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# Brief cooperative contact with ethnic minorities reduces discrimination

## Abstract

We carried out a natural field experiment in the Netherlands in which we randomly assigned high school students from the ethnic majority group to an ethnically homogeneous or mixed team to perform a cooperative task. One month later, the students made strategic choices in behavioral games with game partners that belonged to the majority group or to an ethnic minority group. We find that participation in the mixed-team intervention lessened discrimination among students who had no peers from a minority group in their regular classes. For students exposed to minority peers on a daily basis, there is no effect, but they had shown no evidence of discrimination in the first place. The results show that a relatively simple intervention that induces interethnic cooperative interaction can reduce discrimination among individuals who lack such interaction in their daily lives.

JEL Classification: J15, R23, C93, D91

Keywords: ethnic discrimination, cooperative contact, prejudice, ethnic diversity, natural field experiment, behavioral games

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# Brief cooperative contact with ethnic minorities reduces discrimination

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## Abstract

We carried out a natural field experiment in the Netherlands in which we randomly assigned high school students from the ethnic majority group to an ethnically homogeneous or mixed team to perform a cooperative task. One month later, the students made strategic choices in behavioral games with game partners that belonged to the majority group or to an ethnic minority group. We find that participation in the mixed-team intervention lessened discrimination among students who had no peers from a minority group in their regular classes. For students exposed to minority peers on a daily basis, there is no effect, but they had shown no evidence of discrimination in the first place. The results show that a relatively simple intervention that induces interethnic cooperative interaction can reduce discrimination among individuals who lack such interaction in their daily lives.

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# 1 Introduction

“A fundamental threat to the quality of the rule of law is that too often, still, a person’s skin color or name determines his or her opportunities in life. That is unacceptable.” In his 2020 Throne Speech (a kind of State of the Union), King Willem-Alexander van Oranje Nassau of the Netherlands expressed deep concern about continued discrimination and unequal treatment of ethnic minorities in the country.<sup>1</sup> His concern does appear to be justified. Ethnic minorities in many countries face discrimination in numerous domains: in labor markets (Bertrand and Mullainathan, 2004; Heath et al., 2013; Hedegaard and Tyran, 2018; Zschirnt and Ruedin, 2016), housing markets (Bartoš et al., 2016), consumer markets (Ayres, Banaji, and Jolls, 2015; List, 2004), and the judicial system (Anwar, Bayer, and Hjalmarsson, 2012; Shayo and Zussman, 2011). Given that unequal treatment of minority groups in societies is both unjust and inefficient, a key question is how it can be overcome.

We report on a field experiment that tested the effect of an intervention aimed at reducing ethnic discrimination, inspired by the idea that cooperative intergroup contact is crucial in reducing discrimination (Allport, 1954). The main subjects were 16- or 17-year-old Dutch high school students who participated in an educational program at Tilburg University and visited the campus at least twice. The intervention was combined with a single 45-minute lecture that took place during the first visit. During the lecture, the high school students worked on a group assignment in randomly formed teams consisting of three or four members that included one university student who was visibly a member of either the majority group or a minority group.<sup>2</sup> This generated exogenous variation in interethnic contact between a *Control* group and a *Treated* group of high school students. Students and lecturers were unaware of being part of a research study.

During the second campus visit, which took place a month after the intervention, we measured ethnic discrimination among the participants. To do so, we had the high school

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<sup>1</sup>Ethnic minorities constitute about 14 percent of the population in the Netherlands, of which the majority are first- or second-generation immigrants of Turkish or Moroccan descent. The unemployment rate among ethnic minorities is more than twice that among native Dutch, and the poverty rate is more than five times as high (Eurostat, 2021). The situation is similar in other Western European countries.

<sup>2</sup>The teams were randomly formed with the restriction that high school students from the same school could not be on the same team.

students make choices in two behavioral games with monetary incentives as part of a lecture on economic games.<sup>3</sup> The main measure of discrimination was based on responder choices in an ultimatum game (Güth, Schmittberger, and Schwarze, 1982). The students, who all played the role of responder, were asked, in private, to choose the minimum amount they would be willing to accept from a randomly assigned partner-proposer who was meant to distribute an amount of money (40 euros) between the two of them. The proposers were (male) students from either a minority or majority background who did not participate in the educational program and were unknown to the responders. The responders only knew the first name of the proposer, which signaled his ethnic background while preserving anonymity.<sup>4</sup> We define ethnic discrimination as the tendency for a responder to be less willing to accept a given offer from a minority proposer than from a majority proposer.

We found little evidence of ethnic discrimination overall, nor did the contact intervention have a general effect on behavior in the ultimatum game. Nonetheless, we found that prior contact with minority peers in the classroom is an important moderator. Specifically, students in the *Control* group who had no minority classmates in their regular classes required 8 euros more on average from a minority proposer than from a majority proposer, meaning they were substantially less willing to accept a given amount from the former than from the latter. Those in the *Treated* group did not differentiate according to ethnic background. Students without any prior minority contact thus engaged in overt discrimination, and the intervention eliminated it. In contrast, students who had minority peers in their regular classes did not discriminate, and were not affected by the contact intervention. The effects of the intervention are robust to including data from a second game played by the high school students after the ultimatum game.

The current paper contributes to the literature on the causal effects of intergroup contact on ethnic prejudice or attitudes toward ethnic minorities. One branch of this literature uses laboratory experiments that typically involve a short intervention and measurement of outcomes immediately afterward. In general, studies of this kind provide strong support that

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<sup>3</sup>The second lecture was organized differently than the first, with different lecturers and slides, so that the students would not discern a connection between the two.

<sup>4</sup>Names are often used to signal ethnic background in behavioral games used to study ethnic discrimination (e.g., Bouckaert and Dhaene, 2004; Cettolin and Suetens, 2018; Fershtman and Gneezy, 2001).

contact reduces prejudice (Pettigrew and Tropp, 2006), even if the contact is only imaginary (Crisp and Turner, 2009; Miles and Crisp, 2014). However, the light touch nature and artificiality of most laboratory contact interventions raise concern that the findings do not apply outside the lab (Paluck and Green, 2009; Paluck et al., 2021). In the current study the contact intervention and the outcome measurement are tightly controlled, as in the laboratory, but are at the same time unobtrusively integrated into a natural field setting.

A second branch of the literature uses more natural settings. These studies typically observe college students who are randomly assigned roommates who are members of an ethnic minority. A common finding is that the students are less likely to maintain stereotypes about minority groups, they have more interethnic friendships and are more likely to marry someone from a minority background later in life (Boisjoly, Duncan, Kremer, Levy, and Eccles, 2006; Carrell, Hoekstra, and West, 2019; Corno, La Ferrara, and Burns, 2019; Marmaros and Sacerdote, 2006; Merlino, Steinhardt, and Wren-Lewis, 2019). Field experiments that involve interethnic contact in military training (Finseraas et al., 2019; Finseraas and Kotsadam, 2017), in the classroom (Scacco and Warren, 2018), or in sports competitions (Lowe, 2021; Mousa, 2020) also show overall positive effects; however, they tend to be weaker and may depend on the specific outcome variable. In general, field experiments show that interethnic contact leads to a reduction in ethnic prejudice, although the effects tend to be smaller when the outcomes are measured with a delay (see the meta-studies of Lemmer and Wagner, 2015; Paluck, Green, and Green, 2019).

Whereas studies using natural experiments or interventions in the field have, by and large, focused on the effects of relatively intense, long-run contact experiences, the current study investigates whether a brief but meaningful interaction can also generate positive effects. This is particularly relevant for policy makers who do not always have the option of facilitating extended contact. Our results show that a contact intervention can be effective among high school students. Since almost everyone attends high school it is an ideal target population for anti-discrimination policies. Remarkably, this group is currently understudied when it comes to such interventions: only 10 percent of the studies involving prejudice reduction intervention are based on high school students (Paluck, Porat, Clark, and Green,

2021).

The paper proceeds as follows. In Section 2, we provide details of the experimental design and procedures. In Section 3, we discuss the empirical strategy. Section 3 presents the results and Section 4 concludes.

## **2 Experimental design and procedures**

The subjects in the experiment were 16- or 17-year-old high school students, who took part in a biennial educational program called Econasium. The program is organized by the School of Economics and Management at Tilburg University in cooperation with a range of secondary schools in the Netherlands. Students attending the program have typically good grades in mathematics and they are interested in studying economics at the university when they finish high school. The program consists of a lecture on statistics at their school that is not part of the standard curriculum and a series of lectures at the university. Other elements of the program include excursions to, for example, the Dutch Central Bank or a well-known company, support while preparing a high school thesis and participation in an entrepreneurial game. Any school that is ready to engage in these activities can sign up to participate by contacting the director of the program at Tilburg University. The interested students in such schools can then voluntarily decide to participate in the program. Most of the participating schools are located in the south of the Netherlands, as shown in Figure 1.

The students visited the campus at least twice for half a day each time, and on both occasions they attended lectures in two large lecture halls. The experiment consisted of two main phases: an intervention phase and a decision-making phase, plus a debriefing phase, which were all integrated within the Econasium program. Neither the high school students nor the other participants knew that they were part of an experiment. The intervention phase took place on February 14, 2019, and was designed to bring the high school students into contact with peers who are members of an ethnic minority. In the decision-making phase, which took place on March 12, 2019, the students participated in two economic games designed to elicit their attitude toward ethnic minorities. Two debriefing sessions took place in May-June, 2019. In Subsection 2.1 to 2.3, we explain the procedures followed in each of



**Figure 1. Location of schools in the Netherlands.**



Notes: The figure shows the location of the schools that participate in the Econasium program across the Netherlands. Source: Google Maps.

the three phases in detail. In Subsection 2.4, we provide descriptive statistics.

