to the best-fitting model, children were more likely to predict that the reciprocal pair would become better friends with increasing age ($\beta = 0.95$, $SE = 0.23$, $OR = 2.58$, $p < .001$). There was no significant difference between the two types of trials ($\beta = -0.23$, $SE =$

0.23, *OR* = 0.80, *p* = .32). As shown in Figure 4, across both *reciprocal vs. recipient* and *reciprocal vs. provider* trials, children's choices shifted from below chance to above chance across age. As in Experiment 1, we then used the Johnson-Neyman "regions of significance" approach, and found that children younger than 5.58 years of age chose the reciprocal pairs below chance, and children's choices of the reciprocal pairs became significantly higher than chance at 6.95 years of age.

Figure 4

Proportion of Trials Children Chose the Reciprocal Pair in Experiment 2



Note. The dashed line indicates chance performance (.5), and the error bars indicate 95% CIs.

Discussion

In Experiment 2, we asked 4- to 8-year-olds to predict whether a pair of individuals who engaged in reciprocal prosocial behaviors or a pair where only one individual provided prosocial behaviors would become better friends. We found that across the two types of trials, children were more likely to predict that the reciprocal pair would become better friends with age. Specifically, while younger children were more likely to choose the non-reciprocal pair, by age 7, children reliably chose the reciprocal pair. Thus, when the role of the protagonist was weakened, the trial type difference we observed in Experiment 1 went away. It seems that the trial type difference might have been caused by the specific methodology used in Experiment 1, instead of conceptual differences between the two types of trials. These findings extend the results of Experiment 1, and demonstrate that starting at age 7, children consistently recognize the importance of reciprocity in friendship formation.

General Discussion

The present study examined whether children consider short-term reciprocity an important factor at the beginning stage of friendship formation, above and beyond one individual behaving prosocially towards the other individual. Four- to 8-year-olds observed a pair of individuals who engaged in reciprocal prosocial behaviors and a pair where only one individual provided prosocial behaviors. In Experiment 1, we asked children to predict with whom the protagonist (i.e., the individual common to both pairs) would become better friends. In Experiment 2, we asked them to predict which pair of individuals would become better friends. Across two studies, we observed a developmental shift in children's understanding of friendship between ages 4 and 8. Specifically, while younger children preferred one-way prosociality over

reciprocity in friendship formation, older children increasingly valued reciprocity. By age 7, children demonstrated a more mature understanding of friendship, consistently favoring reciprocity over one-way prosociality.

What developmental changes underlie the shift in children's friendship concept? Although our study did not directly probe children's reasoning, we draw on past qualitative and ethnographic research to propose several possibilities. Previous studies suggest that younger children's concept of friendship is self-centered, i.e., focused on the benefits children themselves receive. In contrast, older children begin to consider both parties in a friendship, emphasizing mutual benefits and shared responsibilities. For instance, an ethnographic study of a nursery school found that 3- to 4-year-olds often used friendships instrumentally, to gain access to playgroups and toys. Children would invoke their friendship status to request entry, for example, by saying, "(be)cause I'm your friend, right?" (Corsaro, 1981). Similarly, an interview study found that 6- to 7-year-olds described friends in terms of personal benefit, e.g., "They invite you to a party", or "They always say yes when I want to borrow their eraser". In contrast, 9- to 10-year-olds mentioned reciprocity and mutual support, e.g., "She invites me to her house and vice versa", "When I had problems, he helped me and when he had problems, I helped him" (Youniss & Volpe, 1978). Therefore, one possibility is that children's concept of friendship shifts from focusing on one individual (usually the child herself) to considering both parties in the relationship. In the present study, younger children might have selectively attended to the character who received more prosocial behaviors, overlooking the other character and her benefits. For example, they might have noticed that in the non-reciprocal pair, one character received 6 prosocial behaviors, whereas in the reciprocal pair, she received only 3, leading them

to predict that the non-reciprocal pair would become better friends. Another possibility is that younger children did not understand the word "become" in our question. The average age of acquisition of the word "become" is 5.85 years (Kuperman et al., 2012). Therefore, one potential limitation of our study is that younger children might have misunderstood our question and showed a different pattern of responses than older children. Future research should disentangle these possibilities by assessing younger children's judgments using simpler words and asking them to explain why they thought the non-reciprocal pair would become better friends.

