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Individual and Group Cheating Behavior: A Field Experiment with Adolescents

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Abstract:
Dishonest activities with negative consequences for others and society are often undertaken by individuals as well as groups of people. In this paper, we use a field experiment among students aged 11-16 years to study whether there is a difference between individual and group cheating behavior. We find that students cheat, but not to the maximum extent possible. On average, groups are more inclined to cheat than individuals, but there are important differences across age. While there is no evidence of dishonesty among younger individuals, older individuals as well as younger and older groups cheat and do so to a similar extent. The way in which groups are formed does not seem to matter.

Keywords: cheating, dishonesty, adolescence, group decision-making, field experiment

JEL: C93, D63, D70

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1. Introduction

In many situations in life lying and dishonesty increase individual benefits but have negative consequences for others. People evade taxes, cheat on exams, illegally download music from the Internet, and are unfaithful to their partners, to name just a few examples. Surveys that typically rely on self-reported behavior or attitudes toward dishonesty reveal that cheating is relatively common. For example, three-fourths of students confessed to cheating on tests or assignments (McCabe and Trevino 1997) and one-third of scientists admitted they engaged in questionable research practices in the past three years (Martinson et al. 2005). In the World Values Survey, 10% of more than 200,000 respondents from 87 societies considered cheating on taxes justifiable, 12% did so for claiming government benefits to which one is not entitled, and 13% for avoiding a fare on public transport.[1]

Often, groups of people participate in dishonest actions. Two of the largest bankruptcies in US history (Enron and WorldCom) were the result of fraudulent accounting methods and malpractice of groups of executive officers. Lance Armstrong – a cyclist who won the Tour de France a record seven consecutive times – admitted using performance-enhancing drugs and said that he acted with the help of doctors, drug smugglers and others within and outside his team. An eminent example is corruption, a widespread phenomenon many forms of which require two or more participants. Bribery requires at least one to give the bribe and one to take it. Both parties of an "unholy alliance" – a term coined by former US President Theodore Roosevelt – are typically groups.

While there is relatively rich evidence on the cheating behavior of individuals and its underlying motivations, we know little about the dishonest behavior of groups. In the lab, (Sutter 2009) showed that groups behave more dishonestly than individuals if dishonesty takes the form of sophisticated truth-telling. In the cheap-talk sender-receiver experiment, sender teams were more likely to send a true message but less likely to expect that the receivers would follow it, thus attempting to deceive them. In this paper, we present a field experiment without strategic interaction in which students could cheat when rolling dice that determined their payoff, knowing they were not monitored either individually or in groups of three. We aim to answer the following questions: (1) Are there differences in the cheating

[1] They chose values 6-10 on the 1-10 scale in which 1 indicates never justifiable and 10 indicates always justifiable.

behavior of individuals and groups? (2) Does cheating behavior develop with age? (3) Does the process of group formation matter for cheating in groups?

Recently, scientists started using experimental methods to study actual cheating behavior of individuals who do not know they are subject of an experiment. The evidence documents that in situations when dishonest behavior leads to higher payoff and there is no threat of its revelation, people do cheat but not to the maximum extent possible (Mazar et al. 2008; Gino et al. 2009; Fischbacher and Föllmi-Heusi 2013). This finding suggests that people do not only care about maximizing their own monetary payoff, as assumed by standard economic theory, but that they experience intrinsic costs when they behave dishonestly (Gibson et al. 2013). Other incentives which may limit the extent of cheating include lying aversion (Gneezy 2005; Lundquist et al. 2009; López-Pérez and Spiegelman 2013), guilt aversion (Charness and Dufwenberg 2006), or an effort to maintain a self-image as an honest person (Bénabou and Tirole 2002).

Given the extent and consequences of corruption and other dishonest actions undertaken by groups, it is important to understand whether these motivations and the resulting inclination for dishonest behavior are strengthened or suppressed when groups make these decisions. Using mostly experiments in the laboratory, economists studied the differences between individual and group decision-making in a variety of tasks that involve cognitive abilities, coordination or social considerations (for a comprehensive review see (Charness and Sutter 2012)). Indeed, the emerging evidence consistently shows that individual decisions are not good predictors of group decisions.

A priori, it is not clear whether groups should be more or less likely to cheat. There are several potential mechanisms as to why groups might exhibit higher dishonesty. First, experimental literature found that groups are less influenced by cognitive limitations (Charness et al. 2007, 2010; Kocher and Sutter 2005; Sutter 2005; Maciejovsky et al. 2013), suggesting that groups may be more likely to identify cheating as a feasible way to increase their payoff while individuals may be unaware of such a possibility. Second, groups were observed to make better self-interested decisions (Kugler et al. 2007; Bornstein et al. 2004) which would also predict that they should be more likely to engage in cheating in order to increase their payoff. Third, social norms affect individual behavior and people learn social norms related to dishonesty by interacting with others and observing their behavior. Importantly in our context, (Gino et al. 2009) found that people cheat more when they observe

the cheating of a member of their social group. Fourth, if people do not behave purely selfishly and do care about the welfare of others – a behavior richly documented by experimental evidence (for a review see (Fehr and Schmidt 2006)) – then people in groups may cheat more if doing so increases not only their own payoff but also the payoff of other group members. In line with this, previous research found that individuals are sensitive to the harm that lying causes to others (Gneezy 2005) and cheat more when others benefit from their cheating (Gino et al. 2013; Erat and Gneezy 2012).

On the other hand, there are also potential explanations as to why groups might be less inclined toward dishonest behavior compared to individuals. First, the desire to appear as having favorable traits may be stronger when deciding in groups where others observe attitudes of an individual and may spread the information about them to even more people outside of the group. In line with this argument, (Coricelli et al. 2010) observed that a public display of a tax evader's picture deters cheating. Second, when other people observe dishonest behavior the saliency of this act increases. Research has shown that when dishonesty is made more salient, for example by asking people to recall the Ten Commandments (Mazar et al. 2008) or by thanking them for being honest (Pruckner and Sausgruber 2013), people cheat less.