## 2.1 Intervention phase

During the first campus visit, the high school students attended a lecture on *Strategic Thinking* (see Section A.1 in the appendix for the slides). Before the lecture started, university students recruited from Tilburg University were assigned a code (e.g. A2) and were dispersed in the two lecture halls where the lectures were being given. They were instructed to make the code visible when the high school students entered the room. The high school students, who also had been assigned a code upon arrival at the university, were instructed to find a seat in the lecture hall next to the university student with a matching code. The teams were randomly constructed, conditional on the members not being from the same school. Each team consisted of two or three high school students and a university student and they were meant to work together on a task. Because some of the university students had a majority background while others had an ethnic minority background, some teams were homogeneously Dutch (the *Control* group) while others were ethnically mixed (the *Treated* group).<sup>5</sup>

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<sup>5</sup>The high school students were members of the Dutch majority, except for one of them. To ensure the reliability of the results, we excluded the team that included the minority high school student.

The task consisted of choosing a successful strategy in a repeated prisoner’s dilemma game. After listening to an introductory lecture on the topic, the teams were given 15 minutes to discuss and prepare their answer. The task of the university students was to guide the discussion and submit a strategy by means of an online quiz platform. The lecture took place in two different rooms, and was accompanied by slides in both. Two native Dutch teaching assistants, who were also unaware of the experiment, served as instructors. Their task was to show the slides and answer questions if needed, as well as to present the distribution of answers at the end of the lecture. The lecture ended with the explanation of a smart repeated-game strategy.

The university students were recruited via email invitations signed by the director of the Econasium program.<sup>6</sup> They were offered 40 euros to help with an introductory lecture for high school students that would take about an hour. To ensure fluency in the Dutch language— since all the lectures were conducted in Dutch—those chosen were born in the Netherlands. Furthermore, to guarantee that they had basic knowledge in strategic thinking, we only invited students registered in a business or economics program. The email invitations were sent to university students with a Moroccan or Turkish sounding name and to a random subset of the other university students (mainly Dutch). In total, 51 university students were recruited, of which 18 were members of an ethnic minority group.<sup>7</sup> One week before the lecture, we sent out detailed instructions about the task they were going to be involved in (see Section A.2 in the appendix). After the lecture, the university students were invited to fill out a short survey of the level of engagement among the high school students and the discussion held in the team framework (see Section A.3 in the appendix).

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<sup>6</sup>The director was aware that an experiment was taking place but did not know what the research question was.

<sup>7</sup>During the session, we double-checked the identification of the university students as belonging to a minority or the majority. The university students with a Moroccan, Turkish, or Asian sounding name were coded, except for one, as belonging to a minority group. The exception was coded as a member of the Dutch majority since his minority background was not visible. In addition, one dark-skinned student was coded as being part of a minority group.

## 2.2 Decision-making phase

During the second campus visit, the high school students attended a lecture called *Participation in Economic Games* (see the accompanying slides in Section A.4 in the appendix). The high school students were first assigned to a seat.<sup>8</sup> There was a different arrangement and different instructors than in the first lecture so that the subjects would not suspect a connection between the two lectures. Two university professors were present in the classrooms and read the instructions for the decision-making tasks.<sup>9</sup>

The task for the high school students was as a responder in an ultimatum game, which was referred to as a *Distribution Game* in the instructions (see Section A.5 in the appendix). The high school students were told that a student from a school that is not part of the Econasium program (the partner-proposer) had been given 40 euros and asked to propose a division of the amount between himself and another person. They were each communicated the first name of the matched proposer in private, and were asked to write down the minimum amount they would be willing to accept on an answer sheet. They were told that if their answer is lower than the proposed amount, the proposed allocation would be implemented. Otherwise, neither the responder nor the proposer would receive anything.

The proposer's ethnic background was randomly varied across the high school students and it was signaled to the student through the name on the answer sheet.<sup>10</sup> The proposers consisted of eight male university students recruited prior to the task. Four were members of the Dutch majority (Daan, Koen, Max and Tom) and the other four were of Turkish or Moroccan descent (Abderrahman, Mohamed, Yassin and Younes).<sup>11</sup> The high school students were unaware of the total number of proposer participants, did not know they were all male, and did not know they were selected according to their ethnic background. If discrimination against ethnic minorities is present then we would expect that the minimum

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<sup>8</sup>Seating was arranged in alphabetical order (using name tags) both between and within the two lecture halls. Space between seats was maximized.

<sup>9</sup>The professors were informed that the lecture was part of an ongoing experiment but they were not aware of its purpose or the research question. One of the professors was the director of the Econasium program.

<sup>10</sup>A name signals the ethnic background of an individual in an unobtrusive way and is therefore often used in research on ethnic discrimination (Bertrand and Mullainathan, 2004; Cettolin and Suetens, 2018; Fershtman and Gneezy, 2001, e.g.).

<sup>11</sup>In the decision-making phase none of the high school students had a game partner with the same name as the team member they encountered in the intervention phase.

amount accepted from a minority proposer will be larger than that accepted from a majority proposer.

After collecting the answer sheets with the minimum acceptable offer, the instructions and answer sheets for the second decision task, called *Communication Game*, were handed out and explained (see Section A.6 in the appendix). The second task made it possible to measure discrimination within subjects, because students who had a majority partner in the ultimatum game were now assigned to a minority partner, and vice versa. The partner was selected from among the same eight university students mentioned above (and the high school students were of course unaware of this). The high school students were again communicated the first name of their partner and recorded their answers on the answer sheet which was collected right after the decision was made.

The second task consisted of making a choice in the role of sender in a communication game (Danilov and Saccardo, 2019). Specifically, the high school students were informed about the outcome of a die roll and were asked to report the outcome to an anonymous partner. They were told that their partner had to choose a number between 1 and 6 upon receiving their message and that he received no further information. If the number that the partner chose was the same as the outcome of the roll, then the high school student and the partner would each receive 20 euros. If the number that the partner chose differed from the outcome of the roll, the high school student would receive 18 euros and the partner would receive 30 euros. We identify discrimination if the high school students are more willing to lie for a majority partner than for a minority partner. The rationale is that lying implies a willingness to sacrifice a small amount of money to generate a large benefit for the partner.

Notice that behavior in the second game may arguably be less ‘clean’. Given the switch in the ethnic background of the partner (from majority to minority or vice versa), the high school students may have been more inclined to adopt a socially acceptable behavior in the second game, whereby minority and majority partners are treated equally (see e.g. Barr, Lane, and Nosenzo, 2018). To minimize this possibility, we chose a task that is markedly different from the ultimatum game.

In the instructions handed out at the start of each game, the high school students were

informed that four of them would be randomly chosen for each game to receive payment and that they would be informed of the outcome at a later stage. Thus eight students in total would be selected for payment. They could collect their earnings during a third campus visit in May or June 2019, or it would be collected for them by their teacher on the third visit. The eight partner-proposer students were recruited via email invitations sent by the Economics Department at Tilburg University. The email solicited participants for an online survey on economic decision-making with the possibility of earning up to 40 euros, depending on the choices made. All eight were paid for their choices.

At the end of the decision-making phase, the students participated in an online survey. A QR code and a link to the online survey (run on Qualtrics) were given to them after they had played both games and handed in their answer sheets. The survey consisted of seven questions concerning risk attitude, general trust, and opinions about ethnic diversity and the presence of immigrants in the Netherlands, as well as the individual's number of classmates and friends who are members an ethnic minority (see Section A.7 in the appendix for details). The presence of minority classmates served as a proxy for prior contact with ethnic minorities.

### **2.3 Debriefing session**

During a third campus visit, which took place on May 9 or June 13, 2019, (most of) the high school students who participated in the experiment listened to a lecture entitled "Unknown is unloved?" (see Section A.8 in the appendix for the slides). The lecture introduced them to the ultimatum game and how it can be used to measure unequal treatment and discrimination. They were also shown the results of the experiment in which they themselves had participated. The session served two purposes. The first was to give them a first-hand look at research done at the university and the process that researchers go through, from data collection to communicating the results. The second was to explain the experiment to the high school students, which up to that point they had not been aware of participating in. The session provided time for discussion, which the high school students indeed took advantage of. They were also given the contact information of a person outside the research study who

they or their parents could contact in case they felt uncomfortable with the study’s outcome or they wished to share concerns (which none of them took advantage of).

## 2.4 Number of observations

In each of the two main phases (intervention and decision-making) 136 high school students participated; 124 of them participated in both lectures.<sup>12</sup> We omitted the data for one team of 4 students and one team of 3 students, leaving us with observations for 117 high school students organized into 49 teams.<sup>13</sup> Eighty of them were assigned to the *Control* group, with 45 of them being matched to a *Majority* proposer and 35 to a *Minority* proposer in the ultimatum game (and vice versa in the communication game). The remaining 37 students were assigned to the *Treated* group, with 16 matched to a *Majority* proposer and 21 to a *Minority* proposer in the ultimatum game (and vice versa in the communication game).

# 3 Empirical strategy

## 3.1 Description of main data analyses

To answer the question of whether the contact intervention reduced the level of ethnic discrimination, we first perform a difference-in-differences analysis of responder behavior in the ultimatum game. In particular, we regress the minimum acceptable offer (MAO) made by the high school students on a binary variable for being matched to a *Minority* partner-proposer, a binary variable for being part of the *Treated* group, and an interaction term. The estimated effect of *Minority* should reflect the extent of discrimination against minorities in *Control*. A positive effect would imply that a higher MAO is required from minority proposers than from majority proposers, indicating the presence of discrimination. Also of key

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<sup>12</sup>12 students only participated in the first lecture, and another 12 participated only in the second lecture.

