

The influence of implicit social pressure on prosocial behavior of adolescents

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SUMMARY

Adolescents are easily influenced by their peers, resulting in a phenomenon known as social pressure, which can have both positive and negative effects on the teens. This study addresses the influence of implicit social pressure on prosocial behavior (e.g., voluntary acts that benefit someone else) in adolescents aged 12–19. Specifically, this experiment measured the influence of prosocial, neutral, and antisocial pressure on sharing. This study consisted of 2 parts, part 1 ($N = 101$) and part 2 ($N = 16$). In a game similar to a dictator game, participants divided money between themselves and four teammates with whom they did a school project. Participants received manipulated social pressure by showing an example of how the money can be divided. We hypothesized that participants would share more after receiving implicit prosocial pressure, and that girls would share more than boys. Our results indicate that there was no difference in the way participants divided the money in the prosocial, neutral, and antisocial condition. In addition, there was also no statistically significant difference between boys and girls. These findings may implicate that implicit social pressure has no influence on adolescents' behavior. However, methodological and contextual factors like the COVID-19 pandemic need to be considered.

INTRODUCTION

Adolescence, the age period between the ages of 10 and 24, is the transitional stage from childhood to adulthood (1). On the one hand, this developmental stage can be viewed as a period of *vulnerabilities*. Adolescents become more aware of their peers compared to when they were children (2), which makes them experience more fear for rejection and criticism (3). Furthermore, adolescents are at a higher risk of developing depression (2). On the other hand, this developmental stage can also be seen as a period of *opportunities*. Adolescents develop their social perspective-taking skills, which helps them grow into contributing members of society (4, 5). The current study focused on these opportunities by examining the effects of social pressure on prosocial behavior.

Prosocial behavior is the performance of a voluntary act that benefits someone else (6). It entails a broad,

multidimensional domain of behaviors, such as donating, sharing, and cooperation. Showing prosocial behaviors fulfills adolescents' need for autonomy, respect, and impact (7). In addition, it helps them to attain the fundamental developmental task of fitting in (4, 5). Prosocial behavior is often seen as advantageous for society because, for example, people build their society when they volunteer or help others. In this study, we focused on sharing—a form of prosocial behavior. Sharing is defined as voluntarily giving to someone else, which makes one have less or become disadvantaged (8).

Social pressure is the exertion of influence to behave according to the social norm (9). This pressure can be exerted consciously and unconsciously (10). An explanation of social pressure and its attendant consequences may lie in the brain. In the presence of a group, the prefrontal cortex of the brain is suppressed. This brain region is involved in mental functions such as judgment, impulse control, social behavior, and thinking in solutions. When the prefrontal cortex is suppressed, these mental functions are impaired and thus behavior is affected (11). For example, research has shown that a part of the prefrontal cortex, the dorsolateral prefrontal cortex (DLPFC), is important for adaptation. In a study on patients with damage to the DLPFC, the researchers assigned their patients a card sorting task and were given rules at the beginning of the task (12). The patients were often unable to switch to a new rule, and instead, continued to follow the original rule (12, 13). Consequently, when the prefrontal cortex is being suppressed by social pressure it may be harder for people to adapt. Adapting to social pressure may be especially difficult for adolescents, who are easily influenced by their peers.

There is a distinction between implicit and explicit social pressure. Explicit social pressure is when an individual conforms to the behavioral norms of the group because other group members force them to do so. Individuals adapt their behavior because of the sanctions with which they are threatened, such as ridicule, physical or material damage, or exclusion (14). Explicit social pressure has been shown to be a powerful motivator of prosocial behavior like voting in elections (15–20). In this study, we aimed to examine whether subtle, implicit pressure could impact prosocial behavior in the way direct, explicit pressure does. Instead of measuring the effect of social pressure on voting in elections, we decided

to measure the effect of another form of prosocial behavior—sharing. Therefore, we focused on implicit social pressure during this study. With implicit social pressure, a person is not aware that pressure is being applied, because other people do not explicitly express any expectations (21). The pressure originates from an imaginary standard created by oneself and it is based on what one thinks other people expect from them. One either follows this standard because one wants approval from others or fears negative reactions from them (14).