What about older children? How do they come to recognize that both parties play an important role in a friendship, and begin to understand the importance of reciprocity in forming friendships? One possible mechanism is cognitive maturation. Improvements in executive functioning and memory may enhance children's ability to simultaneously attend to both individuals in a relationship and to track the direction and balance of prosocial behaviors between them. Another potential source is observing social interactions in the environment. For instance, children may observe their parents' interactions with their friends, and notice that they each provide favors to the other, instead of one person always helping the other. In addition, children may also learn from their own experiences with friends. Children start forming friendships from around 3 years of age (Hay, 2020). They might experience some friendships where they provide prosocial behaviors to their friends but never receive any prosocial behaviors, and they might feel a sense of unfairness or a sense of being exploited. These observations and experiences could lead children to recognize the importance of reciprocity in friendships. Future research could examine whether we can promote children's recognition of the importance of reciprocity at younger ages by showing them scenarios of non-reciprocal

friendship, and asking them to reflect on how each party in the friendship would feel. This research may have important practical implications for promoting friendships among younger children, especially for children who might lack certain socio-emotional skills (e.g., children with ASD, Chang & Dean, 2022).

Why is short-term reciprocity important in friendship formation? What information did older children extract from these reciprocal interactions to predict that the two individuals would form a higher-quality friendship? We hypothesize that these interactions help build trust and establish a shared understanding that both individuals are willing to support each other when in need. In addition, exchanging prosocial behaviors may foster positive moral evaluations and positive feelings toward each other, further facilitating the development of friendship. Alternatively, older children may view reciprocity as a social norm that applies broadly to interpersonal interactions, and interpret refusing to reciprocate as a cue of unwillingness to form a friendship. Future studies could test these possible mechanisms to better understand how reciprocal prosocial behaviors support friendship formation among older children.

These findings extend the literature on children's concept of friendship. Past interview studies have shown that children's descriptions of their own friendships evolve from emphasizing one-way assistance (ages 4–9) to reflecting reciprocity (ages 6–12) (Bigelow & LaGaipa, 1975; Selman, 1981; Youniss & Volpe, 1978). Building on this work, the present study used simpler experimental methods to examine children's third-person reasoning of friendship formation as a dyadic process. Our findings corroborate the developmental trajectory identified in prior interview studies. This pattern also aligns with broader research showing that children's friendship concept develops from a simpler understanding focusing on superficial factors such as

propinquity, similarity, and one-way prosocial behaviors in preschool years, to a more mature concept that emphasizes loyalty and intimacy at around age 7 to 8 (Afshordi, 2019; Bigelow, 1977; Bigelow & la Gaipa, 1975; Hayes, 1978; Liberman & Shaw, 2017, 2019; Selman, 1981). Our findings demonstrate that the expectation that prosocial behaviors should be reciprocal is another key component of this mature concept of friendship.

The present study also contributes to the theoretical debate on the role of reciprocity in friendship. Past work suggests that while adults value reciprocity and balance in friendships (Hall, 2012; Walker, 1995), short-term reciprocity can also undermine the foundation of friendship, which is built on genuine care for each other's wellbeing (Clark, 1981; Clark & Mills, 1979, 1993). Our study sheds new light on this debate by (1) highlighting the relevance of short-term reciprocity in friendship formation and (2) adding a developmental perspective. While our findings cannot settle the debate on the role of reciprocity in established friendships, they suggest that children value reciprocity during the early stages of friendships. In line with the findings that the "raise the stakes" strategy facilitates the formation of cooperative relationships (Roberts & Renwick, 2003; Roberts & Sherratt, 1988), our findings suggest that the exchange of prosocial behaviors in a short amount of time might help build trust among individuals and facilitate the formation of friendships.

The present study paves the way for future studies to continue investigating the role of reciprocity in children's friendships. First, we observed interesting differences in older children's predictions across the two experiments. In Experiment 2, children recognized the importance of reciprocity in both types of trials [*reciprocal vs. recipient* trial and *reciprocal vs. provider* trial] when asked to predict which pairs would become better friends. However, in Experiment 1,

when asked to predict with whom the protagonist would become better friends, children only recognized the importance of reciprocity when the protagonist was the provider of prosocial behaviors in the non-reciprocal pair. One possible explanation is that in Experiment 1, children might have adopted the protagonist's perspective and were influenced by selfish concerns. These findings have important implications for understanding the role of reciprocity in children's *own* friendship formation. Based on these results, we predict that children under 6 may be willing to befriend anyone with whom they engage in one-sided prosocial behaviors. By ages 7 to 8, children may become reluctant to befriend peers who fail to reciprocate their own prosocial behaviors. However, it may not be until later in development that children recognize that failing to reciprocate others' prosocial behaviors can also hinder the formation of friendships. Future research should directly examine the role of reciprocity in children's own friendship formation, and identify when children begin to recognize the importance of reciprocating their peers' prosocial behaviors.