<sup>13</sup>During the first session, three high school students from the same school joined a different team than they were assigned to. Since previous connections among students might have altered the group dynamics, we omitted this team (of 4 high school students in total) from the dataset. In a different team, one of the high school students had an ethnic minority background. Even though our treatment manipulation was by means of the university students, the minority background of a high school student could also influence the behavior of the other students in the team. Thus, we omitted that team (of 3 high school students) as well. The main results remain unchanged if both teams are included, when either of them is included, and when the two high school students on the team of the minority high school student are recoded as members of the *Treated* group.

interest, is the estimated effect of the interaction term, which if negative would indicate that the contact intervention has reduced discrimination.

The analysis of behavior in the communication game is similar to that in the ultimatum game, with the only difference being that the dependent variable is now the tendency to lie. Specifically, a binary variable indicating whether or not the student was honest about the outcome of the die roll (equal to 1 if he was and 0 otherwise). Honesty corresponds to an unwillingness to sacrifice a small amount of money to generate a large benefit for the partner. We again perform a difference-in-differences analysis and focus on the estimated effect of the interaction between *Treated* and *Minority*, the latter now referring to the ethnic background of the partner in the communication game.

In another analysis, we combine the data from the ultimatum game and the communication game to construct an index of discrimination measured at the individual level.<sup>14</sup> This is referred to as the *relative kindness towards minority* index and is defined as the kindness shown by a high school student towards a minority partner in the ultimatum game minus his/her kindness towards a majority partner in the communication game or vice versa. Kindness in the ultimatum game is measured by the standardized value of the MAO, with lower values implying greater generosity towards the partner. Kindness in the communication game is measured by a binary variable indicating whether the student was dishonest about the outcome of the die roll, given that lying increased the payoff of the partner. A negative relative kindness index indicates that the high school student was less kind towards a minority partner than a majority partner (the minimum value is -1) while a positive index indicates that he was kinder towards a minority partner (the maximum value is 1). A value of zero means that he treated majority and minority partners similarly. In order to study whether the contact intervention reduced ethnic discrimination, we regressed the *relative kindness towards minority* index on a binary variable for whether the high school student was in *Treated*.

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<sup>14</sup>Recall that in the communication game the high school students were matched with partners with a different ethnic background than in the ultimatum game.

### 3.2 Prior interethnic contact

Since we are investigating the effect of interethnic contact, it is natural to look at heterogeneous effects driven by previous contact with ethnic minorities. Thus, in a second step of our analysis of the behavioral games, we use information gathered by means of the survey results on the number of classmates with a minority background and distinguish between two groups: those with no minority classmates and those with at least one minority classmate. For both games and for the *relative kindness towards minority* index, we estimate a fully interactive regression model in order to determine whether the groups differ in their tendency to discriminate and whether they reacted differently to the contact intervention. This made it possible to investigate whether the effect of the contact intervention differs between high school students who had prior contact with minorities and those who did not. Our underlying assumption is that high school students with minority classmates have already experienced cooperative contact in the sense of Allport (1954)'s contact theory prior to the experiment. This might include group assignments, participation in mixed sports teams, etc.

The division into the two groups is backed up by the observation that students without prior contact with minorities tend to live in municipalities with a lower share of residents with an immigration background ( $p = 0.001$ ), are more likely to report that there are too many foreigners in the Netherlands ( $p = 0.052$ ), and have fewer minority friends ( $p = 0.006$ ) than students in regular contact with minorities in the classroom. They also have somewhat lower levels of trust ( $p = 0.072$ ), live in less urbanized areas (but  $p = 0.126$ ) and tend to be negative about a multicultural society (but  $p = 0.175$ ).<sup>15</sup>

### 3.3 Confounding effects

In this section, we wish to determine whether in the case that the contact intervention indeed had an effect, we can be confident that it is due to variation in interethnic contact rather than differences in other characteristics between the majority and minority university stu-

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<sup>15</sup>Table S.1 in the appendix provides an overview of the statistics for students with and without prior contact with ethnic minorities.



dents who took part in the intervention phase. First, we find that the gender distribution is similar in both groups, where 41% of the minority students are male as compared to 47% of the majority students. Neither the team size nor the university student's major differ between teams with a minority student (*Treated*) and teams with a majority student (*Control*). Moreover, the university students did not differ in their effect on the outcome of the team task. Thus, the strategies chosen in the repeated prisoner's dilemma task did not differ significantly between the teams with a minority student (*Treated*) and those with a majority student (*Control*). In both cases, the most frequently chosen strategy was the *grim trigger* strategy, followed by the *always defect* strategy. An overview of the team-related variables, as well as the *p*-values for the tests of differences are shown in the first section of Table 1. Finally, evidence from the survey among the university students shows that the majority and minority students did not rate their experiences in carrying out the team task differently with respect to participation and engagement in the discussion and enjoyment of the session (see Table S.2 in the appendix). Overall, these findings suggest that minority and majority university students do not differ in respects other than ethnic background.

### 3.4 Balancing tests

In this section, we show that the treatments are balanced in terms of the high school students' background characteristics. The lower section of Table 1 shows the means of the variables we measured and a number of relevant administrative variables, along with *p*-values of the associated tests of differences between *Control* and *Treated*. As can be seen, the two groups are well-balanced in terms of all measured characteristics (i.e., gender, risk-taking, level of trust, preferences with regard to multiculturalism and foreigners, number of minority friends and classmates, etc.).

Furthermore, in the context of heterogeneity, it is important to check whether the background characteristics of the high school students and the team-related variables are also balanced between treatments within each group of high school students (i.e. those with and those without prior contact with ethnic minorities). Table 2 reports separate balancing statistics for high school students with prior contact and those without prior contact. As can be

**Table 1. Comparison of *Control* and *Treated***

	<i>Control</i>	<i>Treated</i>	<i>p</i> -value
<i>Team-related variables</i>			
Male university students	0.47	0.41	0.769
Bachelor's degree students	0.84	0.88	0.720
Team size	2.72	2.47	0.327
Team strategy:			
Tit-for-tat	0.22	0.12	
Grim trigger	0.34	0.35	
Defect + tit-for-tat	0.16	0.24	0.815
Always defect	0.28	0.29	
Observations	32	17	
<i>High school student characteristics</i>			
Male	0.57	0.49	0.427
Population density school district	1716	1735	0.873
Proportion non-Western immigrants school district	0.12	0.12	0.977
Observations	80	37	
<i>Survey responses</i>			
Fun lecture	4.19	4.19	0.801
Risk taking	3.14	3.27	0.649
Level of trust	3.14	2.97	0.456
Pro-multiculturalism	4.35	4.22	0.297
Accepting of foreigners	3.57	3.73	0.270
Minority friends	0.88	0.87	0.655
Minority classmates	0.88	0.76	0.225
Observations	77	37	

*Notes:* The table reports means of team-related variables, high school students' characteristics and survey responses and *p*-values associated with tests of differences between *Control* and *Treated*. The third column reports the *p*-value of a Fisher's exact test for categorical variables (gender and team strategy), the *p*-value of a two-independent-samples t-test for continuous variables (team size, proportion of bachelor's degree students, population density and proportion of non-Western immigrants in the school district) and the *p*-value of a Mann-Whitney test for all other variables. All other variables are ordinal variables ranging from 1-"Strongly disagree" to 5-"Strongly agree" (except for *Minority friends* and *Minority classmates* which take the following values: 0-"No friends/mates with immigrant background", 1-"Between 1 and 5", 2-"Between 6 and 10", 3-"More than 10"); for these the last column reports the *p*-value of a Mann-Whitney test.

seen, the two groups (with and without prior contact) are well balanced between *Control* and *Treated* for the team-related variables, as well as for the high school students' characteristics.

For a second set of balancing statistics, we test whether high school students who were first assigned a *Majority* partner (in the ultimatum game) differ from those who were first

**Table 2. Comparison of *Control* and *Treated* according to prior contact**

	Prior contact			No prior contact		
	<i>Control</i>	<i>Treated</i>	<i>p</i> -value	<i>Control</i>	<i>Treated</i>	<i>p</i> -value
<i>Team-related variables</i>						
Male university students	0.49	0.41	0.449	0.33	0.50	0.442
Bachelor's degree students	0.83	0.88	0.485	0.93	0.90	0.775
Team size	2.88	2.74	0.409	3.40	2.70	0.025
Team strategy:						
Tit-for-tat	0.23	0.04		0.00	0.10	
Grim trigger	0.32	0.37	0.134	0.60	0.30	0.391
Defect + tit-for-tat	0.15	0.19		0.20	0.30	
Always defect	0.29	0.41		0.20	0.30	
<i>High school student characteristics</i>						
Male	0.60	0.48	0.358	0.47	0.50	1.000
Population density school district	1763	1778	0.914	1513	1621	0.680
Proportion non-Western immigrants school district	0.12	0.13	0.752	0.08	0.08	0.989
<i>Survey responses</i>						
Fun lecture	4.18	4.22	0.869	4.27	4.10	0.376
Risk-taking	3.15	3.22	0.831	3.13	3.40	0.596
Level of trust	3.19	3.11	0.784	2.93	2.60	0.421
Pro-multiculturalism	4.37	4.30	0.636	4.27	4.00	0.328
Accepting of foreigners	3.68	3.82	0.455	3.13	3.50	0.294
Minority friends	0.97	0.93	0.895	0.53	0.70	0.550
Observations	65	27		15	10	

*Notes:* The table reports means of team-related variables, high school students' characteristics and survey responses and *p*-values associated with tests of differences between *Control* and *Treated* for students with vs. without prior contact with minorities. The third columns for each group report the *p*-value of a Fisher's exact test for categorical variables (gender and team strategy), the *p*-value of a two-independent-samples t-test for continuous variables (team size, proportion of bachelor's degree students, population density and proportion of non-Western immigrants in the school district) and the *p*-value of a Mann-Whitney test for all other variables (see the notes of Table 1).