We conducted a field experiment among secondary school students in the Czech Republic, building on the design of (Fischbacher and Föllmi-Heusi 2013). Students were rewarded for filling out an unrelated anonymous questionnaire based on a number they rolled on dice. The students were not monitored when rolling the dice and the experimenter could not tell whether the reported number was the one actually rolled. We cannot identify cheating behavior at the individual level, but we can study cheating patterns among the whole sample and sub-samples of students. The students rolled the dice either individually or in groups of three. In order to study whether the process of group formation matters, we implemented two group treatments. In the *exogenous group treatment* groups were assigned randomly, while in the *endogenous group treatment* students were asked to form the groups themselves.

We find several interesting results. (1) In line with the previous evidence, students do cheat, but not to the maximum extent possible. (2) On average, students who decide in groups are more likely to cheat than individuals. (3) There are important differences across age. Among younger students, groups cheat more than individuals for whom we do not find any evidence of cheating. We do not observe the group-individual difference among older

students, who all cheat to a similar extent as younger groups do. (4) We also study whether the process of group formation and friendship ties matter. Groups in both treatments cheat to a similar extent, although groups formed by the students themselves have closer friendship ties than randomly-assigned groups.

The rest of the paper is organized as follows: Section 2 describes the design of the experiment and the sample. In Section 3, we present the results and Section 4 concludes.

2. Experimental design

The experimental procedure and treatment conditions

We conducted a simple field experiment, the purpose of which was not revealed to the participants. The design of the experiment builds on (Fischbacher and Föllmi-Heusi 2013). The students were asked to fill in a questionnaire on environmental protection, which also included questions about their characteristics. The experimenter[2] informed students that they would be rewarded for filling out the questionnaire and the reward would depend on the roll of a six-sided dice. He further informed them that their payoff would be equal to 1, 2, 3, 4 or 5 rewards if they roll a corresponding number on the dice and zero if they roll number 6. Number 6 – the number which usually brings the highest payoff in the board games – was not used as a payoff number in order to avoid acting according to gambling heuristics. To meet different preferences and prevent satiation effect, the rewards included a variety of sweets of similar monetary value from which the students could choose.

The students were told that they would roll the dice in private at the end of the classroom where they could not be observed by anybody, neither by the experimenter nor by classmates. They were instructed to roll the dice once and report the number they rolled in the questionnaire, which was completely anonymous. Therefore, it was clear that it was impossible to detect whether the reported number was the one actually rolled. While the students were filling out the questionnaire they rolled the dice one at a time. Then they showed the number reported to be rolled on the dice to the experimenter and chose the corresponding number of rewards. We recorded the order in which the students rolled the dice so that we could control for the potential effect of different time for thinking about the possibility of cheating and the strategy for reporting the number rolled on the dice.

[2] All experimental sessions were run by one experimenter.

In order to study the difference in cheating between individuals and groups, classes of students were randomly assigned to one individual and two group treatments. In the individual treatment the students filled out the questionnaire and rolled the dice on their own and communication between participants was strictly prohibited. In the group treatments students filled a portion of the questionnaire and rolled the dice in groups of three.

To test whether the process of group formation matters, the students were randomly distributed into groups in the exogenous group treatment, while they formed the groups themselves in the endogenous group treatment. In the exogenous group treatment, the random assignment to groups was implemented by drawing numbers from a bag. When the number of students in the class was not divisible by three, one or two groups of two students were formed and the observations were not included in the dataset. The questionnaire was divided into two parts. The first part consisted of questions about personal and family characteristics, was filled out by each student individually and communication was not allowed. The second part focused on environmental protection, was filled out by all three members of the group together and the students were asked to discuss the questions and agree on their answers. The group rolled the dice and each member chose the corresponding number of rewards. In the endogenous group treatment, the procedure was the same except that the students were asked to form the groups of three by themselves.

Measures of cheating behavior

By cheating we mean reporting another number than actually rolled on the dice. The complete anonymity and the fact that the dice was rolled in private make it impossible to identify cheating at the individual/group level. Nevertheless, when we compare the distribution of the reported numbers with a random dice rolling we can infer information about cheating patterns among the whole sample and sub-samples of students.

We use three types of variables that indicate the reported result of the dice rolling. First, we use a variable which indicates the corresponding payoff, i.e. the number of rewards. Second, we use a dummy variable “High reward” which is equal to one if numbers corresponding to 3, 4 or 5 rewards were reported and equal to zero if numbers corresponding to 0, 1 or 2 rewards were reported. Third, in a more detailed analysis we use a set of six dummy variables, each one indicating whether a number corresponding to 0, 1, 2, 3, 4 or 5 rewards was reported.

Sample and non-experimental data

Participants of the experiments were students of sixteen classes in seven eight-year gymnasia[3] in the Czech Republic. The headmasters of the schools gave us official permission to conduct the experiment. The experiment took place during usual school days and lasted approximately 40 minutes. In each school, all classes took part during the same day, in most cases in lessons directly following each other to prevent communication between students who had not taken part with those who already had.

In total, we collected data from 444 students. All students who were present at school on the day of the experiment took part. The absence rate was 6.6%. The number of observations in the individual treatment is 117 and in the group treatments it is 109. We selected the first and fourth grades in order to study whether there is a relationship between cheating and age. The younger students were 11-13 years old and the older students were 14-16 years old. The choice of gymnasia and first and fourth grades within each school limits the problem of selection into higher grades since the dropout rate at gymnasia is low.[4]

Besides age, we collected data about students' gender and family background, in particular about number of siblings, being firstborn, education of their mother and father, and whether the students live with both parents. Since education levels of mothers and fathers in our sample are highly correlated, in the analysis we use variable "High parental education" which is a dummy variable equal to one if at least one of the parents has completed university education. In the analysis for groups, we use the variables indicating the total number of siblings of all three group members, number of firstborn group members, number of group members who have at least one parent with completed university education, and number of group members who live with both parents.[5]

Between groups, we further collected information about friendship ties of the group members. We asked each student how many of the two remaining group members she/he would identify as being her/his best friends, friends, or classmates without particular friendship ties. We add these numbers across all three group members and for each group we construct an index which is a sum of the number of classmates without particular friendship

3 In the Czech education system, a gymnasium refers to a secondary school focused on preparing students to enter a university. Students enter the eight-year gymnasia after the fifth grade of the primary school.
[4] In the gymnasia which participated in our study, the average drop-out rate was 1.8%.
[5] The results are robust to using maxima and minima of the variables within a group instead of the sums (Table A1 in the Appendix).

ties, the number of friends multiplied by two and the number of best friends multiplied by three.