Adolescents are often confronted with social pressure. At age 12-18, adolescents are in the conformist stage of adolescence in which they display characteristics of prosocial behavior (2). Simultaneously, the ventral-lateral part of the prefrontal cortex is maturing during this age period (22). This maturation influences the adolescents' decision-making, processing of rewards, and storing of new information in the long-term memory (23-25). In the current study, we therefore investigated the influence of implicit social pressure on Dutch adolescents' prosocial behavior. We used a dictator game to test prosocial behavior. In most studies, dictator games are not realistic and look like questionnaires. Therefore, our goal was to improve the dictator game to make it more realistic and appealing. In this case the participants might answer the questions more realistically.

We hypothesized that implicit social pressure has a positive effect on sharing. This hypothesis is based on adolescence being a period that creates not only vulnerabilities, but also opportunities for healthy prosocial development and social adjustment learning (26, 27). Social acceptance and approval are highly salient for adolescents since this is a period of social reorientation in which peers' opinions become more important (28-31). We also hypothesized that girls would share more with others than boys. Previous research from Van der Graaff, *et al.* showed that gender differences in perspective-

taking emerged during adolescence, with girls' increases being steeper than those of boys (32). Girls also showed higher levels of empathic concern than boys. Whereas girls' empathic concern remained stable across adolescence, boys showed a decrease from early to middle adolescence with a rebound to the initial level thereafter (32). When one shows a high level of empathic concern, one is more likely to perform prosocial behavior. If this study finds positive effects of implicit social pressure, this may have implications for both future research and practice. The results could for example lead to a stronger focus on the positive - rather than negative - effects of social pressure in adolescence. Moreover, the findings of this study can be used to adapt prosocial behavior interventions, by including for example gender-specific lessons or social pressure components.

RESULTS

To measure the influence of implicit social pressure on sharing, we made a game based on a dictator game: *the group project game*. In this game, participants received a certain amount of money (i.e., 20 euros) for a group project. They were asked if and how much they wanted to share with their teammates. Before the participants made their decision, they watched an example of how someone else divided the money. This example differed per condition. The game consisted of three conditions. First, there was the prosocial condition, in which the participant of the example shared the money equally. Secondly, the neutral condition was the control condition, in which the participant divided the money randomly. Lastly, the antisocial condition demonstrated that the participant kept all the money.

Money kept (€)	Prosocial condition		Neutral condition		Antisocial condition	
	Number of students	Percentage	Number of students	Percentage	Number of students	Percentage
4	24	77.42%	28	82.35%	34	94.44%
5	0	0.00%	1	2.94%	0	0.00%
6	1	3.23%	0	0.00%	0	0.00%
8	1	3.23%	2	5.88%	0	0.00%
12	1	3.23%	1	2.94%	0	0.00%
14	1	3.23%	0	0.00%	0	0.00%
20	3	9.68%	2	5.88%	2	5.56%
Total	31	100.00%	34	100.00%	36	100.00%

Table 1: Frequency distribution of the different conditions.

Part 1

Prosocial Condition

In the prosocial condition, 77.42% (N=24) divided the money equally over all the teammates, including participants themselves. Three participants (9.68%) in this condition decided to keep all the money to themselves. The remaining 12.9% (N=4) chose to divide the money, but kept more for themselves to a certain extent (Table 1).

Neutral Condition

In the neutral condition, 82.35% (N=28) divided the money equally over all the teammates, including themselves. Two participants (5.88%) decided to keep all the money for themselves. The other 11.77% (N=4) chose to divide the money, but kept more for themselves to a certain extent (Table 1).

Antisocial Condition

In the antisocial condition, 94.44% (N=34) divided the money equally over all the teammates, including themselves. Two participants (5.56%) decided to keep all the money for themselves (Table 1).

Thus, in the antisocial condition compared to the neutral and prosocial condition, a bigger part of the group (in percentage) shared the money equally. Furthermore, there were relatively more participants in the neutral condition than in the prosocial condition who divided the money equally.

Differences between Conditions

We assessed the amount of money given away by a one-way ANOVA for the three groups (prosocial pressure, no pressure, antisocial pressure). If the person divided the money equally over all the teammates, including themselves, they gave away 16 euros in total. The ANOVA showed no statistically significant effect of pressure on the amount of money given away $F(2,98)=0.94; p=0.396$.

Gender Differences

For further analysis, we categorized the data by gender. Females comprised 59.41% (N=60) of the participants. The remaining 40.59% (N=41) was male. To compare the two groups, we conducted a t-test. This test shows that, on average, females gave more money to their teammates ($M=15.13; SD=3.54; N=60$) than their male peers ($M=13.54; SD=5.10; N=41$). However, this difference was not significant ($t(64)=-1.538; p=0.129$).

