

Adolescents' trust and reciprocity toward friends, unknown peers, and community members

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Funding information

European Research Council (ERC) European Union's Horizon 2020 research and innovation programme, Grant/Award Number: 681632 to Eveline A. Crone; NWO Spinoza Prize (awarded to Eveline A. Crone)

Abstract

Using a newly developed version of the Trust Game among 196 adolescents aged 11–20 years, this study examined whether adolescents distinguish between trust and reciprocity to unknown peers, friends, and community members. We also tested for effects of age, gender, and individual differences in attending to others' emotions, emotional support to friends, societal contributions, and institutional and interpersonal trust beliefs. Results indicated that adolescents showed the least trust and reciprocity to unknown peers, more to a community member, and most to friends. Reciprocity increased with age, and individual differences in societal contributions and interpersonal trust were positively related to trust and reciprocity. This study was the first to show that community members are a specific target in adolescents' social world.

KEYWORDS

adolescence, reciprocity, societal contributions, trust, Trust Game

INTRODUCTION

During adolescence, defined as the transition period between childhood and adulthood, the social environment is significantly expanding, and social relationships are developed outside the family context (Crone & Dahl, 2012). Specifically, compared to childhood, adolescents spend more time with friends and reciprocal friendships become more important (Lam et al., 2014), with these adolescent relationships relying more on interpersonal trust and reciprocity (Güroğlu, 2021). At the same time, adolescence is also a time where young people develop broader connections with larger societal organizations through volunteering, job experiences, or getting engaged with school curricula (Fuligni, 2019). However, it is currently not yet well-known whether these relations also rely on interpersonal trust with the members of larger community organizations. As adolescents increasingly engage with the broader community, adolescents learn to value their own autonomy and feel a need to contribute to societal problems (Fuligni, 2019). Moreover, when growing up, adolescents experience an increasing need to be respected for their own opinions (Fuligni, 2019, 2020). As such, adolescence is a critical period for developing mature long-term

social goals and societal values (Crone & Dahl, 2012; Crone & Fuligni, 2020).

Trust and reciprocity in adolescence

Trust and reciprocity are important building blocks for social relationships because they help adolescents to successfully develop and maintain these social relationships (Burke et al., 2020; Crone et al., 2022; Crone & Dahl, 2012). While trust is defined as decisions favoring other individuals' outcomes aiming at future cooperation and self-gain, reciprocity refers to mutual exchange (i.e., repaying trust; Lahnö, 1995). Trust allows individuals to build relationships, whereas reciprocity of trust is critical for maintaining social relationships (Lahnö, 1995; van den Bos et al., 2010). The Trust Game is an economic game that allows researchers to systemically investigate complex social behaviors such as trust and reciprocity in an experimental task. Trust and reciprocity are considered more complex than some other prosocial (i.e., other-benefitting) behaviors (e.g., giving and sharing), given the interaction between a trustee and trustor (Rilling & Sanfey, 2011).

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In the Trust Game, participants are presented with a certain number of resources (e.g., coins) which they can divide between themselves and another participant. The resources entrusted to the second player are then multiplied (e.g., doubled or tripled), after which the second player can either reciprocate trust by returning coins, or defect the trust by keeping most of the resources for himself or herself. Given the complexity of the Trust Game, developmental studies have often employed a dichotomous version, in which the resources cannot freely be given or returned, but in which participants instead can either select an option to trust or not to trust as the first player, and to reciprocate or defect as the second player (van den Bos et al., 2009, 2011). This version has been successfully employed to study trust and reciprocity in developmental samples, particularly adolescence (Güroğlu et al., 2014; van den Bos et al., 2010). In general, studies examining trust and reciprocity choices with unknown others have shown age-related increases in trust and reciprocity between childhood and adolescence, possibly related to increases in sociocognitive perspective taking or risk taking (Sutter & Kocher, 2007; van den Bos et al., 2010, 2011). While some studies demonstrate further increases in trust and reciprocity during midadolescence (van den Bos et al., 2010), other studies have shown stability or decreases across adolescence (Derks et al., 2014; Fett et al., 2014; Güroğlu et al., 2014; Lemmers-Jansen et al., 2017; van de Groep et al., 2018). These mixed developmental patterns across studies are possibly due to different sample selections, age ranges, and task characteristics (Burke et al., 2020). Regarding gender, previous studies show that adolescent males show higher trust than females, whereas no gender differences have been found in reciprocity (Burke et al., 2020; van de Groep et al., 2018).

Adolescents' trust and reciprocity toward unknown and familiar others

Traditionally, trust and reciprocity have been examined in relation to unknown others to avoid strategic or reputation effects (van de Groep et al., 2018; van den Bos et al., 2010, 2011). In line with the notion that trust and reciprocity choices toward unknown others may represent more generalized forms of trust and reciprocity (Rotenberg et al., 2005), recent studies showed that trust in adolescence is strongly dependent on the interaction partner. For example, Güroğlu et al. (2014) demonstrated that adolescents (ages 9–18 years) showed higher levels of trust and reciprocity toward friends compared to unknown, neutral, and disliked peers, which increased with increasing age. Using a Trust Game design in which participants could build relationships with the other players over multiple trials and learn whether they were trustworthy, other studies showed a developmental advancement in learning whom to trust and to reciprocate between ages 13 and 19 years (Fett et al., 2014; Lemmers-Jansen et al., 2019) and between ages 8 and 23 years (Westhoff et al., 2020). These findings suggest that adolescents distinguish between

recipients (e.g., friends and unknown; trustworthy vs. non-trustworthy) when making trust and reciprocity decisions.

Adolescents' trust and reciprocity toward community members: Introducing the Societal Trust Game

Given that adolescence is a critical transition phase for building larger societal values (Crone & Fuligni, 2020), an important question concerns how adolescents develop trust and reciprocity toward broader community partners, such as members of a community organization. Trust and reciprocity processes toward community members may help adolescents to build their self-concept in relation to others and, in the long term, to develop their social identity (Crone et al., 2022; Crone & Fuligni, 2020), because these processes may help adolescents discover their position within society, an important developmental goal of adolescence (Crone & Fuligni, 2020). Trust and reciprocity choices for close others (e.g., friends) and community members are essential on an individual level, because these developments touch upon adolescents' fundamental need to contribute and to have an impact (Fuligni, 2019). Similarly, adolescents' development of trust and reciprocity is also crucial on a societal level as it is often argued that trust is the “glue” of society (e.g., Sullivan & Transue, 1999). Trust and reciprocity toward community targets (e.g., community members) have not yet been examined in adolescence. However, developmental findings from neuroimaging studies emphasize that adolescence is an important developmental period for societal contributions. That is, neural networks associated with promoting contributions to others undergo significant development during adolescence, as demonstrated by studies investigating neural networks engaged in giving to others (Eisenberger, 2013; Keltner et al., 2014; Moll et al., 2006). These studies suggest that adolescence is an important developmental period for forming relations outside the family context and how individuals are oriented toward society.