In the endogenous group treatment, we recorded the order in which groups were formed. We define a dummy variable indicating whether a group was one of the five most quickly formed groups in a class or a relatively slowly formed group.[6] Slowly-formed groups may differ from quickly-formed ones in, for example, weaker friendship ties, a lack of communication and social skills, or absence of leaders who may affect decisions of others, all of which may play a role in the decision of a group whether to cheat or not. The groups were randomly assigned a desk in the classroom in order to separate the effect of the speed of group formation from the effect of different time for considering the possibility of cheating.

Table 1 shows means of the variables across treatments. There are no significant differences in characteristics of students assigned to individual treatment compared to group treatments, indicating that the randomization was successful. When we compare the two group treatments we find little differences – groups in the endogenous group treatment are more likely to be composed of girls and to be older compared to the exogenous group treatment (both differences are statistically significant at the 10% level). We control for these variables in the regressions in which we study whether the cheating behavior of randomly assigned groups differs from cheating behavior of groups formed by the students.

To measure awareness of the possibility of cheating, after completing the experiment we asked the students to indicate the number on a dice they though had been the most frequently reported by students of their age in other schools who had already taken part in the study. Students who estimated the number correctly received one reward. This measure combines students' awareness of the possibility of cheating with their beliefs about behavior of others. In case the students were not aware of the possibility of cheating or believed that others did not cheat they should randomly choose numbers 1-6. On the other hand, if they were aware that cheating was a feasible way to increase payoff and thought that other students cheat they should indicate numbers associated with above-average number of rewards. Our measure is thus a crude proxy for the awareness of the possibility of cheating and likely an underestimate

[6] In the endogenous group treatment, there were two classes with nine groups, three classes with ten groups, and one class with eleven groups.

of it. This measure is available for a sub-sample of 57 students in the individual treatment and 105 students in the group treatments.[7]

3. Results

Overall cheating pattern

We start with the analysis of cheating behavior among the entire sample of students, irrespective of the treatment. In regressions where the dependent variable is the number of rewards, we use the OLS model. For the analysis of the dummy variable indicating above-average number of rewards, we use the probit model, and for the analysis of the set of six dummy variables, each one indicating whether a particular number of rewards was reported, we use the ordered probit model.

We find strong evidence for dishonest behavior. On average, the students received 3.1 rewards. In the case of truly random dice rolling, the average reward would be 2.5. The difference is large in magnitude (24%) and statistically significant at the 1% level (Table 2, Column 1). More than two-thirds of students (69%) reported numbers corresponding to above-average numbers of rewards (3, 4 or 5), a proportion significantly different from 50% (Table 2, Column 2).

Next, we look at the distribution of numbers reported to be rolled on the dice (Figure 1 and Table 2, Columns 3-8). Compared to a random dice rolling where each number should be rolled in 1/6 of the cases, students were significantly less likely to report all three numbers corresponding to a below-average number of rewards (0, 1 and 2) and significantly more likely to report all three numbers corresponding to above average number of rewards (3, 4 and 5). The distribution is not uniform (Pearson's chi-squared test, p-value=0.00) which implies that some participants reported a higher reward than they actually rolled on the dice. Interestingly, numbers corresponding to zero, one and two rewards were all reported with similar frequency (approximately 10%), as is the case for numbers corresponding to three, four and five rewards (approximately 23%).

This pattern of results indicates that (1) a non-negligible portion of students cheat, (2) some did not cheat since they reported zero rewards and (3) not all students who cheat do so to the maximum extent possible since the proportion of students who reported four rewards,

[7] We collected this data in the last six classes.

i.e. above average but not the highest number of rewards, is larger than 1/6. This pattern is consistent with the findings of (Fischbacher and Föllmi-Heusi 2013) who use the same design, and with other studies which find evidence that some but not all people cheat (Mazar et al. 2008; Bucciol and Piovesan 2011; Houser et al. 2012).

Individuals vs. groups and development of cheating with age

When we compare the results for individuals and groups we find important differences. While the results suggest that students in both types of treatments cheat, students who act in groups are more likely to do so than individuals. On average, individuals received 2.93 rewards and groups 3.28 rewards. Both numbers are significantly different from 2.5 at the 1% level (Table 2, Column 1) and the difference between them is marginally significant (Table 3, Column 1). While individuals are most likely to report three rewards (in 25.6% of cases), for groups the frequency increases between two and five rewards (reported in 27.5% of cases), suggesting that groups are more likely to cheat to the maximum extent possible (Figure 1). The distributions are significantly different at the 10% level (Wilcoxon rank-sum test) and the regression results also document that groups are in general less likely to report a below-average number of rewards and are more likely to report an above-average number of rewards compared to individuals (Panel A of Table 3).

Further, our sample allows us to study differences between younger (11-13 years old) and older (14-16 years old) students. We find strong evidence for higher cheating in groups compared to individuals among younger students (Panel C of Table 3), while we do not find such differences among older students (Panel D of Table 3). In fact, we do not find any evidence of cheating among younger individuals. The average reward is not significantly different from 2.5 and the proportion of students who reported an above-average number of rewards does not significantly differ from 50%. In contrast, the average reward was significantly higher than 2.5 among younger groups, older individuals as well as older groups (3.32, 3.23 and 3.32, respectively), and the majority of students reported above-average rewards (72%, 80% and 71%, respectively). Thus, the evidence suggests that younger groups, older individuals and older groups do, unlike younger individuals, cheat and they do so to similar extent (Table 2 and Columns 1-2, Panels B, C and D of Table 3).

The analysis of the distribution of the numbers reported to be rolled on the dice reveals the same pattern (Figure 2). Younger individuals do not seem to cheat since the frequency of

none of the numbers differs significantly from 1/6 (Table 2). The distributions for younger groups, older individuals and older groups all differ from the distribution for younger individuals (Wilcoxon rank-sum test, p-value<0.05). Unlike younger groups and older individuals – who are the most likely to report four and three rewards, respectively – older groups are the most likely to report the highest possible number of rewards. However, the distributions are not significantly different between these three categories of students (Wilcoxon rank-sum test). The entire pattern of results indicates that adolescence is a sensitive period when people start to behave dishonestly, and that in groups people already do cheat at a younger age when they are not inclined to do so individually.