Group	Mean amount given away	Standard deviation
Prosocial feedback	13.68	5.11
No feedback	14.56	4.04
Antisocial feedback	15.11	3.72
Total	14.49	4.29

Table 2: Mean amounts of money given away and standard deviation.

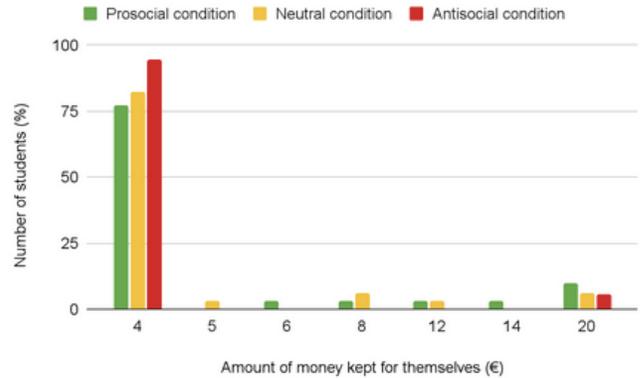


Figure 1: Grouped bar graph of frequency distribution of the different social conditions. Bar graph showing the number of students for each different amount of money shared for each of the 3 social conditions. Participants (N=101) played a dictator game in which they were exposed to prosocial, neutral, or antisocial implicit social pressure. After this they received money for a team project and they could decide how to divide it among their team. A one-way ANOVA showed no statistically significant effect of pressure on the amount of money given away $F(2,98)=0.94; p=0.396$.

From the female participants, 93.33% (N=56) decided to divide the money equally over all the teammates, including themselves. Another 5.00% (N=3) did not divide the money at all. The remaining 1.67% (N=1) divided the money but kept more for themselves.

From the male participants, 73.17% (N=30) divided the money equally over all the teammates, including themselves. Another 9.76% (N=4) kept all the money for themselves. The remaining 17.07% (N=7) chose to divide the money, but to keep more for themselves to a certain extent.

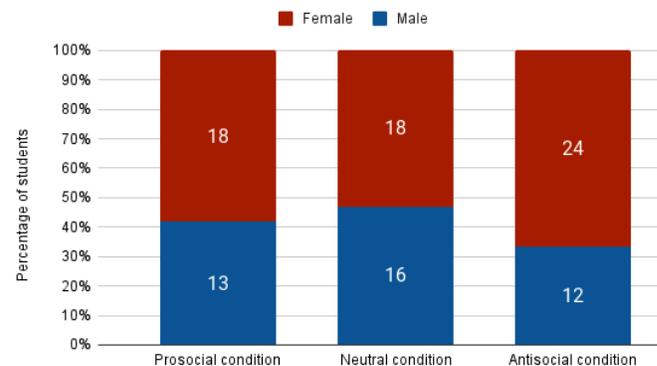


Figure 2: Gender distribution within the conditions. Bar graph showing the number of male and female participants in each of the 3 social conditions. The total of participants (N=101) analyzed by asking the participants' sex before playing the dictator game. Total of male and female participants counted for each social condition and then plotted.

Part 2

The data regarding the divided money in Part 2 of the study was not suitable for a statistical method due to it not being normal (i.e., extreme values in combination with a low number of participants). Consequently, we only included Part 2 to examine how participants experienced our game compared to a dictator game used in previous research (related to COVID-19). We asked the following questions: On a scale of 1 to 10, how fun, realistic, and attractive did you find the game? On what did you base your decision? Can you explain your thoughts about the game? What could we do better in the future?

On a scale from 1 to 10, with 1 as least realistic and 10 as most realistic, the participants gave a mean of 7.8 for the group project game being realistic. While the traditional dictator game received a mean of 6.2. Besides, the group project game received mean scores of 7.6 and 7.2 for it being fun and attractive, with 1 as least fun/attractive and 10 as most fun/attractive, while the traditional dictator game received mean scores of 6.8 and 6.3 for those aspects of the game.

Furthermore, in response to the question “Where did you base your decision on?”, 75.00% of the participants ($N=12$) gave the same reason for distributing the money evenly. Specifically, participants assumed that all teammates had equally contributed to the project. Thus, according to them, it would be unfair to not divide it equally, so they split it equally.