Second, the current study investigated short-term reciprocity at the behavioral level, without making assumptions about the motivations underlying reciprocal behaviors. Past theories have distinguished two motives: 1) Individuals may exchange prosocial behaviors with the expectation of receiving benefits in return—characteristic of exchange relationships; or 2) Individuals may act out of genuine concern for one another—characteristic of communal relationships (Clark, 1981; Clark & Mills, 1979, 1993). Given that the present study does not distinguish between these two motives, future studies should investigate whether children differentiate these underlying motives when evaluating reciprocity in friendship formation. In addition, past research suggests that short-term reciprocity might become less important and

even backfire when friendships are already established, as it could signal a lack of genuine care and trust (Clark, 1981; Clark & Mills, 1979, 1993). Therefore, future studies should also examine whether children think the absence of immediate reciprocity might be a better indicator of friendships in later stages.

Third, future research could explore cultural differences in children's understanding of reciprocity in friendship formation. Past studies with adults suggest that norms and expectations about reciprocity in family and friend relationships vary across cultures. For instance, individuals from US-American cultural contexts tend to rely on *exchange norms*: They feel obligated to reciprocate immediately after receiving a benefit, but this obligation weakens after reciprocation and over time. In contrast, individuals from Indian contexts tend to follow *communal norms*: They feel obligated to be responsive to the needs of the helper whenever these needs arise, even after reciprocation and years after the initial favor (Miller et al., 2014; Goyal & Miller, 2018). These findings raise the possibility that children's expectations about reciprocity in friendship formation may also differ by cultural context (see also House, 2017). Specifically, future studies could examine whether and how cultural norms shape children's expectations about immediate reciprocity in the early stages of friendship formation.

More broadly, most previous research on children's concept of friendship has focused on identifying the cues that children use to infer the existence of friendships. Less is known about how friendships emerge in childhood. The present study takes a step toward addressing this gap by identifying reciprocity as a key factor in friendship formation. Future research should further investigate the mechanisms that give rise to friendships, especially high-quality and stable

friendships, as these relationships play a vital role in promoting children's well-being across multiple dimensions (Berndt et al., 1999; Hartup, 1996; Ladd et al., 1996).

References

Afshordi, N. (2019). Children's inferences about friendship and shared preferences based on reported information. *Child Development*, *90*(3), 719–727. https://doi.org/10.1111/cdev.13237

Berndt, T. J., Hawkins, J. A., & Jiao, Z. (1999). Influences of friends and friendships on adjustment to junior high school. *Merrill-Palmer Quarterly (1982-)*, 13-41.

Bigelow, B. J. (1977). Children's friendship expectations: A cognitive-developmental study. *Child development*, 246-253.

Bigelow, B. J., & la Gaipa, J. J. (1975). Children's written descriptions of friendship: A multidimensional analysis. *Developmental Psychology*, *11*(6), 857–858. https://doi.org/10.1037/0012-1649.11.6.857

Chang, Y.-C., & Dean, M. (2022). Friendship interventions and measurements in children with ASD: A systematic review. *Research in Autism Spectrum Disorders*, *93*, 101947. https://doi.org/10.1016/j.rasd.2022.101947

Chernyak, N., Leimgruber, K. L., Dunham, Y. C., Hu, J., & Blake, P. R. (2019). Paying back people who harmed us but not people who helped us: Direct negative reciprocity precedes direct positive reciprocity in early development. *Psychological Science*, *30*(9), 1273–1286. https://doi.org/10.1177/0956797619854975

Clark, M. S. (1981). Noncomparability of benefits given and received: A cue to the existence of friendship. *Social Psychology Quarterly*, *44*(4), 375. https://doi.org/10.2307/3033907

Clark, M. S., & Mills, J. (1979). Interpersonal attraction in exchange and communal relationships. *Journal of Personality and Social Psychology*, *37*(1), 12–24. https://doi.org/10.1037/0022-3514.37.1.12

Clark, M. S., & Mils, J. (1993). The difference between communal and exchange relationships: What it is and is not. *Personality and Social Psychology Bulletin*, *19*(6), 684–691. https://doi.org/10.1177/0146167293196003

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. https://doi.org/10.1016/j.evolhumbehav.2019.01.003

Engelmann, J. M., Over, H., Herrmann, E., & Tomasello, M. (2013). Young children care more about their reputation with ingroup members and potential reciprocators. *Developmental Science*, *16*(6), 952-958. https://doi.org/10.1111/desc.12086

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Goyal, N., & Miller, J. G. (2018). The importance of timing in reciprocity: An investigation of reciprocity norms among Indians and Americans. *Journal of Cross-Cultural Psychology*, *49*(3), 381–403. https://doi.org/10.1177/0022022117746239

Hall, J. A. (2012). Friendship standards: The dimensions of ideal expectations. *Journal of Social and Personal Relationships*, *29*(7), 884–907. https://doi.org/10.1177/0265407512448274

Hartup, W. W. (2021). The company they keep: Friendships and their developmental significance. In *The social child* (pp. 143-163). Psychology Press.