Individual differences in trust and reciprocity

Previous studies have suggested that such individual variation may be more effective at explaining trust and reciprocity decisions than age-related developments (e.g., Fett et al., 2014). Five promising sources of individual variation that may account for differences in trust and reciprocity toward the three targets of interest are the following: (1) attending to others' emotions, (2) emotional support toward friends, (3) general contributions to society, (4) institutional trust beliefs, and (5) interpersonal trust beliefs. First, age-related changes in trust and reciprocity can be explained by the advancing ability of adolescents to mentalize and to orient themselves toward others' social signals (Dumontheil et al., 2010; van den Bos et al., 2011). In line with this, attending to others' emotions may be related to trust and reciprocity behavior toward different targets. Second, emotional support to others may reinforce adolescents'

subsequent prosocial behavior, because of the social reward experienced by showing these prosocial actions (Telzer, 2016). For example, prior research supported the association between given emotional support to friends and subsequent prosocial behavior (Sweijen et al., 2022), as well as the association between prosocial behavior on adolescents' motivation to contribute to society (Froh et al., 2010). Also, it has been suggested that adolescents' societal contributions (e.g., volunteering in local communities) may reflect other-oriented motives (Crone & Fuligni, 2020; Fuligni, 2019). Indeed, previous studies demonstrated a significant association between societal contributions and other types of prosocial behavior, such as giving (Sweijen et al., 2022), but it remains unknown whether this also applies to trust and reciprocity. Finally, previous studies provided evidence on the relation between individuals' institutional and interpersonal trust beliefs and prosocial behavior (e.g., Rotenberg et al., 2005; Thielmann et al., 2020). For example, adolescents' trust in authorities is related to their societal commitments (Stals et al., 2022), suggesting that institutional trust may be related to trust and reciprocity behavior to society (e.g., community member). Similarly, interpersonal trust beliefs, defined as the general trust placed in others (King-Casas et al., 2005), may explain differential patterns in trust and reciprocity behavior to close and distant others. To our knowledge, no previous studies examined these individual difference measures specifically in relation to adolescents' trust and reciprocity behavior to community targets, friends, and unknown others.

The current study

Taken together, while prior research demonstrates the increasing importance of reciprocal friendships and increasing engagement with the broader community during adolescence (Fuligni, 2019; Güroğlu, 2021), it remains relatively unknown whether the relations with community members similarly rely on interpersonal trust and reciprocity as for the adolescent relations with friends. In addition, given that previous studies demonstrated adolescents' trust and reciprocity are highly dependent on social contextual factors (e.g., Güroğlu et al., 2014), it is important to include several important individuals within an adolescent's social world within the same research design, which might also explain inconsistencies between studies regarding developmental effects. The goal of this study was therefore to examine how adolescents trust community targets (e.g., community members) relative to distant (i.e., unknown peers) and close others (i.e., friends). Building upon prior studies examining this question for friends versus unknown peers (Güroğlu et al., 2014; Spaans et al., 2020; Westhoff et al., 2020), we asked adolescents to participate in a modified version of the Trust Game with three different age-matched players: an unknown peer, a self-nominated friend, and a community member.

The first and main aim of this study was to examine whether adolescents distinguish in trust and reciprocity choices to unknown peers, friends, and community targets.

We expected that adolescents would show the least trust and reciprocity to unknown peers, more to community, and most to friends (Fuligni, 2019, 2020; Güroğlu et al., 2014; van de Groep et al., 2018). Here, we also tested the construct validity of this modified version of the Trust Game using questionnaires. Specifically, we explored whether participants distinguished between the three targets in terms of importance, general trust, and pleasure ratings related to their outcomes. Second, we examined whether differences in trust and reciprocity choices were related to age and gender. We therefore hypothesized that, compared to younger adolescents, older adolescents would show higher levels of trust and reciprocity in general and would differentiate more between the different targets (Fett et al., 2014; Güroğlu et al., 2014; Sutter & Kocher, 2007; van den Bos et al., 2010). Based on prior studies, we expected that males would show more trust than females, but we expected to find no gender differences in reciprocity (Derks et al., 2015; Lemmers-Jansen et al., 2017, 2019; van de Groep et al., 2018).

The second aim of this study was to examine the extent to which trust and reciprocity decisions toward unknown peers, friends, and community members can be explained by individual differences across adolescence. Based on previous studies, we focused on the following five promising sources of individual variation that may account for differences in trust and reciprocity toward the three targets of interest: (1) attending to others' emotions, (2) emotional support toward friends, (3) general contributions to society, (4) institutional trust beliefs, and (5) interpersonal trust beliefs. We correlated adolescents' trust and reciprocity choices with these five measures (i.e., attending to others' emotions, daily emotional support to friends, general contribution to society, institutional trust beliefs, and interpersonal trust beliefs). That is, we expected that individuals with higher scores on these five measures would show higher levels of trust and reciprocity choices. We explored whether these relations were stronger for specific targets, because we expected differential patterns in these relations depending on the target (e.g., stronger association societal contributions and trust and reciprocity choices to the societal target, compared to the friend and unknown peer).

METHODS

Participants

In total, 248 adolescents between the ages of 11 and 20 years were enrolled in a longitudinal daily diary study during the COVID-19 pandemic, recruited through Dutch high school in the urban Rotterdam area in the Netherlands. Within this larger study, 52 participants were excluded from analyses due to incomplete data of the Trust Game (i.e., only single time points of trust or reciprocity data available).¹ Our final sample therefore included 196 adolescents ($M_{\text{age}} = 16.08$;

¹This enabled us to analyze all data simultaneously, thereby decreasing the total number of statistical analyses and reducing the risk of type 1 error.

$SD_{age} = 1.82$; 77% female) with complete trust and reciprocity data at two time points.² We performed one-way ANOVAs to examine whether there were differences in demographic variables included in the analyses between the participants with complete data and those with single time point data. As displayed in Table 1, the analyses revealed no differences between the two samples on age ($p = .556$) and gender ($p = .922$).

Given that participants played two rounds of the Trust Game on separate days at the second time point of the longitudinal study to ensure credibility of the game (i.e., first as the trustor and subsequently as the trustee; see Materials) and additionally filled in several questionnaires at the third time point, the number of participants included in each of the analyses are given in-between brackets.

Procedure

Participants were recruited for a longitudinal daily diary study (see OSF page <https://osf.io/h5x2a/>). In this online study, participants were invited to fill in 10 daily questionnaires in November 2020 and one follow-up questionnaire in May 2021 (see Figure 1). This study is part of a larger longitudinal study (the Urban Rotterdam Study) that started in May 2020. In November 2020, participants played the Trust Game, on separate days for Trust (Day 1) and Reciprocity (Day 10), and filled in self-report questionnaires (i.e., attending to others' emotions, emotional support to friends, general contribution to society). In May 2021, participants filled in additional questionnaires (i.e., institutional and interpersonal trust beliefs), allowing us to add these promising measures related to the second study aim. At each time point, informed consent was obtained from participants and, for adolescents aged 15 or younger, also from their parents. The study was reviewed and approved by the Ethics Committee of the Erasmus School of Social and Behavioural Sciences of Erasmus University Rotterdam (EUR). As compensation for participation, all participants received 15 Euros at the second wave in November 2020, and 10 Euros at the third wave in May 2021. In addition, coins earned during the Trust Game were converted into real money that participants could receive during the study (i.e., 1 coin equaled 30 Eurocents).

Materials

Trust Game

Participants completed an adapted version of the Trust Game (Berg et al., 1995; Güroğlu et al., 2014; van den Bos et al., 2009). During the daily diary study in November 2020,

TABLE 1 Sample characteristics for the sample of adolescents with complete data on the Trust Game ($N = 196$) and those with single time point data ($N = 52$).