DISCUSSION

Our goal was to examine the influence of implicit social pressure on prosocial behavior in 12- to 18-year-old adolescents. To this end, we developed a new version of a dictator game: the group project game. The group project game scored considerably higher on being realistic, fun, and attractive compared to the traditional dictator game. Therefore, we can conclude that we achieved our goal of building a better dictator game. We made the experimental game more appealing by visualizing the whole situation. In addition, there was an extensive explanation video beforehand. These improvements might explain the favorable feedback results. These results may encourage developmental researchers to collaborate more with adolescents when they design experimental tasks (i.e., co-creation and citizen science).

The key finding in our study was that in all three conditions, where a different form of implicit social pressure was applied, there were no differences in prosocial behavior. We rejected the hypothesis that prosocial behavior can be influenced by social pressure in adolescents. We found a difference between the prosocial behavior of different sexes. On average, females shared more than males; however, this difference was not statistically significant. We rejected the hypothesis that girls would share more with others than boys.

Several limitations might have contributed to the results of the present study. The experiment was limited by a small sample size ($n=101$). Similar studies researching the effects of implicit social pressure had anywhere between 5 to 1000

times as many participants. (15-19, 33). Therefore, our experiment may not be generalizable to a larger population or when conducted in other settings, and thus lacked external validity (34). Moreover, sample size may have limited the statistical power to detect differences between groups.

Another limitation is related to the available resources. Compared to similar studies, we had less time and money to conduct the social experiment (15-19, 33, 35). For example, we could not actually give participants money. These limitations might have contributed to our results being different from other studies. For instance, the results of the present study conflict with earlier results of a study researching prosocial peer influence on donations in a public goods game during adolescence (33). In this study, researchers asked participants to allocate tokens between themselves and a group (33). There were three conditions: Spectators evaluated decisions with likes for large donations to the group, spectators were present without evaluative feedback displayed, or no spectators nor feedback. Results demonstrated that prosocial behavior increased when peers were watching and even more when participants received evaluative feedback from peers (33). Thus, the results of this study suggest that implicit social pressure does stimulate prosocial behavior, contrary to results from our study.

Moreover, a second line of research suggests that peers influence prosocial decision-making by enhancing regions of the social brain network that have been shown to be implicated with prosocial behavior (35). This brain network, involved in thinking about the self and others, consists of cortical structures such as medial prefrontal cortex, temporo-parietal junction, and superior temporal sulcus (35). These cortex structures are thought to stimulate prosocial behavior in adolescence (29). Donation choices made in the presence of peers enhanced the activity of these regions of the brain (29, 35, 36). These previous results suggest that such brain networks, which stimulate prosocial behavior, are sensible to peers and allow prosocial behavior to be influenced by peers. As a result of the sensitivity to peers, opposing our research results, social pressure might have an influence on the way adolescents divide money.

In addition, our results regarding gender are also in conflict with previous results. An earlier study suggests that there are indeed differences between the prosocial behavior of the different sexes, concluding that girls are generally more prosocial than boys (37). In our study, the same difference was found, although it was not a statistically significant difference, because the difference was not big, namely 1.40 euro on average.

A few factors could have influenced the results of the present study, explaining the difference between our results and previous results. These factors are unfounded assumptions, the chosen participants, the degree of realism of the game and the school environment. We will elaborate these four factors further.

The first factor that could have influenced the results was

the unfounded assumptions of the participants. In Part 2 of this study, the motivation of participants for dividing the money was examined. We found that 75% of participants assumed that all teammates had equally contributed to the project. Therefore, they divided the money evenly over all teammates. Otherwise, the participants could have a sense of guilt since they did not treat all their teammates equally, though they did an equal amount of work. Thus, the assumption of having teammates who evenly contributed might play a role in determining how much money everyone received. Previous research shows that adolescents display more prosocial behavior towards friends with whom they have a bond than to neutral classmates or anonymous peers (38). Teammates are often friends or at least peers with whom participants have created a bond during the process of the project. As a result, participants may show more prosocial behavior towards their teammates and give them more money.

Secondly, the chosen participants could have influenced the results. The target audience consisted of students from the same high school in Amstelveen, The Netherlands. The majority of the students at this high school derive from higher socioeconomic status upbringings. This one-sided target audience may have had consequences on the outcome. The percentage of participants who may want to divide the money equally might be smaller when compared to target groups with different upbringings.