assigned a *Minority* partner. Results are shown in Table S.3 and Table S.4 in the appendix and show that the characteristics of the high school students are well-balanced across the treatments. With respect to the team strategy, there is evidence of a statistically significant imbalance in the distribution of strategies. As shown in Table S.3, high school students in *Control* with a majority partner in the ultimatum game were relatively more likely to be part of a team selecting the *grim trigger* strategy while those in *Treated* with a minority partner in the ultimatum game were more likely to be part of a team choosing *always defect*. Table S.4 shows that the imbalance is only present in the group of high school students with prior

**Table 3. Treatment effects in the ultimatum game**

Dep. var.: Minimum accepted offer	(1)	(2)	(3)	(4)
<i>Minority</i>	0.35 (1.39)	-0.58 (1.70)	8.20 (2.70)***	8.05 (2.50)***
<i>Treated</i>	0.93 (1.75)	0.95 (1.88)	1.05 (2.79)	1.46 (3.10)
<i>Minority</i> × <i>Treated</i>	-2.40 (2.19)	-2.52 (2.38)	-12.95 (3.66)***	-13.90 (3.64)***
Prior contact			1.69 (2.10)	2.23 (2.29)
<i>Minority</i> × Prior contact			-9.32 (3.70)**	-10.63 (3.58)***
<i>Treated</i> × Prior contact			-0.10 (3.67)	-1.09 (4.32)
<i>Minority</i> × <i>Treated</i> × Prior contact			13.17 (4.97)**	15.36 (5.71)**
Constant	8.51 (0.92)***	15.83 (8.38)*	7.20 (1.68)***	15.59 (8.45)*
Controls		✓		✓
Number of observations	117	114	117	114
Number of clusters	49	49	49	49

Notes: *Minority* is a binary variable equal to one if the high school student is matched with a minority partner. *Treated* is a binary variable equal to one if the student is in the *Treated* group. *Prior contact* is a binary variable equal to one if the student has at least one classmate from an ethnic minority. Controls include the gender of the high school student, the proportion of non-Western immigrants and population density in the school district, level of enjoyment in the team task, measures of trust levels and risk, an index indicating the degree of acceptance of ethnic diversity, the team’s university student’s gender and major, team size, and strategy chosen in the team task. Standard errors (in parentheses) clustered at the team level. \*\*\* - significant at 1 percent, \*\* - significant at 5 percent, \* - significant at 10 percent.

contact. To take this into account in our data analysis, we carried out regressions that include the chosen team strategy as a control variable.

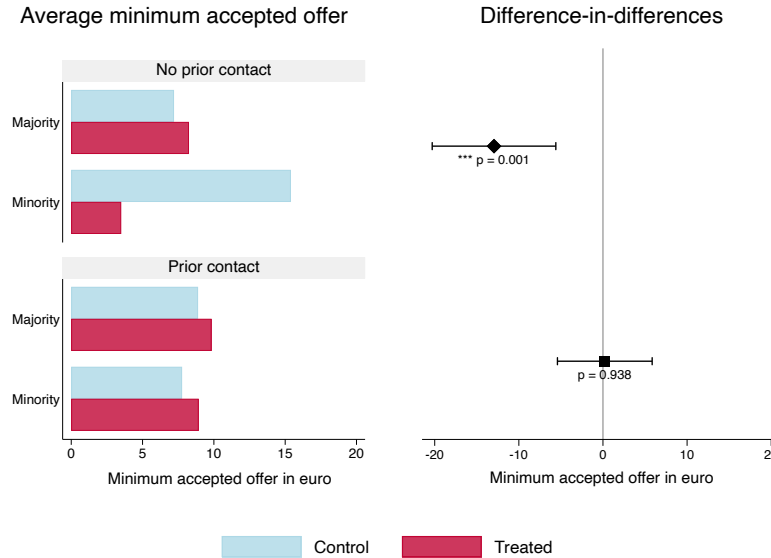
## 4 Results

### 4.1 The ultimatum game

Table 3 presents the regression results for responder behavior in the ultimatum game: general results appear in column 1 (without controls) and column 2 (with controls) while results from the fully interactive model that allows for heterogeneous effects depending on prior contact appear in column 3 (without controls) and column 4 (with controls). According to the results in columns 1 and 2, there is no discrimination present in the *Control* group (the effect of *Minority* is close to zero). Moreover, the interaction *Minority* × *Treated* is negative but qualitatively small and statistically not significant, indicating that the contact intervention did not have a general effect on behavior.

If we focus on the heterogeneous effects depending on prior interethnic contact, then

**Figure 2. Effect of intervention on minimum accepted offer by prior contact**



Notes: The  $p$ -values are based on regressions reported in column 3 of Table 3. \*\*\* - significant at 1 percent, \*\* - significant at 5 percent, \* - significant at 10 percent.

interesting patterns can be detected. To visualize the patterns, the results in column 3 of Table 3 are presented graphically in Figure 2. The right-hand panel shows the coefficient and  $p$ -value for the difference-in-differences effect in the case of students who had prior contact with minority peers (lower panel) and those who did not (upper panel). As can be seen, the minimum accepted offer (MAO) for high school students without prior contact is particularly sensitive to the contact intervention. In particular, in the *Control* group, these students expect more than 8 additional euros from a minority proposer than from a majority proposer, providing evidence of a substantial degree of discrimination. The discrimination completely disappears, however, as a result of the contact intervention. Thus, students in *Treated* are willing to accept almost 13 euros less than students in *Control* when matched to a minority proposer, whereas the MAO is similar when matched to a majority proposer. High school students with prior contact tend not to discriminate: the MAO of students in *Control* with a minority partner is of the same order of magnitude as the MAO in the case of a majority partner and is almost 9 euros lower than that made by high school students without prior contact. Moreover, given that the effect size of the triple interaction term corresponds

very closely to that of *Minority*  $\times$  *Treated*, we conclude that the contact intervention has no effect on students with prior contact.

As shown in column 4 of Table 3, the results also hold when controlling for the background characteristics of the high school students (gender, measures of trust levels, risk, an index of diversity acceptance and enjoyment of the lecture, all based on the survey questions), team characteristics (gender and major of the university student, team size and the chosen repeated-game strategy), and characteristics of the school's district (proportion of non-Western immigrants in the school's district and its population density).

## 4.2 The communication game

Table 4 reports the treatment effects and the difference-in-differences effect in the communication game where the dependent variable is a binary honesty indicator. As shown in columns 1 and 2, the general effects are qualitatively small and not statistically significant, as in the ultimatum game. The heterogeneous effects are reported in columns 3 and 4, and show that, in contrast to the ultimatum game, discrimination is not present among the high school students without prior contact (the *Minority* variable is small in size and not statistically significant). Nonetheless, the difference-in-differences effect for this group of students is qualitatively similar to that in the ultimatum game, albeit not statistically significant. Among students with prior contact, treatment effects are qualitatively small and not statistically significant. Figure 3 provides a visualization of the results reported in column 3.

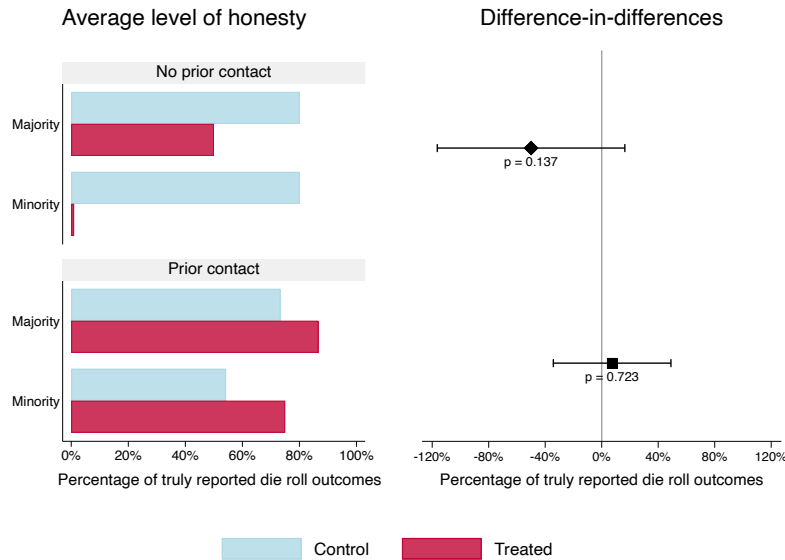
A possible explanation of the lower level of ethnic discrimination in the communication game than in the ultimatum game among students without prior contact is that the switch from a majority partner to a minority partner may have made the high school student more aware that treating someone with a minority background differently is inappropriate, which may have moderated their behavior (see e.g. Barr, Lane, and Nosenzo, 2018).