One of the potential explanations for higher dishonesty in groups compared to individuals is that groups are better able to solve cognitive tasks and, in our experiment, more likely to be aware of the possibility of cheating. This argument may also explain higher dishonesty among older individuals compared to younger ones. To study the relevance of this channel in the context of our experiment, we look at the measure of awareness of the possibility of cheating. Cognitive limitations do not seem to play an important role since a vast majority of students believed that others behaved dishonestly. On average, 96% of students estimated that other students reported above-average numbers of rewards, and this proportion is stable both across treatments and age.

Higher dishonesty in groups compared to individuals can also arise due to the tendency of groups to make better self-interested decisions (Bornstein et al. 2004; Kugler et al. 2007) or the fact that in groups people can observe behavior of others and thus learn social norms related to dishonesty (Gino et al. 2009). Because in our experiment cheating increases not only one's own payoff but also the payoff of other group members, another potential explanation is that cheating in groups is partly driven by other-regarding preferences. While all these mechanisms can shed light on our finding that among younger students groups behave more dishonestly than individuals, it is more difficult for them to explain why there is no such difference among older students.

The role of group formation

Next, we are interested in whether the process of group formation matters. For example, endogenous group formation may affect friendship ties among group members, which may in turn result in differences in cheating behavior. Indeed, we find that groups formed by the

students themselves have closer friendship ties compared to randomly assigned groups (the difference is statistically significant at the 1% level). We analyze cheating behavior among the sub-sample of students deciding in groups and find only weak insignificant evidence for groups formed by the students to cheat less than randomly assigned groups (Panel A of Table 4).

However, the structure of groups in the endogenous group treatment is not likely to be homogenous and may depend on the speed of group formation. Indeed, we observe differences in behavior – slowly-formed groups are less likely to cheat than quickly-formed groups. They report significantly lower numbers of rewards and are less likely to report the highest possible number of rewards (Panel B of Table 4). The distributions of number reported to be rolled on the dice are significantly different between slowly and quickly-formed groups (Wilcoxon rank-sum test, p-value=0.05). In fact, there is no evidence of cheating among slowly-formed groups. The average reward is not significantly different from 2.5 and the proportion of groups which reported above average number of rewards does not significantly differ from 50%. Also, the frequency of none of the numbers differs from 1/6 (Table 2).

Last, we compare slowly and quickly-formed groups with groups in the exogenous group treatment which were assigned randomly. When we look at the distributions (Figure 3), we find that there is no significant difference between randomly assigned groups and quickly-formed groups, while the distribution of slowly-formed groups differs from both of these (Wilcoxon rank-sum test, the difference between slowly and quickly-formed groups is significant at the 5% level, the difference between slowly-formed groups and randomly assigned groups is marginally significant). This result is also documented by the average number of rewards. While there is no difference between randomly assigned groups and quickly-formed groups, slowly-formed groups report a lower number of rewards than randomly assigned groups (marginally significant, p-value=0.13) and are significantly less likely to report the highest possible number of rewards (Panel C of Table 4). The results in Table 4 are qualitatively similar for the sub-samples of younger as well as older students (Table A2 in the Appendix).

An analysis of the friendship index reveals that members of slowly-formed groups have weaker friendship ties than members of quickly-formed groups, although the difference is not statistically significant (p-value=0.18). However, this difference does not drive lower

dishonesty of slowly-formed groups as documented by the results in Table A3 in the Appendix where we control for the friendship index. A potential explanation is that students in slowly-formed groups lack leadership, communication or social skills and thus found it more difficult to form a group as well as to make a decision to cheat.

The role of individual characteristics and family background

Last, we study which characteristics reported by the students in the questionnaire predict cheating. Panel A of Table 5 shows the results for the sub-sample of individuals. In the regressions, we control for gender, age, number of siblings, being firstborn, living with both parents and having parents with high education. We also include the order of dice rolling to control for the potential effect of different time to consider the possibility of cheating. Except for the fact that older students are more likely to cheat compared to younger ones, we do not find much evidence for other characteristics to predict cheating. There is only weak evidence that firstborn students cheat less than students with older siblings – they received a lower average number of rewards (marginally significant), were more likely to report zero rewards (significant at the 10% level) and less likely to report five rewards (marginally significant).

Panel B of Table 5 shows the results for the sub-sample of randomly assigned groups where the composition of groups is exogenous. We control for age, number of females in a group, number of siblings of all group members, number of firstborn members, number of members who live with both parents, number of members who have parents with high education, the order of dice rolling and the friendship index. As mentioned earlier, we do not find any age difference among groups. Other characteristics also do not play a role except for the number and age structure of siblings. Groups with members with high numbers of siblings are significantly less likely to cheat, as are groups with firstborn members. We get similar results when we control for maxima and minima of the variables among the group members instead of their sums (Table A1 in the Appendix).

4. Conclusions

Dishonest activities with negative consequences for others and for society are widespread and undertaken by individuals as well as groups of people. In this paper, we use a field experiment among secondary school students to study whether there is a difference between individual and group cheating behavior.

Our study complements the literature which has shown that groups do not decide in the same way as individuals in a variety of tasks that involve cognitive abilities, coordination or social considerations (Charness and Sutter 2012). We provide evidence that there is a difference in cheating behavior as well – groups are more inclined toward dishonest behavior than individuals. We find an important difference in the group effect across age. While there is no evidence for younger individuals to cheat, older individuals as well as groups, irrespective of their age, cheat and do so to similar extents. In other words, individual cheating increases with age and group decision-making augments younger students' cheating to the level of older students.

Regarding the process of group formation, we do not find any significant difference in the dishonest behavior of groups that were assigned randomly compared to groups that were formed by the students and consist of closer friends. Interestingly, slowly-formed groups – probably consisting of members who found it difficult to coordinate to form a group – do not seem to cheat at all. In our experiment, group members were always classmates who knew each other. An interesting avenue for future research would be to study the behavior of groups composed of members with varying levels of knowledge of each other, including complete strangers.