	Adolescents with complete data	Adolescents with incomplete data
	<i>N</i> (percentage of sample)	<i>N</i> (percentage of sample)
Age (years)		
11	1 (0.5)	0
12	4 (2.0)	2 (3.8)
13	27 (13.8)	6 (11.5)
14	25 (12.8)	4 (7.7)
15	43 (21.9)	12 (23.1)
16	28 (14.3)	6 (11.5)
17	36 (18.4)	12 (23.1)
18	25 (12.8)	3 (5.8)
19	7 (3.6)	0
Gender		
Female	151 (77.0)	33 (63.5)
Male	44 (22.4)	10 (19.2)
Ethnicity		
Dutch	142 (72.4)	37 (71.2)
Non-Dutch	4 (2.0)	1 (1.9)
Multiple ethnicities, including Dutch	44 (22.4)	9 (5.9)
Multiple ethnicities, all non-Dutch	2 (1.0)	2 (1.3)
Educational level		
Elementary school	1 (0.5)	0
High school	159 (81.1)	37 (71.2)
Higher education	31 (15.8)	5 (9.6)
No current education	3 (1.5)	0

participants first played a block of six trials as player 1 (the trustor) on the 1st day and subsequently played a second block of six trials as player 2 (the trustee) on the 10th day, with randomized trials within each block. Participants received on-screen instructions and, due to the online setup of the study, were able to ask questions through email. It was explained that they would play Trust Games with several age-matched individuals, with a separate trial for each individual. These individuals were three age-matched players (i.e., targets): an unknown peer, community member, and a self-nominated friend. Participants were told that the unknown peer was an individual also participating in the study. The community member was a young individual from a community in Rotterdam that represents youth in a youth advisory board named Young010. Participants received information about the events this board organizes, such as youth panels in which young people discuss their future with respect to societal topics such as education, mental health, and living space. It was explained to the participants that the coins this community member earned during the

²We performed follow-up sensitivity analyses on the complete dataset for trust and reciprocity trials separately, allowing us to examine whether analyses with single time point data on the Trust Game yielded the same results as the analyses on the complete dataset. An overview of the results is presented in Supplement 1 of Data S1.

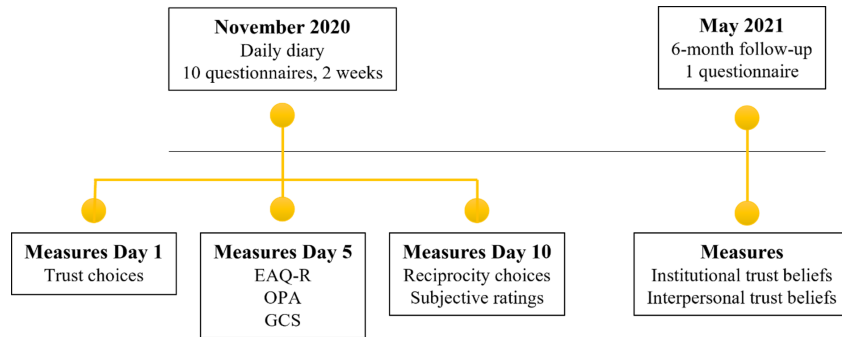


FIGURE 1 Overview of the longitudinal study with all measures at each time point. EAQ-R, attending to others' emotions; GCS, general contributions to society; OPA, emotional support to friends.

game would be received by the community. The reason for focusing on community Young010 rather than, for example, a charity is because recent studies showed an elevated sensitivity in adolescence to have a voice and impact in society (Fuligni, 2019; Yeager et al., 2018).

As for the self-nominated friend, participants could decide themselves with which friend they wanted to play the Trust Game and could choose one out of two avatars representing their friend (i.e., male or female). Here, we explicitly instructed them this friend could not be someone they had a romantic relationship with to make the target relation comparable across participants.

Participants were explained that these individuals were actual players and that they would be matched with these individuals. Because previous studies showed the importance of individuals believing that they are playing with real counterparts (Johnson & Mislin, 2011), we ensured the credibility of actual players by splitting up the game into two parts on separate days (i.e., Day 1 and Day 10 of the daily diary study). In this way, we were able to collect the choices made by player 1 on the 1st day and to implement these choices in the game on the 10th day, which we also explained to participants to increase credibility of the other players. However, no actual players were involved since the choices on the 10th day were preprogrammed. That is, participants as player 2 were only presented with trust choices by the hypothetical player 1. Finally, participants were explained that the coins were worth actual money (i.e., 1 coin equaled 30 Eurocents) and that they would receive this money at the end of the Trust Games.

As player 1 (trustor), participants received the instruction “You are player 1 and you are now playing with ‘target’. You have 10 coins. Click on the box of your choice.” While the entire decision tree was shown, the choice for the trustee was shaded to ensure that it was clear to the participants that this was the trust decision. Specifically, participants indicated whether they chose the “no trust” option, resulting in the end of the trial, or the “trust” option, allowing the trustee to decide the outcome of the trial (see Figure 2). In the latter case, the coins in that trial were multiplied by 2. Note, however, that the labels of “no trust” and “trust” were not visible to the participants and that they did not receive feedback on the subsequent choice of player 2 (see Figure 2).

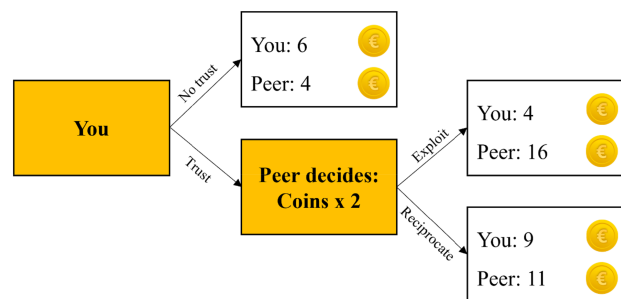


FIGURE 2 Example of the visual display of the Trust Game in the *advantage* condition. While the visual display was identical in both experimental conditions, in the *no advantage* condition the “reciprocate” outcome was reversed for the two players (11 instead of 9 coins for player 1 “you” and 9 instead of 11 coins for player 2 “peer”) to counterbalance the relative advantage for either player 1 or player 2. While the entire decision tree was visible to the participants as players 1 and 2, the choices for player 2 were shaded for the participant as player 1. Note that the labels (e.g., “trust”) are used here for visual purposes and that these were not shown to the participants during the game.

As player 2 (trustee), the instructions read: “You are player 2 and you are now playing with ‘target’. ‘Target’ decided to allow you to divide the coins. The coins have been doubled. Click on the box of your choice.” Again, participants were able to see the entire decision tree (i.e., seeing the risk taken by the trustor), while they indicated whether they chose the “reciprocate” option, resulting in an approximately equal distribution of coins among both players, or the “exploit” option, resulting in player 2 keeping most of the coins to themselves (see Figure 2). The labels of “reciprocate” and “exploit” were not shown to the participants.

The number of coins participants could earn during the Trust Game is shown in Figure 2. In this study, we included only unequal coins distributions, because prior research has shown that most individuals have a strong preference for equity and that this can sometimes unwantedly influence trust and reciprocity decisions if one choice is equal and the other is not (Meuwese et al., 2015). As such, in our game, one player earned more coins than the other player in all trials (e.g., player 2 always earning more coins than player 1 in the “exploit” option). To counterbalance the relative advantage for either player 1 or player 2, the Trust Game therefore consisted of two conditions

based on the coin distribution in the “exploit” option: *advantage* (player 1 receiving less coins than player 2) and *no advantage* (player 1 receiving more coins than player 2). Subsequently, this led to participants making two trust choices and two reciprocity choices toward each target, resulting in 12 trials in total (i.e., 2 advantage conditions \times 3 targets for both trust and reciprocity choices). The mean percentages of trust and reciprocity choices were calculated per target as well as across targets. As the involvement of advantage was not related to the aims of this study, we averaged across these two conditions in the analyses (*advantage* and *no advantage*), which also enhanced statistical power due to the increased number of trials for each variable included in the analyses.

Subjective ratings

On the same day as the reciprocity trials (see Figure 1), participants were asked to indicate how important each target was to them (from 1 [*very unimportant*] to 7 [*very important*]; importance rating), how much they trusted the target within the context of the game (from 1 [*no trust at all*] to 7 [*a lot of trust*]; target–trust rating), and how much they enjoyed receiving coins for the target (from 1 [*not at all*] to 7 [*a lot*]; pleasure rating). Additionally, participants indicated how much they enjoyed receiving coins for themselves. These ratings could be used to validate whether participants differentiated between the three targets in the Trust Game.