The third factor that could have influenced the results was the degree of realism in the game. In the feedback portion of Part 2, the dictator game related to the team project received a mean of 7.8, on a scale of 1 to 10, for being realistic, with 1 as least realistic and 10 most realistic. Although this score seems quite good, it can be better. For example, the game had no real consequences in real life. They did not lose or gain money, depending on how they divided the money. Since there was nothing to gain for the students, participants could have split the money equally and behaved in what some consider well-mannered. Therefore, the experiment may not have been realistic enough to apply enough social pressure on the participants to influence their behavior.

The unbalanced results in Part 1 could be caused by the fourth factor, the school environment itself. School is a public space where there are certain norms and values which are encouraged to be respected. Being social and sharing with classmates are standards in most school environments (39). These factors might have impacted the way students played the game, even though the students were not aware of how fellow students divided the money. Simply being in a school environment may motivate most students to behave to the norms and values. As a result, the participants may have acted to the norms and values of the school environment and not to the social pressure we hoped to exert on them.

The fifth factor that could have influenced the results was the COVID-19 pandemic. The current study was conducted during the time of the COVID-19 pandemic, which may have affected the outcome of our research. The participants may

have shared more than usual, because exhibiting prosocial behavior has become especially important during the COVID-19 crisis. Exhibiting prosocial behavior has become more important during a crisis like the COVID-19 crisis because prosocial behavior is a necessity to support, help and solve this crisis. Social distancing could, for example, be viewed as prosocial behavior. With the act of social distancing, a person distances themselves to lower the possibility that others will get sick (40). Thus, as a result of the possible increase of prosocial behavior during the COVID-19 pandemic, participants may have divided more money than studies conducted before the pandemic.

In future research, multiple parts of the conducted experiment could be done differently to improve reliability of the results. The chosen participants should be selected from many socioeconomic groups. People originating from diverse environments are raised in different ways, have other norms and values, and act dissimilar in certain situations. By selecting adolescents in distinct environments, the group of participants becomes a more representative model of the target audience (41). In addition, it would be interesting to assess the perceived amount of social pressure by doing a follow-up survey. In this survey, the participants can be asked to indicate how much they were influenced to split the money amongst other individuals. This survey could be done by asking to give the influenceability effect a numerical value between 1 and 10.

Furthermore, the impact of the experiment on the participants could be increased. For example, real money could be used. By dividing real money instead of fictitious money, the game becomes more realistic. Also, an experiment could be done where, during a team task, the participants are told that there is a study conducted on how they collaborate with each other. Now the participants, for privacy reasons, are aware of an experiment being performed, but they think another topic is being researched. During the team task, one of the teammates receives money or a reward and the introduction video tells them that they received it for the good work and can choose if and how they want to divide it over teammates. The social pressure is carried out by an actor or actress who is the same age as the participant. Right after the participant receives the money, the actor/actress walks past the participant and says, "I kept the money/cookies for myself, the teammates are unaware anyway" or "I shared the money/cookies evenly with my teammates, which is fair since they also work on the project". For the neutral condition, there will not be an actor or actress passing by the participant. By conducting the experiment in a real-world situation, the participants will experience the actual consequences of their decisions. As a result, they may divide the money differently. We hypothesize that if the study is conducted in real-world situations, participants may display less prosocial behavior and therefore keep more money for themselves.

Lastly, including background information about the participant's teammates would add value to the experiment.

If participants know more about their relationship with their teammates and each individual's contribution, then they will not make assumptions about contributions. For example, people tend to share more with friends and less with strangers (42). So, a participant could assume that all teammates are their friends and therefore they are more likely to share more money. By giving extra background information about the situation, the teammates of the participant, and their relationship, the influence of unfounded assumptions may be excluded and the results of the conducted study could be more reliable.

To conclude, we found no statistically significant difference in the way the participants divided the money in the prosocial, neutral, and antisocial condition. There was also no difference in the way boys and girls divided the money. Thus, based on the findings of Part 1 of the current study, it is included that implicit social pressure has no influence on adolescents' prosocial behavior. Part 2 showed that the use of animation makes dictator games more appealing to adolescents. This implicates that co-creation of experimental games can make developmental studies more relevant and appealing.