The results also contribute to the literature studying the development of preferences and skills during the lifecycle and identifying sensitive windows when they are especially malleable (Cunha and Heckman 2007; Heckman 2006). Empirical evidence documents that a variety of skills and preferences develop substantially during childhood and adolescence. For example, patience (Bettinger and Slonim 2007) and cognitive skills (Schuerger and Witt 1989) were found to increase with age. While small children behave mostly selfishly, prevalence of the positive side of other-regarding preferences increases with age as well (Fehr et al. 2008; Fehr et al. 2013; Bauer et al. 2014; Harbaugh et al. 2003). We provide new evidence on cheating behavior and indeed find that it develops between 11 and 16 years of age. Unlike other types of traits, cheating, however, develops in a negative direction – towards higher dishonesty.[8] Since decreasing selfishness should lead to less cheating among older individuals, our results indicate that the development of other-regarding preferences and

[8] The observed pattern differs from the findings of (Bucciol and Piovesan 2011) who conducted a study on cheating among a sample of heterogeneous age (5-15 years) in Italy and did not find any such relationship. This raises an interesting question whether the pattern varies across cultural environments.

other incentives which may limit cheating (such as lying aversion or a desire to maintain self-image) are separate processes.

Our evidence combined with the results of previous studies on cheating suggests that the tendency to cheat increases during adolescence and then becomes stable. While our experiment does not provide any evidence of cheating among younger students (11-13 years old), it shows that a substantial share of older students (14-16 years) cheated since 80% of them reported above-average numbers of rewards. Studies conducted with university students in the laboratory in Switzerland (Fischbacher and Föllmi-Heusi 2013) and Germany (Houser et al. 2012), and in the field among newspaper readers in Austria (Pruckner and Sausgruber 2013) reveal strikingly similar extents of cheating among adults.[9]

[9] These studies find that 75% of students claimed above-average numbers of rewards when rolling dice (Fischbacher and Föllmi-Heusi 2013), that the same share reported a high-payoff outcome of a coin flip (Houser et al. 2012) – suggesting that one-half of the unlucky ones lied, and that almost two-thirds of people who took the paper from a sales booth did not pay for it (Pruckner and Sausgruber 2013). Interestingly, (Abeler et al. 2014) did not find any evidence of dishonesty at any age during adulthood when they called a representative sample of the German adult population and asked the respondents to report the outcome of a coin flip by phone; at the same time they found that people cheated in a similar experiment conducted in the lab. This research indicates that the environment where the respondents make the decision has important effects on the extent of dishonest behavior.

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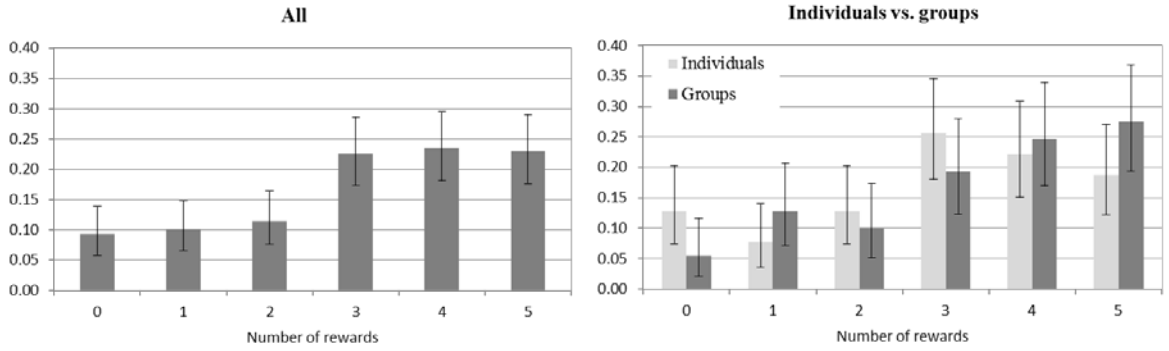
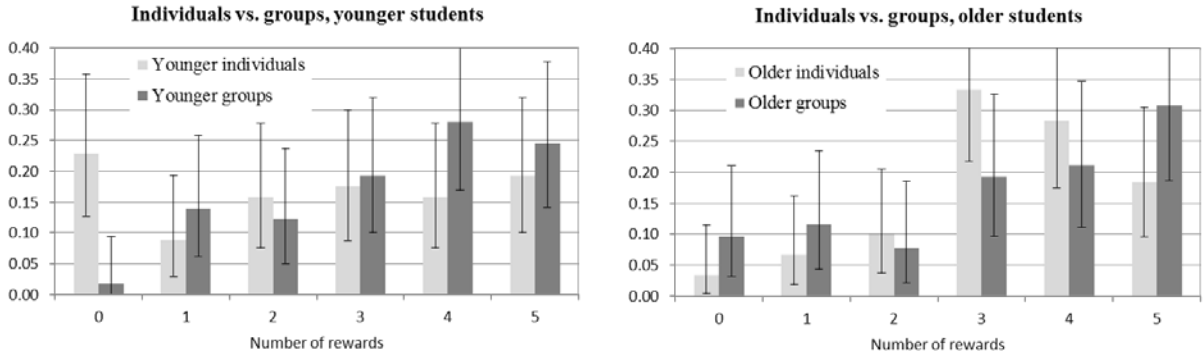
Figure 1: Distribution of number of rewards reported to be rolled on the dice across treatments



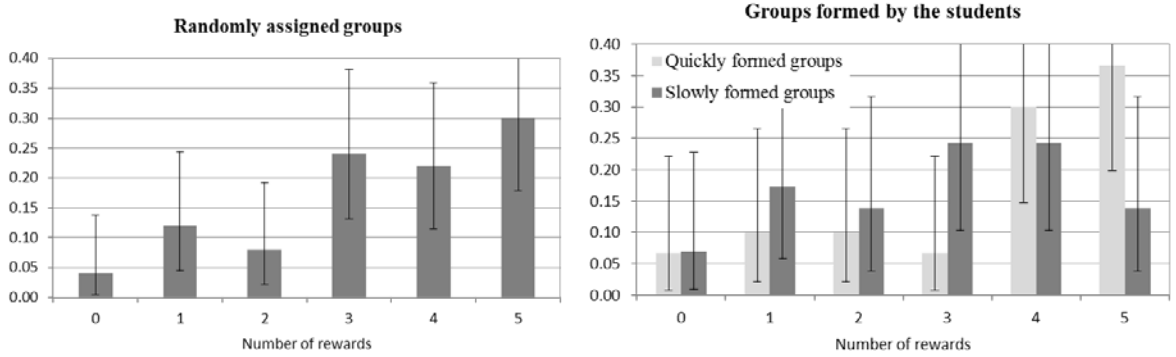
Notes: Error bars provide 95% exact confidence intervals.