**Table 4. Treatment effects in the communication game**

Dep. var.: Honesty	(1)	(2)	(3)	(4)
<i>Minority</i>	-0.14 (0.10)	-0.15 (0.09)	0.00 (0.22)	0.10 (0.22)
<i>Treated</i>	0.02 (0.12)	-0.03 (0.14)	-0.30 (0.31)	-0.23 (0.32)
<i>Minority</i> × <i>Treated</i>	-0.06 (0.22)	0.04 (0.23)	-0.50 (0.33)	-0.56 (0.37)
Prior contact			-0.07 (0.20)	0.09 (0.19)
<i>Minority</i> × Prior contact			-0.19 (0.22)	-0.32 (0.25)
<i>Treated</i> × Prior contact			0.43 (0.35)	0.29 (0.36)
<i>Minority</i> × <i>Treated</i> × Prior contact			0.57 (0.41)	0.78 (0.49)
Constant	0.74 (0.07)***	0.79 (0.60)	0.80 (0.19)***	0.83 (0.62)
Controls		✓		✓
Number of observations	117	114	117	114
Number of clusters	49	49	49	49

Notes: *Minority* is a binary variable equal to one if the high school student is matched with a minority partner. *Treated* is a binary variable equal to one if the student is in the *Treated* group. *Prior contact* is a binary variable equal to one if the student has at least one classmate from an ethnic minority. Controls include the gender of the high school student, the proportion of non-Western immigrants and population density in the school district, level of enjoyment in the team task, measures of trust levels and risk, an index indicating the degree of acceptance of ethnic diversity, the team’s university student’s gender and major, team size, and strategy chosen in the team task. Standard errors (in parentheses) clustered at the team level. \*\*\* - significant at 1 percent, \*\* - significant at 5 percent, \* - significant at 10 percent.

**Figure 3. Effect of intervention on honesty and prior contact**



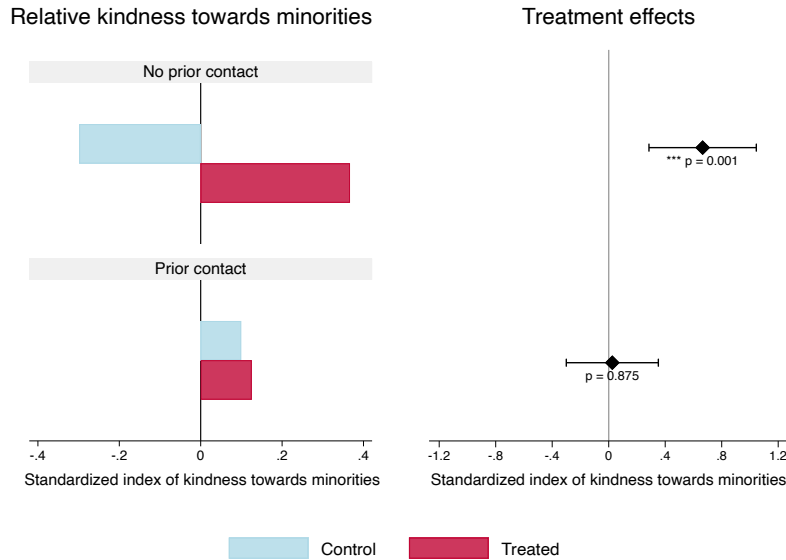
Notes: The *p*-values are based on the regressions results reported in column 3 of Table 4. \*\*\* - significant at 1 percent, \*\* - significant at 5 percent, \* - significant at 10 percent.

**Table 5. Relative kindness towards minorities**

Dep. var.: Relative kindness	(1)	(2)	(3)	(4)
<i>Treated</i>	0.17 (0.13)	0.14 (0.14)	0.67 (0.19)***	0.72 (0.23)***
Prior contact			0.40 (0.16)**	0.51 (0.21)**
<i>Treated</i> × Prior contact			-0.64 (0.27)**	-0.74 (0.30)**
Constant	0.03 (0.06)	0.04 (0.91)	-0.30 (0.14)**	-0.05 (0.92)
Controls		✓		✓
Number of observations	117	114	117	114
Number of clusters	49	49	49	49

Notes: *Treated* is a binary variable equal to one if the student is in the *Treated* group. *Prior contact* is a binary variable equal to one if the student has at least one classmate from an ethnic minority. Controls include the gender of the high school student, the proportion of non-Western immigrants and population density in the school district, level of enjoyment in the team task, measures of trust levels and risk, an index indicating the degree of acceptance of ethnic diversity, the team’s university student’s gender and major, team size, and strategy chosen in the team task. Standard errors (in parentheses) clustered at the team level. \*\*\* - significant at 1 percent, \*\* - significant at 5 percent, \* - significant at 10 percent.

**Figure 4. Effect of intervention on relative kindness towards minorities by prior contact**



Notes: The *p*-values are based on the regressions results reported in column 3 of Table 5. \*\*\* - significant at 1 percent, \*\* - significant at 5 percent, \* - significant at 10 percent.

### 4.3 Individual-level index of discrimination

Table 5 reports the regression results when the dependent variable is the *relative kindness towards minorities* index (values between -1 and 1). Columns 1 and 2 present the general effect.



As in the previous analyses, the contact intervention has no overall effect on relative kindness towards minorities. Nonetheless, it can be seen that the contact intervention increases the relative kindness towards a minority partner by 0.67 points among high school students who do not have minority classmates, as seen in column 3. Moreover, prior contact is associated with an additional 0.40 points in the index for relative kindness towards minorities for high school students who did not experience the contact intervention. Both the contact induced in the experiment and that experienced in the classroom are thus associated with a higher degree of relative kindness towards minorities. The interaction term is negative and statistically significant and of similar magnitude for both forms of contact, suggesting that they can be viewed as substitutes. The results hold when the controls are included in the regression (column 4). Figure 4 graphically illustrates the results (based on column 3 of Table 5). Among students who had prior contact with minorities, there is no indication of discriminatory behavior in the *Control* group nor in the *Treated* group. Nonetheless, such behavior is observed among students without prior contact with minorities in the *Control* group, but not in the *Treated* group.

## 5 Conclusion

We show that an intervention consisting of cooperative interaction with someone from an ethnic minority background attenuates discrimination among majority high school students. This holds only for students without minority classmates. Students with minority classmates did not react to the intervention and did not discriminate in the first place. The results indicate that the students who had no minority classmates were less likely to have had cooperative contact with minorities, which led them to view minorities as an *out-group*. The contact intervention may have been the first time that they worked together with someone from a minority background. In contrast, students who were used to interacting with minority classmates did not think or behave according to minority-majority categories.

The results are relevant to the design of policy interventions aimed at reducing ethnic discrimination and improve interethnic relations. Essentially, the findings demonstrate that a short intervention targeted at high school students in schools with a low representation

of ethnic minority groups can change behavior towards these groups. Such an intervention can be implemented relatively easily at a large scale without affecting the curriculum or the ethnic composition of the classes. All that is required is an extra-curricular activity that involves interethnic cooperation. The activity can be educational in nature, or related to sports or culture. In fact, such activities already exist in many schools, sometimes in the form of exchange programs between schools.

A possible concern is that our intervention is unlikely to have any long-lasting effects (beyond, say, one month). Nonetheless, there are reasons for optimism. First, the intervention features most of the conditions suggested by Allport's contact theory in order to achieve a positive effect of contact: personal interaction, shared goals, a common project, equal status, and approval by a recognized authority. A number of studies show that intergroup contact with these characteristics has long-lasting effects (for example, Bagues and Roth, 2020; Bazzi, Gaduh, Rothenberg, and Wong, 2019). Second, evidence from other contexts shows that short but meaningful interventions can indeed have long-lasting effects (Broockman and Kalla, 2016; Paluck, 2016). Although our contact intervention may seem trivial, for a majority student who has never had a meaningful conversation with a minority student, let alone worked together with one toward a common goal, the intervention may have a major impact, especially in comparison to common policy interventions, such as mass media campaigns (Gerber, Gimpel, Green, and Shaw, 2011).

Finally, the insights arrived at in a Dutch context should be applicable outside of the Netherlands. Many other countries have sizable ethnic minority groups, which tend to be overrepresented in unemployment and poverty statistics (US Bureau of Labor Statistics, 2021; Eurostat, 2021) and face discrimination in amongst others the labor and the housing market (Auspurg et al., 2019; Bertrand and Mullainathan, 2004; Heath et al., 2013; Zschirnt and Ruedin, 2016). In recent years, anti-immigrant political platforms have gained popularity in, for example, European countries and the United States. Remarkably, however, they garner relatively little support among residents who are exposed to ethnic minorities in their neighborhood (Achard et al., 2021; Bursztyn et al., 2021; Steinmayr, 2021; Schindler and Westcott, 2021; Vertier et al., 2022). Our results help to understand this phenomenon and

suggest that positive interethnic contact is a key channel for altering political preferences.

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# Appendix (For online publication)

## A Instructions and lecture slides

This section includes translations to English of

- lecture slides for the *Strategic thinking* lecture on February 14, 2019 (A.1),
- preparatory instructions handed out to the recruited university students who participated in the lecture on February 14, 2019 (A.2),
- the university students survey (A.3),
- lecture slides for the *Participation in economic games* lecture on March 12, 2019 (A.4),
- instructions and answer forms for the distribution and communication game handed out to the high school students on March 12, 2019 (A.5 and A.6, respectively),
- the post-experimental survey (A.7),
- slides of the debriefing session (A.8).

## A.1 Lecture slides *Strategic thinking*

**Strategic thinking – Find your team!**

- You form a team together with:
  - one student-companion from the university, and
  - some other highschool students.
- Each team has its own code ( A1, A2, B1, B2, etcetera).
- You join the student-companion with the same code .

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1

2

**Welcome to 'strategic thinking'**

Your task:

you and your team choose a price -strategy for your firm (firm X) which operates on a market with one other firm (firm Y)

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**How is profit determined?**

profit (in 1000 Euro per day)		Firm Y	
		low price	high price
Firm X	low price	(1, 7)	(5, 2)
	high price	(0, 5)	(3, 3)

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4

**Situation repeats itself for 30 days**

- Each day** your firm has to choose between a high price and a low price.
- A **price-strategy** for your firms consists of:
  - the price you start with on the first day,
  - the price on each subsequent, where this price can depend on the prices on previous days.