MATERIALS AND METHODS

Design

To measure the influence of implicit social pressure on sharing we made a game—the group project game. The game consisted of three conditions. First, there was the prosocial condition. In this condition we used implicit social pressure to influence participants in sharing money equally. Secondly, there was the neutral condition. It was the control condition with no implicit social pressure. Lastly, the antisocial condition provided implicit social pressure to make the participants keep all the money for themselves. The game was based on a dictator game. The participants got an amount of money and needed to decide whether to share or not. To make it more realistic and give the participants a reason to share, we made up a scenario which the target group could easily imagine. The scenario was explained in an animated video and by adding visuals, the game was designed more like a real game than just a form.

The study consisted of two parts. The first part was conducted at the high school. In Part 1, the participants were given a random condition by using computer numbers. Numbers 1–10 had the game with the antisocial pressure, 10–20 with no pressure, and 20–30 had the prosocial pressure. Before the study, we matched participants with a computer number by a random generator in Microsoft Excel. During the study, the Netherlands went into lockdown because of COVID-19. For this reason, Part 2 was an online study which the participants did from home. Part 2 was similar to Part 1 but with a change in the implicit social pressure, done to improve the study. In addition, we let the participants play another dictator game after they played the group project game. The other dictator game was more like a form to complete than an actual game. In the end, the participants gave feedback

about the two games to see if we had succeeded in making a more realistic dictator game—our goal. In Part 2, when the participants clicked on the link to the study, they were randomly assigned one of the conditions from the group project game. After the group project game, the participants played the other dictator game.

Participants

Part 1 included 101 adolescents between the ages of 16–18 years ($M=17.16$; $SD=0.63$), including 41 boys (40.59%) and 60 girls (59.41%). Part 2 included 16 adolescents between the ages of 14–19 years ($M=15.88$; $SD=1.50$), including 7 boys (43.75%) and 9 girls (56.25%). We recruited participants from a high school in Amstelveen, the Netherlands. The high school teaches the two highest academic levels (there are three in total). Both participant and parental consent for minors under age 16 were obtained for all participants. Participants were divided among the three conditions in a random manner: in Part 1, $N=31$ in the prosocial pressure condition, $N=34$ in the neutral condition, and $N=36$ in the antisocial pressure condition. In Part 2, $N=3$ in the prosocial condition, $N=5$ in the neutral condition, and $N=8$ in the antisocial pressure condition.

Experimental Manipulation 1

To achieve the aim of this study, we made up a scenario where the participants had to decide whether they wanted to share money with their peers. The participants were told that the topic of the study was sharing. The scenario was developed specifically for this study to make the game as realistic as possible. We wanted to achieve that the decision of the participants was similar to the decision that they would make in a real-life situation. In an animated introduction, the participants were asked to imagine a scenario in which they participated in a school project with four other teammates. This group size was chosen for two reasons. First, this group size was realistic. From personal experience, group projects at the Keizer Karel College are usually done in groups of 3–5 students. Second, this group size enabled us to include an equal boy:girl ratio (excluding the participant), which was expected to minimize the role of gender in the participants' decisions. This ratio was only achievable with an even number, which in this case, would be four. In the scenario, the group received 20 euros as a reward for the group project. The other four teammates were unaware of the existence of the reward. The participant is subsequently asked what they would do with the money. Do they share, or do they keep everything for themselves?

After the scenario was explained there was an explanation on how to play the game. Until this moment, the introduction video was the same for all the three conditions. Then, an example was shown about how a previous student played the game; here, social pressure appeared. From this moment, the video was different for every condition.

For the prosocial condition, the money is equally split

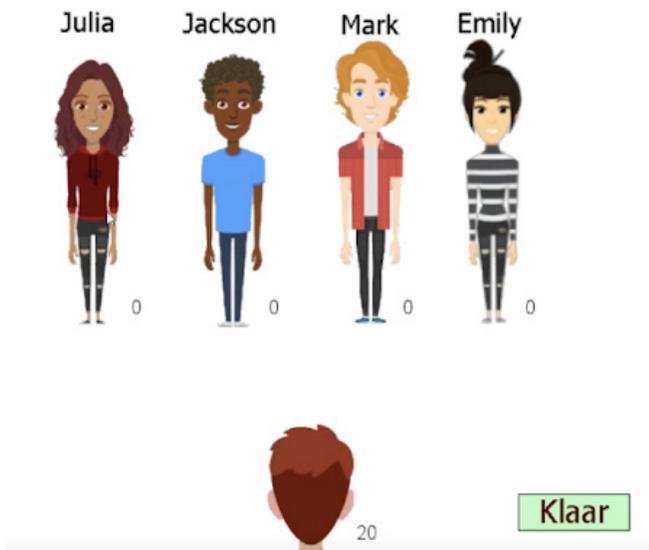


Figure 3: Group project game. Screenshot of the dictator game where the player could click on each teammate and select the amount of money to give to that teammate. The dictator game was programmed in the program GameMaker 8.1.

between the five teammates, including themselves. For the neutral condition, the money is split randomly to show different ways of how one could divide the money, with no social pressure as the control condition. For the antisocial condition, all the money in the example is kept to the participant. With the examples we tried to unconsciously influence the participants on how they would share the money.