Self-report questionnaires: Individual differences

Attending to others' emotions

The extent to which individuals attend to others was measured with the *Attending to Others' Emotions* subscale of the Emotion Awareness Questionnaire–Revised (EAQ-R; Rieffe et al., 2008). This subscale consists of five items assessing the extent to which an individual focuses on the emotions of others (example item “It is important to know how my friends are feeling”). The EAQ-R uses a Likert scale from 1 (*not true*) to 3 (*true*). A mean score of the items belonging to the subscale was computed (Cronbach's $\alpha = .68$).

Emotional support to friends

Emotional support to friends was assessed with the *Emotional Support* subscale of the Opportunities for Prosocial Actions (OPA; van de Groep et al., 2020). This three-item subscale using a Likert scale from 0 (*not at all*) to 5 (*a lot*) assesses the extent to which an individual emotionally supports his or her friends. An example item is “I comforted friends when they were upset.” Given that the OPA was

administered daily in November 2020 (i.e., 10 assessments, see Figure 1), an average score was computed across all days (Cronbach's α range = .77 to .86).

General contribution to society

The extent to which individuals generally contribute to society was measured with the General Contribution to Society Questionnaire (GCS; van de Groep et al., 2020). Participants rated whether two items applied to them using a scale from 1 (*not at all*) to 10 (*very much*). An example item is “I think it is important to contribute to society a lot.” An average score of the two items was computed (Cronbach's $\alpha = .70$).

Institutional trust beliefs

Institutional trust beliefs were measured with six questions focusing on whether an individual trusts various institutions in the Netherlands, such as Dutch politicians and the civil service (OECD, 2017). An example question is “How much do you personally trust the civil service?” Using a Likert scale from 0 (*not at all*) to 10 (*completely*), the average of the six questions was computed (Cronbach's $\alpha = .84$).

Interpersonal trust beliefs

Interpersonal trust beliefs were measured with a set of seven questions, using a Likert scale from 0 (*not at all*) to 10 (*completely*; OECD, 2017). Participants were asked how much they generally trust various (groups of) people, such as family and friends. An example question is “In general, how much do you trust your friends?” An average score was computed, resulting in a mean score for interpersonal trust beliefs (Cronbach's $\alpha = .89$).

Data analysis

We performed several repeated measures MANOVAs to answer the research questions of this study, while we corrected for multiple comparisons by using a Bonferroni method adjusting for correlated variables (Sankoh et al., 1997; Uitenbroek, 1997). Greenhouse–Geisser corrections are applied, because the Mauchly's test of sphericity indicated violations of sphericity in the analyses ($p < .05$).

First, to examine differential patterns in trust and reciprocity choices toward the three targets, we performed a repeated measures MANOVA with trust and reciprocity as dependent variables and target (peer, community, friend) as independent variable. Second, to examine age effects and gender differences, we added age as covariate and gender as between-subjects variable to the same repeated measures

MANOVA. Based on the number of tests (2) and the average of the correlations among the eight included variables ($r = .14$), we corrected for multiple comparisons by using a Bonferroni adjusted significance level of $\alpha = .0276$ in these analyses. Finally, to examine whether differences in trust and reciprocity choices to the three targets were related to individual differences, we added each individual differences measure (i.e., attending to others' emotions, emotional support to friends, general contribution to society, institutional trust beliefs, and interpersonal trust beliefs) as separate covariate to the repeated measures MANOVA. Because this resulted in five tests (with an average of the correlations of $r = .12$ among the 11 included variables), we used the Bonferroni adjusted significance level of $\alpha = .0121$.

Given that the percentages of trust and reciprocity choices were averaged across two dichotomous trials (e.g., either trust or no trust), one can argue that the assumption of normality is not entirely met. Nonparametric analyses forgo the traditional assumption that the underlying populations are normal (Hollander et al., 2013). We therefore also performed nonparametric analyses to check whether these analyses would yield similar results to those of parametric analyses (see Supplement 2 of Data S1), which was the case.

RESULTS

Descriptive statistics of all main variables and correlation matrices are displayed in Tables 2 and 3, respectively. To validate the task, we examined whether there were mean differences between the three targets in subjective ratings of importance, general trust (i.e., target-trust), and pleasure of the different targets. As displayed in Tables S3 and S4 (see Supplement 3 of Data S1), the results showed significant relations that were target specific, validating that

participants distinguished between the different partners in their choices.

Trust and reciprocity choices toward unknown peers, community members, and friends

To examine whether adolescents showed differential trust and reciprocity toward unknown peers, community members, and friends, a repeated measures MANOVA was performed with trust and reciprocity as dependent variables and target (peer, community, friend) as independent variable. This analysis ($N = 196$) resulted in a main effect of target on trust, $F(1.84, 359.25) = 56.00, p < .001, \eta_p^2 = .22$. As shown in Figure 3, post hoc comparisons revealed that participants showed the least trust to unknown peers ($M = 44.13, SE = 2.96$), more trust to community ($M = 70.15, SE = 2.67$), and the most trust to their friends ($M = 78.32, SE = 2.43$). Post hoc comparisons also confirmed that all target conditions differed significantly from each other. The analysis also yielded a main effect of target on reciprocity, $F(1.93, 376.31) = 45.91, p < .001, \eta_p^2 = .19$, such that participants reciprocated unknown peers the least ($M = 57.14, SE = 2.96$), showed more reciprocity to community ($M = 71.94, SE = 2.71$) and the most reciprocity to their friends ($M = 85.71, SE = 2.08$; see Figure 3). Post hoc comparisons confirmed that all target conditions differed significantly from each other. Thus, adolescents showed differential trust and reciprocity choices toward unknown peers, community members, and friends.

To test whether the differences in trust and reciprocity choices toward the different targets were related to age and gender, we performed the same repeated measures MANOVA with age as covariate and gender as between-subjects variable. In this analysis ($N = 195$; excluding one participant who did not report age), relations with age were not significant after

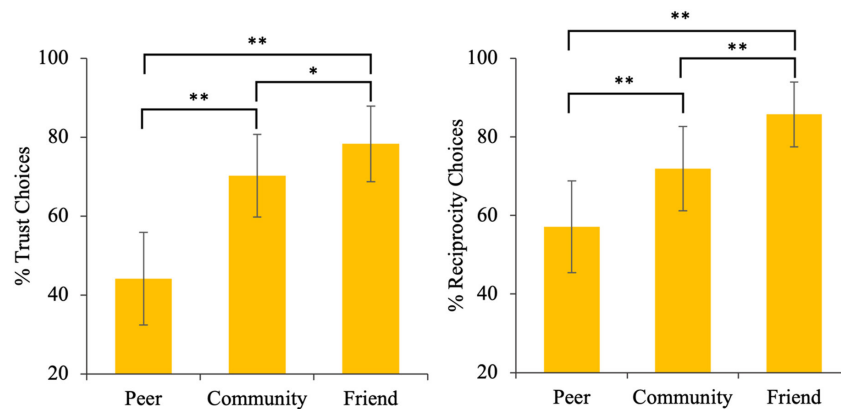
TABLE 2 Descriptive statistics of trust and reciprocity choices and individual differences.

	Number of trials/items	N	Min score	Max score	M (SD)
Trust choices (%)					
Total	6	196	0	100	64.20 (26.11)
Peer	2		0	100	44.13 (41.50)
Community	2		0	100	70.15 (37.41)
Friend	2		0	100	78.32 (33.99)
Reciprocity choices (%)					
Total	6	196	0	100	71.60 (27.45)
Peer	2		0	100	57.14 (41.45)
Community	2		0	100	71.94 (37.94)
Friend	2		0	100	85.71 (29.09)
Attending to others' emotions	5	179	1.20	3.00	2.72 (0.31)
Emotional support to friends	3	192	0.29	5.00	3.00 (1.05)
General contributions to society	2	179	1.00	10.00	7.29 (1.53)
Institutional trust beliefs	6	152	1.17	9.17	6.18 (1.58)
Interpersonal trust beliefs	7	152	0.71	9.14	7.10 (1.50)

TABLE 3 Correlation matrices of all main variables.