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5

**Possible strategies**

- Always low:** a low price on each day.
- Always high:** a high price on each day.
- Coin toss:** toss a coin each day; set a high price with heads, and a low price with tails.
- High + imitation:** a high price on the first day; then match the price the other firm set on the previous day.
- Low + imitation:** a low price on the first day; then match the price the other firm set on the previous day.
- High + punish:** a high price on the first day; then a high price as long as the other firm sets a high price as well, otherwise choose a low price forever after.

TU/e UNIVERSITY

6

### Be careful!

- Your aim is to get the **highest possible profit** for your firm (so your aim is not to "beat" the other firm).
- You are allowed to communicate with your own team members, but not with members from other teams.



7

★ 00:23

### Which strategy does your team choose?

- Always low:** a low price on each day.
- Always high:** a high price on each day.
- Coin toss:** toss a coin each day; set a high price with heads, and a low price with tails.
- High + imitation:** a high price on the first day; then match the price the other firm set on the previous day.
- Low + imitation:** a low price on the first day; then match the price the other firm set on the previous day.
- High + punish:** a high price on the first day; then a high price as long as the other firm sets a high price as well, otherwise choose a low price forever after.

profit (in 1000 Euro per day)		Firm Y	
		low price	high price
Firm X	low price	1 ; 1	5 ; 0
	high price	0 ; 4	3 ; 2

**Be reminded:**  
You make this choice in every period, for a period of 30 days.



8

00:29

### Analysis

- The situation is also known as a **prisoner's dilemma**.
- The dilemma:
  - each firm has an incentive to choose a low price,
  - leads to a bad outcome,
  - the outcome is better if both choose a high price.

profit (in 1000 Euro per day)		Firm Y	
		low price	high price
Firm X	low price	1 ; 1	5 ; 0
	high price	0 ; 4	3 ; 2



9

★ 01:01

### What is a good strategy?

- The best strategy depends on the strategy the other firm chooses.
- This strategy you do not know for sure.
- So your strategy should do well against many strategies the other firm could choose.
- Your strategy should do well "on average".

profit (in 1000 Euro per day)		Firm Y	
		low price	high price
Firm X	low price	1 ; 1	5 ; 0
	high price	0 ; 4	3 ; 2



10

★ 00:29

### Three properties of a good strategy

- cooperative**  
go for a good outcome, and do not try to exploit others
- realistic**  
not everyone will choose a cooperative strategy, so make sure you cannot be exploited in a such case
- forgiving**  
others can occasionally make a "mistake", avoid that this ruins the chances of a good outcome forever

profit (in 1000 Euro per day)		Firm Y	
		low price	high price
Firm X	low price	1 ; 1	5 ; 0
	high price	0 ; 4	3 ; 2



11

★ 00:56

### Evaluation of strategies

strategy	cooperative	realistic	forgiving
1) Always low	no	yes	no
2) Always high	yes	no	yes
3) Coin toss	no	no	no
4) High + imitation	yes	yes	yes
5) Low + imitation	no	yes	yes
6) High + punish	yes	yes	no



12

★ 01:15

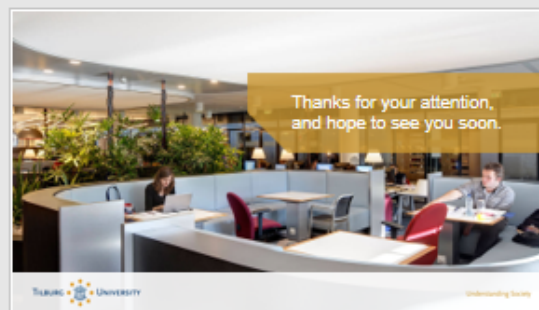
### Summary

- Situation with two firms:
  - Tension between self-interest and joint interest
  - Dilemma: threat that the outcome will be bad for everyone
- A good strategy is cooperative, realistic, and forgiving.
  - An example is ITT-FOR-IAE: start cooperatively and then follow the other
- Lets see which strategies you have chosen!



13

★ 01:02



14

## A.2 Preparatory instructions university students

**Time and place:** Thursday, February 14, 2019; 2.30pm-3.30pm in **Cube 1A /1B** (ground floor Cube building)

*Please report at 2:25pm with your code card and these instructions: if your code starts with A report at in Cube 1A and if your code starts with B report at Cube 1B.*

*Please bring your smartphone and laptop!*

### The lecture

The participants of the practice lecture are high school students from the final two grades of the VWO (pre-university education) interested in economics and business, who visit our university for some trial lectures. The subject of the lecture you will be part of is 'strategic thinking'.

The participants will be allocated to teams and each team will be asked to consider a price strategy for 'Firm X' in a market with two firms, 'Firm X' en 'Firm Y'.

The firms choose a price for every day: a low price or a high price. The daily profits for the firms depends on these prices as indicated in the following table:

profit (in 1000 Euro per day)		Firm Y	
		low price	high price
Firm X	low price	1 ; 1	5 ; 0
	high price	0 ; 5	3 ; 3

You can read the table as follows:

If both firms choose a low price on a certain day, they both make a profit of 1000 euros on that day. If they both choose a high price, they both make a profit of 3000 euros on that day. If firm X chooses a low price and firm Y a high price, firm X makes a profit of 5000 euros on that day and firm Y makes zero profit. If firm Y chooses a low price and firm X a high price, firm Y makes a profit of 5000 euros that day and firm X makes zero profit.

### Your task

During the lecture you will form a team together with 2, 3, or 4 high school students.

The code of your team is printed on the card you received. The high school students in our team receive a card with the same code as yours. It is your task to go to your designated spot in the lecture room and gather your team together by holding up your card in a clearly

visible manner. The spot which is designated for you is indicated on the back of the card you received and/or will be indicated by a lecturer.

Once your team is complete you collect the cards of all the team members. The card will be picked up during the lecture. It is proposed that all team members introduce themselves, for example by mentioning their name.

Furthermore, it is your task to read the instructions on this sheet carefully so that you are prepared for the lecture and can answer any questions by the participants. During the lecture you make sure that instructions are followed carefully, and you guide the discussion in your team on the price strategy to be chosen. You can discuss for example what the pros and cons are of the strategies that the participants propose.

Towards the end of the lecture you will be asked to enter a strategy at [econasium.presenterswall.com](http://econasium.presenterswall.com) on your smartphone or laptop. You will then be asked to fill in your name, but the intention is that you fill in your code. So, it is important to bring your smartphone or laptop.

Summary of what you have to do:

- Collect the code at the secretariat of the Department of Economics (room P 1.208; Feb. 6, 7 or 8)
- Go over the instructions carefully
- Bring a smartphone or laptop to the lecture
- During the lecture:
  - Stand or sit at the correct spot
  - Gather your team members (with the same code as yours)
  - Collect cards of the team members
  - Let the team members introduce themselves
  - Guide the discussion on price strategies
  - Enter the code and strategy on [econasium.presenterswall.com](http://econasium.presenterswall.com)

### **A.3 University students survey**

How many minutes did it take for your team to come to a decision?










1. Less than 5 minutes
2. 5 - 10 minutes
3. More than 10 minutes

To which extent do you agree with the following statements (Answer scale: 1 refers to fully disagree and 5 to fully agree)

1. The participants in my team were actively involved in the discussion.
2. I found the discussion interesting or engaging.
3. I was the discussion leader.
4. I enjoyed helping out pupils in making the strategy choice.
5. Instructions given to me before the session were clear.

Do you have any general feedback? (Open text answer)

## A.4 Lecture slides *Participation in economic games*

<p>Please take a seat where your name is indicated.</p> 	 <h3>Participation in economic games</h3> <p>Organized by professors of the Economics Department</p>
1	2
<h4>introduction</h4> <ul style="list-style-type: none"><li>You will be asked the following:<ol style="list-style-type: none"><li>to make a choice in a distribution game,</li><li>to make a choice in a communication game,</li><li>to fill out a short questionnaire.</li></ol></li><li>In the games you will be matched to another anonymous person.</li><li>You can earn money by participating. The amount that you earn depends on your choices and the choices of this other person.</li><li>Please do not communicate with other students in the room.</li></ul> 	<h4>payment</h4> <ul style="list-style-type: none"><li>In each game, 4 students (and matched persons) will be randomly selected and will be paid for their choices.</li><li>The selection takes place right after the data are collected.</li><li>Those who are selected, will be informed in April about the amount they receive.</li><li>Payments (in cash) take place right after the <i>Food for Thought</i> sessions (on May 8 and June 13).</li></ul> 
3	4
<h4>distribution game</h4> <p>Please double check whether your name is correctly filled out on your form and correct it if there is a mistake.</p> 	<h4>communication game</h4> <p>Please double check whether your name is correctly filled out on your form and correct it if there is a mistake.</p> 
5	6
<h4>short questionnaire</h4> <ul style="list-style-type: none"><li>Finally, please fill out a short questionnaire.</li><li>You are only eligible for payout if you have completed it !</li><li>You can find a link here: <a href="https://bit.ly/2tRbFAc">https://bit.ly/2tRbFAc</a></li><li>QR code: </li></ul> 	<h4>Thanks for your participation!</h4> <p>Remember:</p> <ul style="list-style-type: none"><li>Those who are randomly selected for payment, will be informed in April about the amount they receive.</li><li>Payments (in cash) take place right after the <i>Food for Thought</i> sessions (on May 8 and June 13).</li></ul> 
7	8

## **A.5 Instructions *Distribution game***

You will be paired with another person for this game. For convenience, we will call this person 'person X'. Person X knows from you that you are at school in the Netherlands and knows your first name. Other than that, you are anonymous to him or her. Person X is at a school in the Netherlands that does not participate in the econasium program. His or her first name is indicated on your form. Other than that, person X is anonymous to you.