When the participant had watched the introduction, they went to the next page to play the game (**Figure 2**). The participant clicked on all the teammates and typed in the amount they wanted to give to them. When the participant was done, they clicked on “klaar,” which means “done” in Dutch. The participant then saw a page with their results, each name of the teammate, and the amount they gave to them. The results needed to be transferred to a different form, and we used a Qualtrics form. We collected participant results, age, gender, and computer number. After the form was completed, the participants could debrief with the purpose of the study.

Procedure Part 1

The study was conducted in a regular computer room at the high school. First, we set up the game on the computers. Additionally, we put dividing panels between each computer to prevent the participants from looking at other screens and influencing each other. The computers were numbered, and a QR code was assigned to each computer. When the participants came, they were asked their names and the experimenter told them where to sit. The experimenter explained the procedure to the class. First, they played the group project game on the computer, and then they filled in the form by scanning the QR code with their own mobile phones.

Experimental Manipulation Part 2

To improve our study, we made some changes to the group project game. The scenario and introduction video remained the same. The examples from all three conditions were replaced by a new scene that said 150 students already had played the game. In the prosocial condition, the great majority shared the money equally; in the neutral condition, nothing was said about how the money was divided; and in the antisocial condition, the majority kept all the money for themselves. This time, the social pressure was not based on how one person divided the money but on 150 persons. The aim of this change was to increase social pressure.

After the introduction video, the participants did not play the game like in Part 1. They did not click on their teammates to divide the money and then see their results. They went directly to the form where they divided the money by typing in the amount next to the names of their teammates. This adaptation was made because it was impossible to repeat the Part 1 procedures on a computer at home. Besides asking the age and gender of the participants, we asked their opinion about the game and on a scale of 1 to 10 if it was fun, appealing, and realistic.

Additionally, in Part 2, the participants played a dictator game designed by Erasmus University, Rotterdam, the Netherlands. This game was about sharing with different kinds of people (e.g. a doctor, an infected person) during the COVID-19 pandemic. There was no explanation video. The scenario was explained in a couple of sentences. We asked for feedback about this game as well, to compare the games and see which method was preferred by participants. In this study, the dictator game from Erasmus University was exclusively used to compare the feedback with the group project game. With the feedback, we could improve our studies in the future.

Procedure Part 2

We sent an email to all the students at the high school, excluding the ones who participated in Part 1, asking if they would like to participate in the study. The email included a short introduction, the link to the consent form, and the link to the study itself. As this was during the lockdown in the Netherlands, participants played the game at their own accord with their own devices.

Data Analysis Part 1

We analyzed the data with Microsoft Excel 2016. Amounts of money given away by each participant were calculated. The data was categorized per condition as prosocial pressure, no pressure, or antisocial pressure. The amounts of money given away were assessed by a one-way ANOVA for the three groups. The assumptions of a one-way ANOVA are sample independence, normality, and homogeneity of variances (43). The obtained data did not fail any of the assumptions. Every sample had been drawn independently because the participants were not allowed to talk with each other, allowing

for sample independence. Secondly, according to the central limit theorem, the assumption that the data is normal can be made when $N > 30$ (44). In this study, that was the case, thus the data met the requirement of normality. For the last assumption, homogeneity of variances, we conducted a Levene's test in Excel. This test showed that the variances were equal ($F(2,98)=2.81$; $p=0.065$). We calculated the mean amount of money the participants gave away and the standard deviation for every group. We also made a frequency distribution to summarize the data.

Additionally, data was organized by gender. In this category, the mean amount is given, and standard deviations were calculated. For every gender, we made a frequency distribution. Lastly, we also conducted a t -test between male and female participants. The t -test assumed unequal variances, ($F(1,99)=9.77$; $p=0.002$).