	% Trust choices			% Reciprocity choices		
	Peer	Community	Friend	Peer	Community	Friend
Age	.15*	.09	.04	.15*	.03	.15*
Gender	-.05	.03	.03	.00	.05	.13
% Trust choices						
Peer	-					
Community	.10	-				
Friend	.24***	.35***	-			
% Reciprocity choices						
Peer	.23***	.12	.08	-		
Community	.13	.25***	.16*	.35***	-	
Friend	.14*	.10	.18*	.37***	.36***	-
Attending to others' emotions	.04	.05	.06	.01	.04	.22**
Emotional support to friends	.07	.14	-.02	.05	.07	.08
General contributions to society	.12	.19*	.13	.08	.14	.03
Institutional trust beliefs	.01	.10	-.02	-.04	.12	.04
Interpersonal trust beliefs	.00	.10	.03	-.09	.19*	.06

* $p < .05$; ** $p < .01$; *** $p < .001$.

**FIGURE 3** Percentages of trust and reciprocity choices to unknown peers, community members, and friends. Asterisks denote significant coefficients (* $p < .05$; ** $p < .001$).

Bonferroni corrections for multiple comparisons (all $ps > .05$). However, without Bonferroni correction we found a main effect of age on reciprocity, $F(1, 192) = 4.00$, $p = .047$, $\eta_p^2 = .02$, such that older adolescents showed higher percentages of reciprocity choices than younger adolescents (see Figure 4). The relation between age and percentages of trust choices was at trend level ($p = .056$). Finally, we found no effects of gender on trust and reciprocity choices ($p = .970$ and $.333$, respectively).

Individual differences in trust and reciprocity choices

To investigate whether individual variation can explain trust and reciprocity decisions, we examined whether the differences in trust and reciprocity choices between conditions

were related to individual differences. We performed several repeated measures MANOVA with trust and reciprocity as dependent variables, target (peer, community, and friend) as independent variable, and each individual differences measures as separate covariate (i.e., attending to others' emotions, emotional support to friends, general contribution to society, institutional trust beliefs, and interpersonal trust beliefs). In this way, we could examine whether these measures were specifically related to trust and reciprocity toward the different targets. Regarding attending to others' emotions ($N = 179$), emotional support to friends ($N = 192$), and institutional trust beliefs ($N = 152$), we found no main and interaction effects of these covariates on trust and reciprocity (all $ps > .05$), suggesting that these measures did not relate to the differential patterns in trust and reciprocity choices. Regarding general contributions to society, the analysis ($N = 179$)

resulted in a main effect of general contributions to society on trust, $F(1, 177) = 8.31, p = .004, \eta_p^2 = .05$, such that higher levels of general societal contributions were associated with more trust choices in general (see Figure 5). However, we found no such effects on reciprocity ($p = .128$), and no interaction between target and general societal contributions for trust and reciprocity ($p = .698$ and $.367$, respectively).

Finally, the analysis regarding interpersonal trust beliefs ($N = 152$) yielded an interaction effect between target and interpersonal trust beliefs on reciprocity, $F(1.94, 291.47) = 4.73, p = .010, \eta_p^2 = .03$, but no interaction effects for trust ($p = .535$). Post hoc comparisons revealed that adolescents with higher scores on interpersonal trust beliefs showed more reciprocity to community members ($B = 4.61, p = .022$), but not to

unknown peers and friends (see Figure 6). Note that this effect did not survive sequential Bonferroni corrections ($\alpha = .0121$). Finally, we found no main effects of interpersonal trust beliefs on trust and reciprocity ($p = .479$ and $.444$, respectively).

DISCUSSION

The aim of this study was to examine whether adolescents between the ages of 11 and 20 differentiate in trust and reciprocity choices between unknown (i.e., unknown peers), close (i.e., friends), and community (i.e., community members) targets. We also aimed to investigate developmental

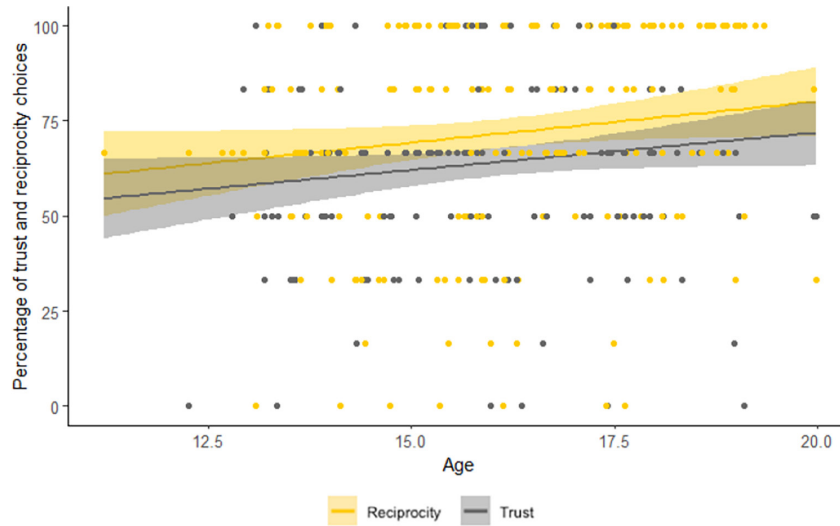


FIGURE 4 Mean percentages of trust and reciprocity choices over the three targets across age.

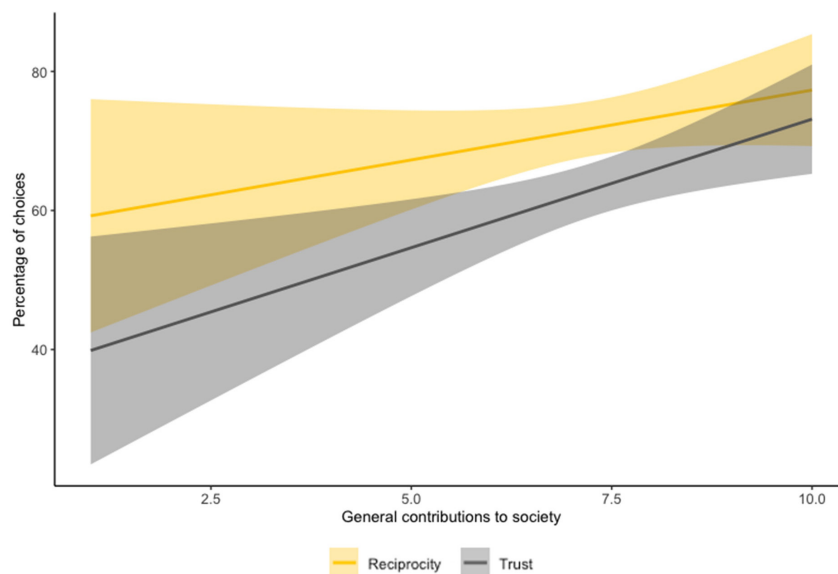


FIGURE 5 Association between general contributions to society and percentages of trust and reciprocity, averaged across targets. Higher levels of general societal contributions are significantly associated with higher percentages of trust choices, but there is no significant relation with reciprocity. Band widths denote confidence intervals.