Figure 2: Distribution of number of rewards reported to be rolled on the dice across age and treatments



Notes: Error bars provide 95% exact confidence intervals.

Figure 3: Distribution of number of rewards reported to be rolled on the dice across group formation



Notes: Error bars provide 95% exact confidence intervals.

Table 1: Randomization check

	Individual treatment	Group treatments	t-test p-value	Exogenous group treatment	Endogenous group treatment	t-test p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.47	0.51	0.45	0.45	0.56	0.06*
	(0.05)	(0.03)		(0.04)	(0.04)	
Older	0.51	0.57	0.27	0.52	0.62	0.08*
	(0.05)	(0.03)		(0.04)	(0.04)	
Number of siblings	1.48	1.33	0.13	1.34	1.32	0.82
	(0.08)	(0.05)		(0.08)	(0.07)	
Firstborn	0.60	0.57	0.54	0.57	0.56	0.80
	(0.05)	(0.03)		(0.04)	(0.04)	
High parental education	0.84	0.81	0.47	0.83	0.79	0.42
	(0.03)	(0.02)		(0.03)	(0.03)	
Lives with both parents	0.83	0.85	0.65	0.83	0.83	0.53
	(0.04)	(0.02)		(0.03)	(0.03)	
Number of observations	117	327		150	177	

Notes: Means. Standard deviations in parentheses. Column 3 reports p-value for a t-test testing the null hypothesis that the means are equal for students in the individual and in the group treatments. Column 6 reports p-value for a t-test testing the null hypothesis that the means are equal in the exogenous group treatment and in the endogenous group treatment.

Table 2: Comparison with random draw

Sample	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All (N=226)	3.10***	0.69***	0.09***	0.10***	0.12**	0.23**	0.23***	0.23**
Individual treatment								
All (N=117)	2.93***	0.67***	0.13	0.08***	0.13	0.26**	0.22	0.19
Younger (N=57)	2.53	0.53	0.23	0.09	0.16	0.18	0.16	0.19
Older (N=60)	3.32***	0.8***	0.03***	0.07**	0.10	0.33***	0.28**	0.18
Group treatment								
All (N=109)	3.28***	0.72***	0.06***	0.13	0.10*	0.19	0.25**	0.28***
Younger (N=57)	3.32***	0.72***	0.02***	0.14	0.12	0.19	0.28**	0.25
Older (N=52)	3.23***	0.71***	0.10	0.12	0.08*	0.19	0.21	0.31**
Exogenous group treatment (N=50)	3.38***	0.76***	0.04**	0.12	0.08	0.24	0.22	0.30**
Endogenous group treatment (N=59)	3.19***	0.68***	0.07*	0.14	0.12	0.15	0.27**	0.25*
Slowly-formed groups (N=29)	2.83	0.62	0.07	0.17	0.14	0.24	0.24	0.14
Quickly-formed groups (N=30)	3.53***	0.73**	0.07	0.10	0.10	0.07	0.30*	0.37**

Notes: Means. In Column 1, t-test of the equality of the number of rewards with 2.5. In Column 2, binomial test of the equality with 0.5. In Columns 3-8, binomial test of the equality with 1/6. *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 3: Choices of individuals and groups

Dependent variable	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A				Sample: All				
Group treatment	0.34	0.05	-0.04*	-0.03*	-0.02*	-0.01	0.02*	0.08*
	(0.21)	(0.06)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.04)
Number of observations	226	226	226	226	226	226	226	226
Panel B				Sample: All				
Group treatment	0.79***	0.18**	-0.08**	-0.06**	-0.04**	-0.02*	0.05**	0.15***
	(0.29)	(0.08)	(0.03)	(0.02)	(0.02)	(0.01)	(0.02)	(0.06)
Older	0.79***	0.27***	-0.07**	-0.05**	-0.04**	-0.02*	0.04**	0.14**
	(0.29)	(0.08)	(0.03)	(0.02)	(0.02)	(0.01)	(0.02)	(0.06)
Group treatment*Older	-0.88**	-0.30**	0.09	0.06*	0.03**	0.01	-0.06	-0.13**
	(0.42)	(0.13)	(0.06)	(0.03)	(0.02)	(0.01)	(0.04)	(0.07)
Number of observations	226	226	226	226	226	226	226	226
Panel C				Sample: Younger				
Group treatment	0.79**	0.19**	-0.10**	-0.05**	-0.04**	-0.01	0.05**	0.14**
	(0.31)	(0.09)	(0.04)	(0.03)	(0.02)	(0.01)	(0.02)	(0.06)
Number of observations	114	114	114	114	114	114	114	114
Panel D				Sample: Older				
Group treatment	-0.09	-0.09	-0.00	-0.00	-0.00	-0.00	0.00	0.01
	(0.28)	(0.08)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.06)
Number of observations	112	112	112	112	112	112	112	112

Notes: In Column 1, OLS. In Column 2, probit, marginal effects. In Columns 3-8, ordered probit, marginal effects. Standard errors in parentheses, *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 4: The role of group formation process

Dependent variable	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
Sample	Group treatments							
Endogenous group treatment	-0.21	-0.08	0.02	0.02	0.01	0.01	-0.01	-0.05
	(0.30)	(0.09)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(0.07)
Number of observations	109	109	109	109	109	109	109	109
Panel B								
Sample	Endogenous group treatment							
Slowly-formed group	-0.72*	-0.13	0.07	0.08*	0.04	0.02	-0.04	-0.16*
	(0.42)	(0.12)	(0.04)	(0.05)	(0.03)	(0.02)	(0.03)	(0.09)
Number of observations	59	59	59	59	59	59	59	59
Panel C								
Sample	Group treatments							
Slowly-formed group	-0.56	-0.14	0.05	0.06	0.03	0.02	-0.03	-0.12*
	(0.36)	(0.11)	(0.04)	(0.04)	(0.02)	(0.01)	(0.03)	(0.07)
Quickly-formed group	0.14	-0.02	-0.01	-0.02	-0.01	-0.01	0.01	0.04
	(0.36)	(0.11)	(0.02)	(0.04)	(0.02)	(0.02)	(0.01)	(0.09)
Number of observations	109	109	109	109	109	109	109	109

Notes: In Column 1, OLS. In Column 2, probit, marginal effects. In Columns 3-8, ordered probit, marginal effects. Standard errors in parentheses, *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. In all Columns of all Panels, we control for the number of female members of a group and for a dummy variable indicating being older (14-16 years).