### **How does the game work?**

Person X is asked to make a proposal to split 40 euros between you and himself. The proposal consists of a certain amount for you and what is left of the 40 euros for himself. You must decide whether to accept or reject this proposal. We ask you to indicate on the form what minimum amount between 1 and 40 euros you are willing to accept. At the moment that person X proposes a distribution, person X does not know what the minimum amount is that you are willing to accept.

### **How are payments calculated?**

If the amount that person X proposes to give you is at least as high as the minimum amount that you have indicated, this means that you accept the proposal. Both of you will then get paid what person X proposes. If the amount that person X proposes to give you is less than the minimum amount that you have indicated, this means that you reject the proposal. In this case, neither of you will be paid anything.

### **Examples**

Example 1: Suppose you indicate that you are willing to accept a minimum amount of 1 euros. And suppose also that person X proposes to give you 2 euros (which means that he would keep 38 euros for himself). In this case, the amount that person X proposes to give you (2 euros) is higher than the minimum amount that you have indicated (1 euros). 2 euros will then be paid to you and 38 euros to person X.

Example 2: Suppose you indicate that you are willing to accept a minimum amount of 38 Euros. Suppose also that person X proposes to give you 2 euros (which means that he would



keep 38 euros for himself). In this case, the amount that person X proposes to give you (2 euros) is less than the minimum amount that you have indicated (38 euros). Both of you will then get nothing paid out.

**Form**

Your surname =

Your first name =

First name of person X = *< first name of matched X is written down >*

Please tick the minimum amount you are willing to accept.

<input type="checkbox"/>	1 Euro
<input type="checkbox"/>	2 Euro
<input type="checkbox"/>	3 Euro
<input type="checkbox"/>	4 Euro
<input type="checkbox"/>	5 Euro
<input type="checkbox"/>	6 Euro
<input type="checkbox"/>	7 Euro
<input type="checkbox"/>	8 Euro
<input type="checkbox"/>	9 Euro
<input type="checkbox"/>	10 Euro

<input type="checkbox"/>	11 Euro
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<input type="checkbox"/>	36 Euro
<input type="checkbox"/>	37 Euro
<input type="checkbox"/>	38 Euro
<input type="checkbox"/>	39 Euro
<input type="checkbox"/>	40 Euro

## **A.6 Instructions *Communication game***

You will be paired with another person for this game. For convenience, we will call this person 'person Y'. Person Y knows from you that you are at school in the Netherlands and knows your first name. Other than that, you are anonymous to him or her. Person Y is at a school in the Netherlands that does not participate in the econasium program. His or her first name is indicated on your form. Other than that, person Y is anonymous to you.

### **How does the game work?**

We have rolled a dice for you and you can see the outcome here:

*< outcome of a six-sided dice roll is shown >*

Person Y has no information about the outcome of the dice roll, but knows that you have the information. Your task is to send person Y a message about the outcome in the form of "The outcome of the dice roll is [...]" where [...] is a number between 1 and 6. This message need not correspond to the actual outcome. We will show the message to person Y, and ask him or her to choose a number between 1 and 6.

### **How are payments calculated?**

If the number that person Y chooses is the same as the actual outcome of the dice roll, you both get 20 Euros. If the number that person Y chooses is different from the actual outcome, you get 18 euros and he or she gets 30 euros. Person Y has no information about these monetary amounts. Person Y is only asked to choose a number between 1 and 6. He or she knows that you have all the information and will of course find out the amount of money he or she finally receives.

### **Examples**

Example 1: Suppose that the outcome of the dice roll is 1 and that you communicate to person Y that the outcome is equal to 2. Suppose further that person Y chooses 2. In this case, you receive 18 euros and person Y receives 30 euros.

Example 2: Suppose that the outcome of the dice roll is 4 and that you communicate to person Y that the outcome is equal to 4. Suppose further that person Y chooses 4. In this case you both get 20 euros.

**Form**

Your surname =

Your first name =

First name of person Y = *< first name of matched Y is written down >*

Please indicate which message you would like to send to person Y by circling a number between 1 and 6:

“The outcome of the dice roll is    1    2    3    4    5    6.”

## **A.7 Post-experimental survey**

Please rate on a scale from 1 to 5 how much you agree or disagree with the following statements (1 refers to fully disagree and 5 to fully agree):

1. It is good if a society consists of people from different cultures.
2. I see myself as someone who takes risks.
3. There are too many people living in the Netherlands with an immigrant background.
4. In general I trust people I meet for the first time.
5. I enjoyed thinking about the choice that had to be made.
6. How many classmates do you have with an immigration background?
7. How many friends do you have with an immigration background?

## A.8 Slides debriefing session

TUbingen University

# Unknown is unloved?

a study by  
Eleonora Freddi, Jan Potters and Sigrid Sueters  
Department of Economics

1

### ultimatum game

- There are two players: Orange and Blue
- Orange has to split €40, and makes a proposal to Blue

2

### ultimatum game

- If Blue accepts the proposal by Orange, both receive what is in the proposal
- If Blue rejects the proposal by Orange, both receive nothing

3

If you were Blue, what is the minimum amount you would want to receive in order to accept the proposal by Orange?

4

### We gaan stemmen

Internet: [www.shakespeare.com](http://www.shakespeare.com)  
 Deze presentatie is gratis zonder de Shakespeare Add-in.  
 Add-in gratis downloaden? Ga naar <http://shakespeare.com/in/free-download/>

SMS: [www.shakespeare.com](http://www.shakespeare.com) \*219 4239 0239  
 Top van 1901: [www.shakespeare.com](http://www.shakespeare.com) 1901 1901 1901

5

To accept the proposal the minimum I would want to receive is

- A. 1 Euro
- B. 5 Euro
- C. 10 Euro
- D. 15 Euro
- E. 20 Euro
- F. 25 Euro

De vraag gaat open zodra u een antwoord heeft ingevoerd.

Stemmen: 127 ● Gesloten

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6

To accept the proposal the minimum I would want to receive is

A. 1 Euro	35,7%
B. 5 Euro	7,0%
C. 10 Euro	17,8%
D. 15 Euro	27,4%
E. 20 Euro	9,6%
F. 25 Euro	2,5%

Stemmen: 156

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7

ultimatum game with German students

- Variation in the Orange player
  - German first name (Andreas, Dirk, Florian, Tobias)
  - Turkish first name (Ali, Huseyn, Ismail, Murat)
- What minimum amount does Blue want to receive in order to accept the proposal by Orange?

Name	Minimum Amount (€)
German name	12
Turkish name	15

Blue is less inclined to accept the proposal if Orange has a Turkish name

Stemmen: 156

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8

unequal treatment

- People sometimes have a less positive attitude toward ethnic minorities
- This affects how we interact with each other
- Job applicants with a Moroccan name have a 60% lower chance to be invited for an interview

Stemmen: 156

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9

what does this have to do with economics?

- Immigrants have a disadvantage at the labor market
  - Partly due to unequal treatment
- Is economics because
  - It is inefficient: the best people should get the best positions
  - It is unfair: everyone should have equal opportunities
- This also holds for unequal treatment based in gender or sexual orientation

Stemmen: 156

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10

how do Dutch students play the ultimatum game?

- Some of you have make a decision in the role of 'Blue' on March 12
- Variation in first names for 'Orange'
  - Dutch names: Daan, Koen, Max, Tom
  - Moroccan names: Abderrahman, Mohamed, Yassin, Younes

Stemmen: 156

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11

Is the average choice of Blue different when Orange has a Dutch or a Moroccan name?

Stemmen: 156

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12

If Orange has a Dutch name the minimum of Blue will be ....

A. lower  
B. the same  
C. higher  
D. don't know

Stemmen: 156

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13

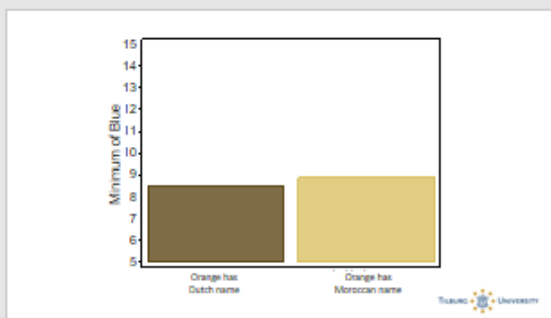
If Orange has a Dutch name the minimum of Blue will be ....

A. lower	46,1%
B. the same	26,6%
C. higher	24,7%
D. don't know	2,6%

Stemmen: 156

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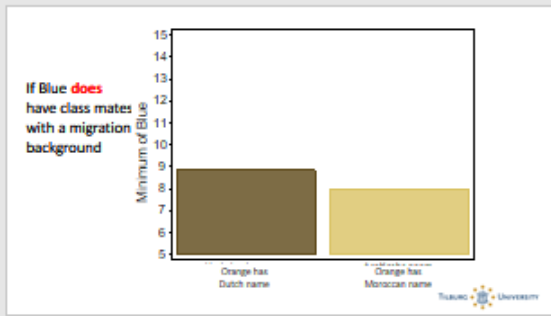
14



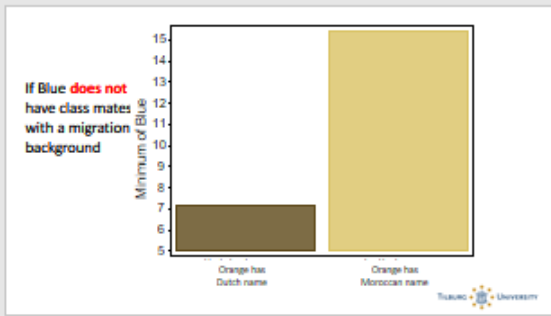
15

result depends on the number of class mates with an immigrant background...