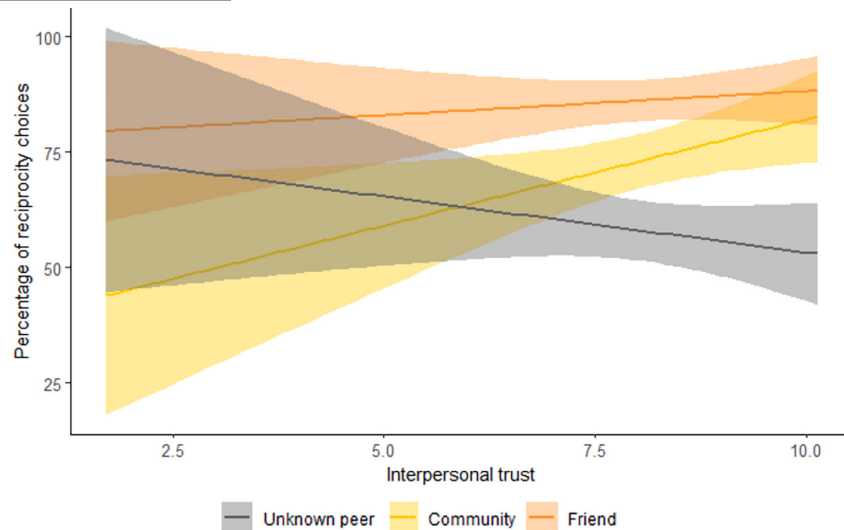


FIGURE 6 Association between interpersonal trust beliefs on percentages of reciprocity toward unknown peers, community members, and friends. Higher levels of interpersonal trust beliefs were significantly associated with higher percentages of reciprocity choices to community, but the relation with unknown peer and friends was not significant. Band widths denote confidence intervals.

and gender effects on these trust and reciprocity choices, as well as underlying individual differences in attending to others' emotions, emotional support to friends, general contribution to society, institutional trust beliefs, and interpersonal trust beliefs. Using a newly developed version of the Trust Game, this study is the first in demonstrating that adolescents showed the least trust and reciprocity to unknown peers, more trust and reciprocity to a member of a community organization (i.e., community member), and most trust and reciprocity to friends. Subjective ratings on the different targets (i.e., importance, target–trust, and pleasure ratings) validated that these differential patterns in trust and reciprocity to close and distant others can be disentangled in this new paradigm. That is, we mainly found positive correlations between the subjective ratings and trust and reciprocity choices to the different targets (e.g., the higher adolescents rated their friend as important, the more trust choices they made to their friend). Regarding developmental effects, reciprocity increased with increasing age, but the age trend in trust did not reach statistical significance. We further demonstrated that individual differences in general contributions to society and interpersonal trust beliefs were positively related to trust and reciprocity choices and in the case of interpersonal trust specifically to reciprocity toward a community member.

The most important aim of this study was to investigate whether adolescents distinguished between unknown, close, and community targets in choosing whether to trust and reciprocate. Indeed, consistent with prior studies we found that adolescents show the least trust and reciprocity to unknown peers, more to a community member, and most to friends. This differential pattern between unknown peers and friends is consistent with prior research on differentiation between targets, such as the study by Guroglu et al. (2014) showing that adolescents showed higher levels of trust and reciprocity to friends compared to familiar and

anonymous peers. Indeed, recent research has shown the importance of interaction partners in adolescents' trust and reciprocity decisions given that contextual sensitivity plays a larger role in social behavior, specifically in this stage of life (Crone & Fuligni, 2020). This study advances this knowledge by demonstrating that adolescents show intermediate levels of trust and reciprocity to a community member, building upon research stressing that adolescence is important for developing relations outside the family context and that is marked by a need to contribute (Crone & Dahl, 2012; Crone & Fuligni, 2020; Fuligni, 2019). Community members represent an important addition to the targets studied in prior literature, such as complete strangers, friends, and charities (e.g., Guroglu et al., 2014; Spaans et al., 2020; van de Groep et al., 2018). While community members are marked by relative closeness in terms of where the young individual is situated and by shared characteristics with the individual (e.g., both young individuals living in the Rotterdam area), both are still relatively distant in terms of social closeness compared to friends and family members. Also, the community member in our study differs from charities because the community member focuses specifically on advancing the position of youth in society instead of a charitable goal that an adolescent may identify themselves less with. Future studies could further elucidate the impact of various degrees of closeness (e.g., social, spatial, and having aligned goals) and how these could possibly interact with trust and reciprocity decisions.

Second, we observed an age-related increase in reciprocity choices, but there were no significant age effects in percentages of trust, which is inconsistent with studies by van de Groep et al. (2018) and van den Bos et al. (2010). It should be noted that the significance values were highly comparable ($p = .047$ vs. $p = .056$), so it is possible that the study was underpowered or had a too limited age range to unravel the age effects in trust decisions. Our finding

that older adolescents showed increased levels of reciprocity may be related to advancements of underlying social-cognitive processes (e.g., perspective taking and outcome monitoring) which may show maturational changes across adolescence and influence the complex interaction between the trustor and the trustee (Rilling & Sanfey, 2011). Indeed, prior studies have demonstrated that these social-cognitive processes show maturational changes across adolescence (reviewed in Burke et al., 2020; Crone et al., 2022), the exact nature of which may depend on contextual factors (Crone & Fuligni, 2020; van Hoorn et al., 2019). While it should be noted that the varying findings regarding developmental effects in trust and reciprocity may also be attributed to the different versions of the Trust Game used, it is important to capture these developmental effects in future research using broader age ranges, preferably within a longitudinal design, and with more specific task paradigms that disentangle target effects and interaction effects between target and age further.

Finally, we examined relations between trust and reciprocity choices to individual differences in attending to others' emotions, emotional support to friends, general contribution to society, institutional trust beliefs, and interpersonal trust beliefs. We observed, consistent with prior research on adolescents' prosocial behavior (Froh et al., 2010; Sweijen et al., 2022), that the more adolescents generally contribute to society, the more trust choices they showed in general. Those who contribute more may display an elevated general willingness to show other-oriented behavior, which may in turn translate to increased levels of trust and reciprocity to others (Crone & Fuligni, 2020; Fuligni, 2019; Sweijen et al., 2022). Similarly, our findings illustrated that adolescents who showed more interpersonal trust also made more reciprocity choices to the community, which may be explained by adolescents' willingness to reciprocate, particularly to a community, because of their enhanced general trust in others (Rotenberg et al., 2005; Thielmann et al., 2020). While interpersonal trust could also be related to these choices to the other targets (friends and unknown peers), our results seem to suggest that interpersonal trust is more strongly related to community members than to unknown others. However, this finding should be interpreted with caution as it did not survive corrections for multiple comparisons. Nonetheless, it could prove an interesting venture for future research, because studies on individual differences in adolescents' trust and reciprocity may advance our knowledge on the mechanisms of this complex prosocial behavior.

Some effects were not observed as expected and warrant further investigation. First, regarding institutional trust beliefs, we did not find a significant relation with trust and reciprocity. While it may be that both types of trust do not correlate the way we hypothesized, another possible explanation may lie in the way we measured adolescents' trust beliefs regarding institutions, which represent more distal organizations (e.g., politicians, news, and social media) compared to the specific community target used in the Societal

Trust Game (i.e., Young010). Young010 may be a community that appealed to most participants, given that its mission is to represent all young individuals in the area. Second, we found no associations between attending to others' emotions and emotional support to friends, and trust and reciprocity. Possibly, individual differences in trust and reciprocity choices may be related more to sociocognitive processes (e.g., perspective taking) rather than earlier developed socioaffective processes (e.g., affective empathy; Crone & Dahl, 2012). Future research may look further into individual differences underlying sociocognitive processes, such as perspective taking (e.g., Burke et al., 2020; Crone et al., 2022; Fett et al., 2014).