Table 5: The role of individual characteristics and family background

Dependent variable	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
Sample				Individual treatment				
Female	0.05	-0.02	-0.02	-0.01	-0.01	-0.00	0.01	0.02
	(0.31)	(0.09)	(0.04)	(0.02)	(0.02)	(0.01)	(0.02)	(0.05)
Older	0.83***	0.29***	-0.10**	-0.04*	-0.04**	-0.01	0.06**	0.13**
	(0.31)	(0.09)	(0.04)	(0.02)	(0.02)	(0.01)	(0.03)	(0.05)
Number of siblings	-0.09	0.00	0.02	0.01	0.01	0.00	-0.01	-0.03
	(0.19)	(0.06)	(0.03)	(0.01)	(0.01)	(0.00)	(0.02)	(0.03)
First born	-0.47	-0.02	0.07*	0.03	0.03	0.01	-0.04	-0.11
	(0.34)	(0.10)	(0.04)	(0.02)	(0.02)	(0.01)	(0.03)	(0.07)
High parental education	-0.03	-0.09	0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.41)	(0.12)	(0.05)	(0.02)	(0.02)	(0.01)	(0.03)	(0.07)
Lives with both parents	0.32	0.17	-0.04	-0.02	-0.01	-0.00	0.02	0.05
	(0.41)	(0.13)	(0.06)	(0.02)	(0.02)	(0.01)	(0.04)	(0.06)
Order of dice rolling	0.00	0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of observations	114	114	114	114	114	114	114	114
Panel B								
Sample				Exogenous group treatment				
Number of females	0.05	0.06	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(0.22)	(0.08)	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)	(0.06)
Older	-0.07	-0.02	0.00	0.02	0.01	0.02	-0.01	-0.04
	(0.43)	(0.14)	(0.01)	(0.06)	(0.03)	(0.04)	(0.04)	(0.11)
Number of siblings of all members	-0.51***	-0.14***	0.01	0.07**	0.05*	0.06*	-0.05*	-0.14***
	(0.11)	(0.05)	(0.01)	(0.03)	(0.02)	(0.03)	(0.03)	(0.04)
Number of firstborn members	-0.36*	-0.06	0.01	0.06*	0.04	0.04	-0.04	-0.11**
	(0.21)	(0.08)	(0.01)	(0.03)	(0.02)	(0.03)	(0.03)	(0.06)
Number of members with high parental education	-0.28	-0.17	0.01	0.04	0.03	0.03	-0.03	-0.08
	(0.35)	(0.13)	(0.01)	(0.05)	(0.03)	(0.04)	(0.03)	(0.09)
Number of members living with both parents	-0.40	-0.09	0.01	0.06	0.04	0.05	-0.04	-0.11
	(0.35)	(0.13)	(0.01)	(0.05)	(0.03)	(0.04)	(0.03)	(0.09)
Order of dice rolling	0.03	0.02	-0.00	-0.01	-0.00	-0.00	0.00	0.01
	(0.08)	(0.03)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Friendship index	0.02	0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.01
	(0.08)	(0.03)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Number of observations	48	48	48	48	48	48	48	48

Notes: In Column 1, OLS. In Column 2, probit, marginal effects. In Columns 3-8, ordered probit, marginal effects. Standard errors in parentheses, *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table A1: The role of individual characteristics and family background, groups

Dependent variable	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
Sample			Exogenous group treatment					
At least one member is a boy	-0.41		0.01	0.04	0.03	0.04	-0.02	-0.10
	(0.68)		(0.01)	(0.07)	(0.05)	(0.08)	(0.02)	(0.19)
Older	-0.01	0.00	0.00	0.01	0.01	0.01	-0.01	-0.02
	(0.44)	(0.15)	(0.01)	(0.06)	(0.03)	(0.03)	(0.03)	(0.11)
Minimum number of siblings	-1.37***	-0.48***	0.04	0.18**	0.10*	0.11	-0.09	-0.35***
	(0.40)	(0.17)	(0.04)	(0.08)	(0.06)	(0.07)	(0.06)	(0.11)
At least one member is not firstborn	0.65	-0.01	-0.03	-0.11	-0.05	-0.03	0.06	0.16*
	(0.50)	(0.18)	(0.04)	(0.08)	(0.04)	(0.03)	(0.05)	(0.10)
At least one member does not have parents with high education	0.15	0.13	-0.01	-0.03	-0.01	-0.02	0.01	0.05
	(0.43)	(0.15)	(0.01)	(0.06)	(0.03)	(0.03)	(0.03)	(0.10)
At least one member is not living with both parents	0.27	-0.03	-0.01	-0.04	-0.02	-0.03	0.02	0.09
	(0.46)	(0.16)	(0.02)	(0.06)	(0.03)	(0.04)	(0.03)	(0.11)
Order of dice rolling	0.02	0.02	-0.00	-0.00	-0.00	-0.00	0.00	0.01
	(0.09)	(0.03)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Friendship index	0.05	0.00	-0.00	-0.01	-0.00	-0.00	0.00	0.01
	(0.09)	(0.03)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Number of observations	48	42	48	48	48	48	48	48
Panel B								
Sample			Exogenous group treatment					
At least one member is a girl	0.08	0.07	-0.00	-0.01	-0.01	-0.01	0.01	0.03
	(0.55)	(0.20)	(0.02)	(0.08)	(0.04)	(0.04)	(0.04)	(0.13)
Older	-0.13	0.02	0.01	0.03	0.01	0.02	-0.01	-0.05
	(0.43)	(0.14)	(0.02)	(0.06)	(0.03)	(0.03)	(0.03)	(0.11)
Maximum number of siblings	-0.61***	-0.15**	0.02	0.08**	0.04*	0.05*	-0.04	-0.16***
	(0.17)	(0.07)	(0.02)	(0.04)	(0.02)	(0.03)	(0.03)	(0.05)
At least one member is firstborn	-0.33	-0.05	0.01	0.06	0.03	0.06	-0.02	-0.15
	(0.59)	(0.18)	(0.02)	(0.06)	(0.04)	(0.08)	(0.02)	(0.17)
Order of dice rolling	0.03	0.02	-0.00	-0.01	-0.00	-0.00	0.00	0.01
	(0.09)	(0.03)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Friendship index	0.04	0.00	-0.00	-0.01	-0.00	-0.00	0.00	0.01
	(0.09)	(0.03)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Number of observations	48	48	48	48	48	48	48	48