Hay, D. F. (2020). Peers and Friends. In J. B. Benson (Ed.), *Encyclopedia of Infant and Early Childhood Development (Second Edition)* (Second Edition, pp. 490–497). Elsevier. https://doi.org/10.1016/B978-0-12-809324-5.23639-0

Hayes, D. S. (1978). Cognitive bases for liking and disliking among preschool children. *Child Development*, *49*(3), 906. https://doi.org/10.2307/1128269

House, B., Henrich, J., Sarnecka, B., & Silk, J. B. (2013). The development of contingent reciprocity in children. *Evolution and Human Behavior*, *34*(2), 86–93. https://doi.org/10.1016/j.evolhumbehav.2012.10.001

House, B. R. (2017). Diverse ontogenies of reciprocal and prosocial behavior: Cooperative development in Fiji and the United States. *Developmental Science*, *20*(6), e12466. https://doi.org/10.1111/desc.12466

Kuperman, V., Stadthagen-Gonzalez, H., & Brysbaert, M. (2012). Age-of-acquisition ratings for 30,000 English words. *Behavior Research Methods*, *44*(4), 978–990. https://doi.org/10.3758/s13428-012-0210-4

Ladd, G. W., Kochenderfer, B. J., & Coleman, C. C. (1996). Friendship quality as a predictor of young children's early school adjustment. *Child Development*, *67*(3), 1103. https://doi.org/10.2307/1131882

Liberman, Z., & Shaw, A. (2017). Children use partial resource sharing as a cue to friendship. *Journal of Experimental Child Psychology*, *159*, 96–109. https://doi.org/10.1016/j.jecp.2017.02.002

Liberman, Z., & Shaw, A. (2019). Children use similarity, propinquity, and loyalty to predict which people are friends. *Journal of Experimental Child Psychology*, *184*, 1–17. https://doi.org/10.1016/j.jecp.2019.03.002

Miller, J. G., Bland, C., Källberg-Shroff, M., Tseng, C.-Y., Montes-George, J., Ryan, K., Das, R., & Chakravarthy, S. (2014). Culture and the role of exchange vs. Communal norms in

friendship. *Journal of Experimental Social Psychology*, *53*, 79–93. https://doi.org/10.1016/j.jesp.2014.02.006

Moore, C. (2009). Fairness in children's resource allocation depends on the recipient. *Psychological Science*, *20*(8), 944–948. https://doi.org/10.1111/j.1467-9280.2009.02378.x

Parker, J. G., & Asher, S. R. (1993). Friendship and friendship quality in middle childhood: Links with peer group acceptance and feelings of loneliness and social dissatisfaction. *Developmental Psychology, 29*(4), 611–621. https://doi.org/10.1037/0012-1649.29.4.611

Paulus, M., & Moore, C. (2014). The development of recipient-dependent sharing behavior and sharing expectations in preschool children. *Developmental Psychology, 50*(3), 914–921. https://doi.org/10.1037/a0034169

Roberts, G., & Renwick, J. S. (2003). The development of cooperative relationships: An experiment. *Proceedings of the Royal Society of London. Series B: Biological Sciences*, *270*(1530), 2279–2283. https://doi.org/10.1098/rspb.2003.2491

Roberts, G., & Sherratt, T. N. (1998). Development of cooperative relationships through increasing investment. *Nature*, *394*(6689), 175–179. https://doi.org/10.1038/28160

Sebastián-Enesco, C., & Warneken, F. (2015). The shadow of the future: 5-Year-olds, but not 3-year-olds, adjust their sharing in anticipation of reciprocation. *Journal of Experimental Child Psychology*, *129*, 40–54. https://doi.org/10.1016/j.jecp.2014.08.007

Selman, R. L. (1981). The child as a friendship philosopher. In S. R. Asher, & J. M. Gottman (Eds.), The development of children's friendships (pp. 242–272). Cambridge, UK: Cambridge University Press.

Vaish, A., Hepach, R., & Tomasello, M. (2018). The specificity of reciprocity: Young children reciprocate more generously to those who intentionally benefit them. *Journal of Experimental Child Psychology*, *167*, 336–353. https://doi.org/10.1016/j.jecp.2017.11.005

Walker, K. (1995). "Always there for me": Friendship patterns and expectations among middle- and working-class men and women. *Sociological Forum*, *10*(2), 273–296. https://doi.org/10.1007/BF02095961

Warneken, F., & Tomasello, M. (2013). The emergence of contingent reciprocity in young children. *Journal of Experimental Child Psychology*, *116*(2), 338–350. https://doi.org/10.1016/j.jecp.2013.06.002

Youniss, J., & Volpe, J. (1978). A relational analysis of children's friendship. *New Directions for Child and Adolescent Development*, *1978*(1), 1–22. https://doi.org/10.1002/cd.23219780103