Part 2

We collected the data in Part 2 and categorized it similarly to Part 1. These data had unequal variances ($F(2,13)=8.47$; $p=0.004$). We also concluded that the data were not normally distributed based on the bell curve. Because of the unequal variances and non-normality, there was no statistical method we could use to test the significance of the results.

The data was also organized by gender. This data was also not normally distributed according to the bell curve.

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Appendix

Introduction videos

<https://drive.google.com/drive/folders/1H8BG6OUTqJOALc94Gt3FewhWGPoqo8QN?usp=sharing>

Script Introduction Videos

Part 1

Scene 1 (00:00): Introduction: “Welcome, my name is Lotte and I will tell you what you need to do. Imagine the following scenario. Phillips asked all teenagers in the Netherlands to invent a new product for their company. You can design whatever you want, from a toothbrush to kitchen equipment, everything is allowed.”

Scene 2 (00:20): Explanation scenario: “Your high school made it into a project and everyone in your grade participates. You worked together with four classmates on the project.”

Scene 3 (00:30): Explanation scenario: “At school you presented your new product with your group. An employee from Phillips, Mr. Boom, was present at the presentation to look at everyone’s ideas.”

Scene 4 (00:42): Explanation scenario: “After the presentation you walk home alone. You bump into Mr. Boom. He tells you how enthusiastic he was during your presentation and finds the product so great he wants to give you a reward.”

Scene 5 (00:56): Explanation scenario: “When you arrive at home, you see you received 20 euros from Mr. Boom.”

Scene 6 (01:02): Explanation scenario: “Your teammates are unaware of the received reward. You can choose yourself if you want to share the money and how. After this introduction video you need to fill in what you would do. You do this in the following way.”

Scene 7 (01:14): Explanation scenario: “The total amount of money you received is 20 euros. These are your teammates, Julia, Jackson, Emily and Mark. Click on a teammate. A field appears on the screen. Here you type in the amount of money you want to give to that teammate. Do this with every teammate. There are no right or wrong answers. When you are done you click on the arrow on the right bottom of the screen. You can now see your results. Fill these in in the apart form.”

Scene 8 (01:44): Explanation scenario: “To give further explanation on how to play the game you are going to look at how another student did it.”

Scene 9 (01:51): Explanation scenario, prosocial condition: “This student split the money equally, which is fair since all the teammates helped with the project.”

Scene 9 (01:51): Explanation scenario, neutral condition: “As you can see, you can divide it just as you would like to.”

Scene 9 (01:51): Explanation scenario, antisocial condition: "This student decided to keep all of the money for themselves, the teammates are unaware anyways."

Scene 10 (02:21), (02:17), (02:33): Outro: “This was the introduction. Now go to the next screen to make your choice.”

Part 2

Scene 1 (00:00): Introduction: “Welcome, my name is Lotte and I will tell you what you need to do. Imagine the following scenario. Phillips asked all teenagers in the Netherlands to invent a new product for their company. You can design whatever you want, from a toothbrush to kitchen equipment, everything is allowed.”

Scene 2 (00:20): Explanation scenario: “Your high school made it into a project and everyone in your grade participates. You worked together with four classmates on the project.”

Scene 3 (00:30): Explanation scenario: “At school you presented your new product with your group. An employee from Phillips, Mr. Boom, was present at the presentation to look at everyone’s ideas.”

Scene 4 (00:42): Explanation scenario: “After the presentation you walk home alone. You bump into Mr. Boom. He tells you how enthusiastic he was during your presentation and finds the product so great he wants to give you a reward.”

Scene 5 (00:56): Explanation scenario: “When you arrive at home, you see you received 20 euros from Mr. Boom.”

Scene 6 (01:02): Explanation scenario: “Your teammates are unaware of the received reward. You can choose yourself if you want to share the money and how. After this introduction video you need to fill in what you would do.”

Scene 7 (01:14): Social pressure, prosocial condition: “Already 150 students participated in this study. The great majority chose to share the amount of money equally over all the teammates, which is fair since all the teammates helped with the project.”

Scene 7 (01:14): Social pressure, neutral condition: “Already 150 students participated in this study.”

Scene 7 (01:14): Social pressure, antisocial condition: “Already 150 students participated in this study. The great majority chose to keep all of the money for themselves. The teammates are unaware anyways.”

Scene 8 (01:21), (01:21), (01:16): Outro: “This was the introduction. Now go to the next screen to make your choice.”