Notes: In Column 1, OLS. In Column 2, probit, marginal effects. In Columns 3-8, ordered probit, marginal effects. Standard errors in parentheses, *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. In Panel B, the variables "At least one member has parents with high education" and "At least one member is living with both parents" dropped due to lack of variation.

Table A2: The role of group formation process, younger and older students

Dependent variable	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
Sample	Younger, Group treatments							
Endogenous group treatment	-0.01	0.03	0.00	0.01	0.01	0.00	-0.00	-0.02
	(0.39)	(0.13)	(0.01)	(0.06)	(0.03)	(0.02)	(0.02)	(0.09)
Number of observations	57	57	57	57	57	57	57	57
Panel B								
Sample	Older, Group treatments							
Endogenous group treatment	-0.30	-0.14	0.02	0.02	0.01	0.01	-0.01	-0.05
	(0.47)	(0.12)	(0.05)	(0.04)	(0.02)	(0.02)	(0.01)	(0.10)
Number of observations	52	52	52	52	52	52	52	52
Panel C								
Sample	Younger, Endogenous group treatment							
Slowly-formed group	-0.69	-0.22	0.03	0.08	0.05	0.02	-0.05	-0.12
	(0.53)	(0.17)	(0.04)	(0.07)	(0.05)	(0.03)	(0.06)	(0.11)
Number of observations	30	30	30	30	30	30	30	30
Panel D								
Sample	Older, Endogenous group treatment							
Slowly-formed group	-0.69	-0.02	0.10	0.07	0.03	0.02	-0.03	-0.19
	(0.67)	(0.18)	(0.08)	(0.06)	(0.03)	(0.03)	(0.03)	(0.14)
Number of observations	29	29	29	29	29	29	29	29
Panel E								
Sample	Younger, Group treatments							
Slowly-formed group	-0.35	-0.08	0.01	0.06	0.03	0.01	-0.03	-0.09
	(0.47)	(0.15)	(0.02)	(0.08)	(0.03)	(0.02)	(0.04)	(0.10)
Quickly-formed group	0.34	0.13	-0.01	-0.03	-0.02	-0.01	0.01	0.06
	(0.47)	(0.13)	(0.01)	(0.06)	(0.04)	(0.03)	(0.02)	(0.11)
Number of observations	57	57	57	57	57	57	57	57
Panel F								
Sample	Older, Group treatments							
Slowly-formed group	-0.63	-0.14	0.07	0.05	0.02	0.02	-0.03	-0.14
	(0.57)	(0.17)	(0.07)	(0.05)	(0.02)	(0.02)	(0.03)	(0.11)
Quickly-formed group	0.01	-0.15	-0.02	-0.02	-0.01	-0.01	0.01	0.05
	(0.56)	(0.16)	(0.05)	(0.04)	(0.02)	(0.03)	(0.01)	(0.13)
Number of observations	52	52	52	52	52	52	52	52

Notes: In Column 1, OLS. In Column 2, probit, marginal effects. In Columns 3-8, ordered probit, marginal effects. Standard errors in parentheses, *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. In all Columns of all Panels, we control for the number of female members of a group.

Table A3: The role of group formation process, controlling for friendship ties

Dependent variable	Number of rewards	High reward	0 rewards	1 reward	2 rewards	3 rewards	4 rewards	5 rewards
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
Sample				Group treatments				
Endogenous group treatment	-0.42	-0.15	0.03	0.04	0.02	0.02	-0.02	-0.09
	(0.37)	(0.10)	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)	(0.08)
Friendship index	0.06	0.02	-0.00	-0.01	-0.00	-0.00	0.00	0.01
	(0.06)	(0.02)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Number of observations	109	109	109	109	109	109	109	109
Panel B								
Sample				Endogenous group treatment				
Slowly-formed group	-0.66	-0.08	0.06	0.07	0.04	0.02	-0.04	-0.16*
	(0.43)	(0.13)	(0.04)	(0.05)	(0.03)	(0.02)	(0.03)	(0.09)
Friendship index	0.06	0.04*	-0.00	-0.00	-0.00	-0.00	0.00	0.01
	(0.09)	(0.03)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)
Number of observations	59	59	59	59	59	59	59	59
Panel C								
Sample				Group treatments				
Slowly-formed group	-0.70*	-0.20	0.06	0.08	0.03*	0.02	-0.04	-0.15*
	(0.41)	(0.13)	(0.04)	(0.05)	(0.02)	(0.01)	(0.03)	(0.08)
Quickly-formed group	-0.05	-0.10	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(0.43)	(0.14)	(0.03)	(0.05)	(0.02)	(0.02)	(0.02)	(0.10)
Friendship index	0.05	0.02	-0.00	-0.00	-0.00	-0.00	0.00	0.01
	(0.06)	(0.02)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Number of observations	109	109	109	109	109	109	109	109

Notes: In column 1, OLS. In Column 2, probit, marginal effects. In Columns 3-8, ordered probit, marginal effects. Standard errors in parentheses, *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. In all Columns of all Panels, we control for the number of female members of a group and for a dummy variable indicating being older (14-16 years).

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