While this study advances our knowledge on developmental patterns in trust and reciprocity, some limitations should be mentioned. First, prior studies used a wider age range (e.g., 9–21 years), whereas this study included participants of ages 11 and older. The reason for including this age range is because we expected that younger children may be less familiar with community targets. However, to verify developmental patterns, a wide age range would be beneficial for future studies. Second, even though we enhanced credibility of the game by splitting up the game into two parts and by using a pay-off based on participants' real choices, the game used deception to some extent. That is, participants were not matched with real players which may have influenced their decisions (Johnson & Mislin, 2011), particularly to the self-nominated friend with whom adolescents have an interpersonal relationship. Future research can look further into these trust and reciprocity choices by using real counterparts in the Trust Game. Third, adolescents' decision to trust and reciprocate the community member may depend on their personal beliefs about this community. For example, the extent to which they believe the community is relevant or important to them and to which they feel connected to this community may have affected their trust and reciprocity decisions. Similarly, the extent to which adolescents experience their contributions to such a community as being useful may explain their trust and reciprocity choices (Fuligni, 2020). Future research may look further into these personal beliefs regarding the community (i.e., relevance, in-group–out-group, efficacy) and how this, in turn, influences prosocial behavior oriented toward a community. Finally, we administered the Trust Game during the COVID-19 pandemic. Given that in this period societal issues such as trust may be under pressure, this may also have impacted the extent to which adolescents trusted and reciprocated others.

Taken together, this study is the first in demonstrating that adolescents distinguish between community members and close and distant others in trust and reciprocity choices. Using a newly developed version of the Trust Game with a large sample of adolescents, this study has several strengths. We enriched existing versions of the Trust Game by adding multiple targets (e.g., community member) which are relevant to adolescent development. Second, we split up the Trust Game and administered the game on separate days (i.e., trust choices on Day 1 and reciprocity choices on Day

10), allowing us to better simulate real-life choices of trust and reciprocity as complex social decisions (Camerer, 2003). Third, in addition to examining gender and age effects, the focus on individual differences gives new insight into adolescents' motivation underlying their trust and reciprocity decisions toward unknown peers, friends, and community members. Specifically, we found evidence that trust and reciprocity decisions were associated with adolescents' own feelings of target importance, pleasure associated with targets' outcomes, and general interpersonal trust, but not with adolescents' emotional skills (e.g., attending to others' emotions and showing emotional support). This suggests that efforts to increase trust and reciprocity toward others may benefit from aligning adolescents' personal feelings with other-benefitting motivations. All in all, we showed that adolescents engage in trust and reciprocity, not only to unknown peers and friends but also to community members. This study advances our knowledge on the development of social relationships with important targets in an adolescent's social world. Specifically, our study demonstrates how trust and reciprocity are building blocks for developing and maintaining social relationships with community members, an understudied but essential target in adolescents' development.

ACKNOWLEDGMENTS

We would like to thank all adolescents who participated in this study.

FUNDING INFORMATION

This work was funded by the NWO Spinoza Prize (awarded to Eveline A. Crone) and the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (grant agreement no. 681632 to E.A.C.).

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Materials for this study have been made publicly available on Open Science Framework (OSF; see <https://osf.io/h5x2a/>). Data is made publicly at the Erasmus University Rotterdam data repository (see <https://doi.org/10.25397/eur.c.6204835>).

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REFERENCES

- Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior*, 10, 122–142. <https://doi.org/10.1006/game.1995.1027>
- Burke, S. M., van de Groep, S., Brandner, P., & Crone, E. A. (2020). Neurocognitive developmental changes in trust and reciprocity across adolescence. In K. C. Kadosh (Ed.), *The Oxford handbook of developmental cognitive neuroscience* (pp. 1–24). Oxford University Press.
- Camerer, C. F. (2003). *Behavioral game theory: Experiments in strategic interaction*. Russell Sage Foundation.
- Crone, E. A., & Dahl, R. E. (2012). Understanding adolescence as a period of social-affective engagement and goal flexibility. *Nature Reviews Neuroscience*, 13, 636–650. <https://doi.org/10.1038/nrn3313>
- Crone, E. A., & Fuligni, A. J. (2020). Self and others in adolescence. *Annual Review of Psychology*, 71, 447–469. <https://doi.org/10.1146/annurev-psych-010419-050937>
- Crone, E. A., Sweijen, S. W., te Brinke, L. W., & van de Groep, S. (2022). Pathways for engaging in prosocial behavior in adolescence. *Advances in Child Development and Behavior*, 63, 149–190. <https://doi.org/10.1016/bs.acdb.2022.03.003>
- Derks, J., Lee, N. C., & Krabbendam, L. (2014). Adolescent trust and trustworthiness: Role of gender and social value orientation. *Journal of Adolescence*, 37, 1379–1386. <https://doi.org/10.1016/j.adolescence.2014.09.014>
- Derks, J., Scheppingen, M. A. V., Lee, N. C., & Krabbendam, L. (2015). Trust and mindreading in adolescents: The moderating role of social value orientation. *Frontiers in Psychology*, 6, 1–7. <https://doi.org/10.3389/fpsyg.2015.00965>
- Dumontheil, I., Apperly, I. A., & Blakemore, S. J. (2010). Online usage of theory of mind continues to develop in late adolescence. *Developmental Science*, 13(2), 331–338. <https://doi.org/10.1111/j.1467-7687.2009.00888.x>
- Eisenberger, N. I. (2013). An empirical review of the neural underpinnings of receiving and giving social support: Implications for health. *Psychosomatic Medicine*, 75(6), 545–556. <https://doi.org/10.1097/PSY.0b013e31829de2e7>
- Fett, A. K. J., Shergill, S. S., Gromann, P. M., Dumontheil, I., Blakemore, S. J., Yakub, F., & Krabbendam, L. (2014). Trust and social reciprocity in adolescence—A matter of perspective-taking. *Journal of Adolescence*, 37(2), 175–184. <https://doi.org/10.1016/j.adolescence.2013.11.011>
- Froh, J. J., Bono, G., & Emmons, R. (2010). Being grateful is beyond good manners: Gratitude and motivation to contribute to society among early adolescents. *Motivation and Emotion*, 34(2), 144–157. <https://doi.org/10.1007/s11031-010-9163-z>
- Fuligni, A. J. (2019). The need to contribute during adolescence. *Perspectives on Psychological Science*, 14(3), 331–343. <https://doi.org/10.1177/1745691618805437>
- Fuligni, A. J. (2020). Is there inequality in what adolescents can give as well as receive? *Current Directions in Psychological Science*, 29(4), 405–411. <https://doi.org/10.1177/0963721420917738>
- Güroğlu, B. (2021). Adolescent brain in a social world: Unravelling the positive power of peers from a neurobehavioral perspective. *European Journal of Developmental Psychology*, 18(4), 471–493. <https://doi.org/10.1080/17405629.2020.1813101>
- Güroğlu, B., van den Bos, W., & Crone, E. A. (2014). Sharing and giving across adolescence: An experimental study examining the development of prosocial behavior. *Frontiers in Psychology*, 5, 1–13. <https://doi.org/10.3389/fpsyg.2014.00291>
- Hollander, M., Wolfe, D. A., & Chicken, E. (2013). *Nonparametric statistical methods*. John Wiley & Sons.
- Johnson, N. D., & Mislin, A. A. (2011). Trust games: A meta-analysis. *Journal of Economic Psychology*, 32(5), 865–889. <https://doi.org/10.1016/j.joep.2011.05.007>
- Keltner, D., Kogan, A., Piff, P. K., & Saturn, S. R. (2014). The sociocultural appraisals, values, and emotions (SAVE) framework of prosociality: Core processes from gene to meme. *Annual Review of Psychology*, 65, 425–460. <https://doi.org/10.1146/annurev-psych-010213-115054>
- King-Casas, B., Tomlin, D., Anen, C., Camerer, C. F., Quartz, S. R., & Montague, P. R. (2005). Getting to know you: Reputation and trust in a two-person economic exchange. *Science*, 308(5718), 78–83. <https://doi.org/10.1126/science.1108062>
- Lahno, B. (1995). Trust, reputation, and exit in exchange relationships. *Journal of Conflict Resolution*, 39(3), 495–510. <https://doi.org/10.1177/0022002795039003005>
- Lam, C. B., McHale, S. M., & Crouter, A. C. (2014). Time with peers from middle childhood to late adolescence: Developmental course and

- adjustment correlates. *Child Development*, 85(4), 1677–1693. <https://doi.org/10.1111/cdev.12235>
- Lemmers-Jansen, I. L. J., Fett, A. K. J., Shergill, S. S., van Kesteren, M. T. R., & Krabbendam, L. (2019). Girls–boys: An investigation of gender differences in the behavioral and neural mechanisms of trust and reciprocity in adolescence. *Frontiers in Human Neuroscience*, 13, 257. <https://doi.org/10.3389/fnhum.2019.00257>
- Lemmers-Jansen, I. L. J., Krabbendam, L., Veltman, D. J., & Fett, A. K. J. (2017). Boys vs. girls: Gender differences in the neural development of trust and reciprocity depend on social context. *Developmental Cognitive Neuroscience*, 25, 235–245. <https://doi.org/10.1016/j.dcn.2017.02.001>
- Meuwese, R., Crone, E. A., de Rooij, M., & Güroğlu, B. (2015). Development of equity preferences in boys and girls across adolescence. *Child Development*, 86(1), 145–158. <https://doi.org/10.1111/cdev.12290>
- Moll, J., Krueger, F., Zahn, R., Pardini, M., de Oliveira-Souza, R., & Grafman, J. (2006). Human fronto–mesolimbic networks guide decisions about charitable donation. *Proceedings of the National Academy of Sciences*, 103(42), 15623–15628. <https://doi.org/10.1073/pnas.0604475103>
- OECD. (2017). *OECD guidelines on measuring trust*. OECD Publishing. <https://doi.org/10.1787/9789264278219-en>
- Rieffe, C., Oosterveld, P., Miers, A. C., Meerum Terwogt, M., & Ly, V. (2008). Emotion awareness and internalising symptoms in children and adolescents: The Emotion Awareness Questionnaire revised. *Personality and Individual Differences*, 45(8), 756–761. <https://doi.org/10.1016/j.paid.2008.08.001>
- Rilling, J. K., & Sanfey, A. G. (2011). The neuroscience of social decision-making. *Annual Review of Psychology*, 62, 23–48. <https://doi.org/10.1146/annurev.psych.121208.131647>
- Rotenberg, K. J., Fox, C., Green, S., Ruderman, L., Slater, K., Stevens, K., & Carlo, G. (2005). Construction and validation of a children's interpersonal trust belief scale. *British Journal of Developmental Psychology*, 23(2), 271–293. <https://doi.org/10.1348/026151005X26192>
- Sankoh, A. J., Huque, M. F., & Dubey, S. D. (1997). Some comments on frequently used multiple endpoint adjustment methods in clinical trials. *Statistics in Medicine*, 16(22), 2529–2542. [https://doi.org/10.1002/\(SICI\)1097-0258\(19971130\)16:22<2529::AID-SIM692>3.0.CO;2-J](https://doi.org/10.1002/(SICI)1097-0258(19971130)16:22<2529::AID-SIM692>3.0.CO;2-J)
- Spaans, J. P., Peters, S., & Crone, E. A. (2020). Neural reward related-reactions to monetary gains for self and charity are associated with donating behavior in adolescence. *Social Cognitive and Affective Neuroscience*, 15(2), 151–163. <https://doi.org/10.1093/scan/nsaa027>
- Stals, L., Isac, M. M., & Claes, E. (2022). Political trust in early adolescence and its association with intended political participation: A cross-sectional study situated in Flanders. *Young*, 30(4), 377–399. <https://doi.org/10.1177/2F11033088221077033>
- Sullivan, J. L., & Transue, J. E. (1999). The psychological underpinnings of democracy: A selective review of research on political tolerance, interpersonal trust, and social capital. *Annual Review of Psychology*, 50, 625–650. <https://doi.org/10.1146/annurev.psych.50.1.625>
- Sutter, M., & Kocher, M. G. (2007). Trust and trustworthiness across different age groups. *Games and Economic Behavior*, 59, 364–382. <https://doi.org/10.1016/j.geb.2006.07.006>
- Sweijen, S. W., van de Groep, S., Green, K. H., te Brinke, L. W., Buijzen, M., de Leeuw, R. N. H., & Crone, E. A. (2022). Daily prosocial actions during the COVID-19 pandemic contribute to giving behavior in adolescence. *Scientific Reports*, 12(1), 1–15. <https://doi.org/10.1038/s41598-022-11421-3>
- Telzer, E. H. (2016). Dopaminergic reward sensitivity can promote adolescent health: A new perspective on the mechanism of ventral striatum activation. *Developmental Cognitive Neuroscience*, 17, 57–67. <https://doi.org/10.1016/j.dcn.2015.10.010>
- Thielmann, I., Spadaro, G., & Balliet, D. (2020). Personality and prosocial behavior: A theoretical framework and meta-analysis. *Psychological Bulletin*, 146(1), 30–90. <https://doi.org/10.1037/bul0000217>
- Uitenbroek, D. G. (1997). SISA binomial. <https://www.quantitativeskills.com/sisa/calculations/bonfer.htm>
- van de Groep, S., Meuwese, R., Zanolie, K., Güroğlu, B., & Crone, E. A. (2018). Developmental changes and individual differences in trust and reciprocity in adolescence. *Journal of Research on Adolescence*, 30(S1), 192–208. <https://doi.org/10.1111/jora.12459>
- van de Groep, S., Zanolie, K., Green, K., Sweijen, S. W., & Crone, E. A. (2020). A daily diary study on adolescents' mood, empathy, and prosocial behavior during the COVID-19 pandemic. *PLoS ONE*, 15, e0240349. <https://doi.org/10.1371/journal.pone.0240349>
- van den Bos, W., van Dijk, E., Westenberg, M., Rombouts, S. A. R. B., & Crone, E. A. (2009). What motivates repayment? Neural correlates of reciprocity in the Trust Game. *SCAN*, 4, 294–304. <https://doi.org/10.1093/scan/ns009>
- van den Bos, W., van Dijk, E., Westenberg, M., Rombouts, S. A. R. B., & Crone, E. A. (2011). Changing brains, changing perspectives: The neurocognitive development of reciprocity. *Psychological Science*, 22(1), 60–70. <https://doi.org/10.1177/0956797610391102>
- van den Bos, W., Westenberg, M., van Dijk, E., & Crone, E. A. (2010). Development of trust and reciprocity in adolescence. *Cognitive Development*, 25(1), 90–102. <https://doi.org/10.1016/j.cogdev.2009.07.004>
- van Hoorn, J., Shablack, H., Lindquist, K. A., & Telzer, E. H. (2019). Incorporating the social context into neurocognitive models of adolescent decision-making: A neuroimaging meta-analysis. *Neuroscience and Biobehavioral Reviews*, 101, 129–142. <https://doi.org/10.1016/j.neubiorev.2018.12.024>
- Westhoff, B., Molleman, L., Viding, E., van den Bos, W., & van Duijvenvoorde, A. C. K. (2020). Developmental asymmetries in learning to adjust to cooperative and uncooperative environments. *Scientific Reports*, 10(1), 1–14. <https://doi.org/10.1038/s41598-020-78546-1>
- Yeager, D. S., Dahl, R. E., & Dweck, C. S. (2018). Why interventions to influence adolescent behavior often fail but could succeed. *Perspectives on Psychological Science*, 13(1), 101–122. <https://doi.org/10.1177/1745691617722620>

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How to cite this article: Sweijen, S. W., te Brinke, L. W., van de Groep, S., & Crone, E. A. (2023). Adolescents' trust and reciprocity toward friends, unknown peers, and community members. *Journal of Research on Adolescence*, 00, 1–13. <https://doi.org/10.1111/jora.12888>