16



17



18

what can we do about it?

- Education and rules
  - sure, but is often not enough
    - 15/20 real estate agents are prepared to reject Moroccan tenants at the request of the landlord
  - people often do this unconsciously

19



what can we do about it?

- Meeting
  - bring people in contact with each other
  - young people who interact often with immigrants tend to think more positively about them
- Question:
  - does becoming 'known' indeed make 'less unloved'
- Answer:
  - we have tested that as well!

20



difference in contact

- Team assignment at Econasium lecture on 'Strategic thinking' on february 14
- Teams of 2 or 3 students were accompanied by a TIU -student
- Background of the TIU -student
  - native (Dutch)
  - immigrant (Arabic or Asian)
- Who was in which team was determined randomly; students could not choose.

21



the key question ...

Did contact with an immigrant TIU student lead to a more equal treatment of immigrants?

Is the minimum amount Blue is prepared to accept less dependent on the first name of Orange if he or she has had contact with someone like Orange?

22



Do you think it makes a difference whether students have cooperated with an immigrant TIU student during the team assignment?



23

whether students have cooperated with an immigrant TIU student during the team assignment

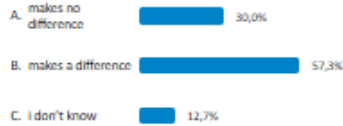
- A. makes no difference
- B. makes a difference
- C. i don't know

De vraag per open vraag is een vraag met één antwoordkeuze.

Stroom: 150 • Gestel

24

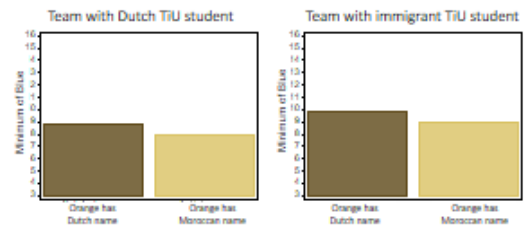
whether students have cooperated with an immigrant TIU student during the team assignment



• Gestel

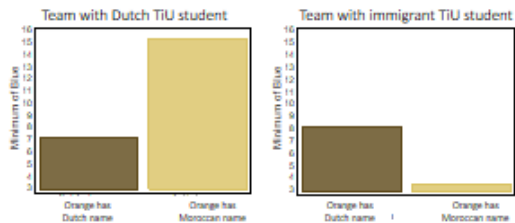
25

if Blue **does have** class mates with an immigrant background



26

if Blue **does not have** class mates with an immigrant background



27

conclusion



- Positive contact has the potential to reduce unequal treatment
- Known makes loved
- Questions about (un)equal treatment:
  - are important
  - are economics
  - are interesting for research!



28

• Students who, by lottery, were selected for payment:

- Bxxx Lxxxx
- Bxxxx Axxxx
- Mxxxx Bxxx
- Cxxxx Axxxxxxx
- Sxxxxxxx Mxxx
- Vxxxx Bxxx
- Wxxxx Axxx

• Ombudsperson

- Bas van Groezen (013 4664034, B.J.A.M.vanGroezen@tut.nl)

29



## B Supplementary tables

**Table S.1. Characteristics of high school students with and without prior contact**

	Prior contact	No prior contact	<i>p</i> -value
<i>Team-related variables</i>			
Male university student	0.47	0.40	0.652
Bachelor university student	0.85	0.92	0.356
Team size	2.84	3.12	0.088
Team strategy:			
Tit-for-tat	0.17	0.04	
Grim trigger	0.34	0.48	0.197
Defect + tit-for-tat	0.16	0.24	
Always defect	0.33	0.24	
<i>High school students characteristics</i>			
Male	0.56	0.48	0.501
Population density	1767	1556	0.126
Proportion of non-Western migrants	0.13	0.08	0.001
<i>Survey responses</i>			
Fun lecture	4.19	4.20	0.875
Risk-taking	3.17	3.24	0.971
Trust	3.17	2.80	0.072
Pro multicultural	4.35	4.16	0.175
Accept foreigners	3.72	3.28	0.052
Minority friends	0.96	0.60	0.006
Observations	92	25	

*Notes:* The table reports averages about team characteristics from the intervention session, several variables from the survey questions and socio-economic background of the areas where the schools are located across two groups of students: those with and without classmates with an ethnic minority background. The last column reports the *p*-value of a Fisher’s exact test for categorical variables (gender and team strategy), the *p*-value of a two independent samples t-test for continuous variables (team size, proportion of bachelor university students, population density and proportion of non-Western migrants) and the *p*-value of a Mann-Whitney test for all other variables.

**Table S.2. Comparing across *Control* and *Treated* for university students' survey responses**

	<i>Control</i>	<i>Treated</i>	<i>p</i> -value
Response rate	0.69	0.53	0.284
Time for task completion			
Less than 5 minutes	0.41	0.44	
5-10 minutes	0.50	0.44	1.000
More than 10 minutes	0.09	0.11	
Active discussion	4.27	4.56	0.315
Interesting discussion	3.86	4.00	0.786
Discussion leader	3.91	4.33	0.244
University student enjoyment	4.73	4.67	0.740
Observations	22	9	

*Notes:* The table reports the averages and *p*-values associated to tests of differences for university students' survey responses. The response rate shows the proportions of university students who responded the survey. The last column reports the *p*-value of a two independent samples t-test. For time for task completion, the last column reports the *p*-value of a Fisher's exact test. All other variables are defined as ordinal variables ranging from 1 "Strongly disagree" to 5 "Strongly agree". The last column for these variables reports the *p*-value of a Mann-Whitney test.

**Table S.3. Balancing of high school students across treatments**

	<i>Control</i>		<i>Treated</i>		<i>p</i> -value
	Majority	Minority	Majority	Minority	
<i>Team-related variables</i>					
Male university student	0.44	0.49	0.44	0.43	0.972
Bachelor university student	0.87	0.83	0.88	0.91	0.881
Team size	2.93	3.03	2.69	2.76	0.360
Team strategy:					
Tit-for-tat	0.16	0.23	0.13	0.00	
Grim trigger	0.51	0.20	0.38	0.33	0.022
Defect + tit-for-tat	0.11	0.23	0.31	0.14	
Always defect	0.22	0.34	0.19	0.52	
<i>High school students characteristics</i>					
Male	0.60	0.54	0.69	0.33	0.136
Population density	1747	1676	1956	1567	0.267
Proportion of non-Western migrants	0.11	0.12	0.13	0.11	0.578
<i>Survey responses</i>					
Fun lecture	4.17	4.23	4.13	4.24	0.956
Risk-taking	3.19	3.09	3.63	3.00	0.175
Trust	3.26	3.00	2.94	3.00	0.694
Pro multicultural	4.41	4.29	4.13	4.29	0.533
Accept foreigners	3.55	3.60	3.50	3.91	0.396
Minority friends	0.95	0.80	0.94	0.81	0.805
Minority classmates	0.86	0.91	0.75	0.76	0.615
Observations	45	35	16	21	

*Notes:* The table reports averages about team characteristics from the intervention session, several variables from the survey questions and socio-economic background of the areas where the schools are located across four groups of students: those in *Control* and in *Treated* intervention, whether they are matched with a minority or a majority game partner in the ultimatum game (UG). The last column reports the *p*-value of a Fisher's exact test for categorical variables (gender and team strategy), the *p*-value of a two independent samples t-test for continuous variables (team size, proportion of bachelor university students, population density and proportion of non-Western migrants) and the *p*-value of a Kruskal-Wallis rank test with tied data for all other variables.

**Table S.4. Balancing across treatments for groups with and without prior contact**

	Prior contact					No prior contact				
	Control		Treated		<i>p</i> -value	Control		Treated		<i>p</i> -value
	Majority	Minority	Majority	Minority		Majority	Minority	Majority	Minority	
<i>Team-related variables</i>										
Male university student	0.49	0.50	0.33	0.47	0.812	0.30	0.40	0.75	0.33	0.545
Bachelor university student	0.86	0.80	0.92	0.87	0.800	0.90	1.00	0.75	1.00	0.505
Team size	2.77	3.00	2.67	2.8	0.468	3.50	3.20	2.75	2.67	0.145
Team strategy:										
Tit-for-tat	0.20	0.27	0.08	0.00	0.003	0.00	0.00	0.25	0.00	0.539
Grim trigger	0.49	0.13	0.42	0.33		0.60	0.60	0.25	0.33	
Defect + tit-for-tat	0.06	0.27	0.33	0.07		0.30	0.00	0.25	0.33	
Always defect	0.26	0.33	0.17	0.60		0.10	0.40	0.25	0.33	
<i>High school students characteristics</i>										
Male	0.60	0.60	0.67	0.33	0.267	0.60	0.20	0.75	0.33	0.333
Population Density	1791	1730	2094	1525	0.105	1592	1353	1544	1673	0.872
Proportion of non-Western migrants	0.12	0.13	0.14	0.12	0.644	0.08	0.07	0.08	0.07	0.942
<i>Survey responses</i>										
Fun lecture	4.16	4.20	4.08	4.33	0.867	4.20	4.40	4.25	4.00	0.666
Risk-taking	3.19	3.10	3.50	3.00	0.438	3.20	3.00	4.00	3.00	0.464
Trust	3.34	3.03	3.00	3.20	0.670	3.00	2.80	2.75	2.50	0.840
Pro multicultural	4.47	4.27	4.17	4.40	0.496	4.20	4.40	4.00	4.00	0.759
Accept foreigners	3.72	3.63	3.67	3.93	0.699	3.00	3.40	3.00	3.83	0.418
Minority friends	1.13	0.80	0.92	0.93	0.416	0.40	0.80	1.00	0.50	0.380
Observations	35	30	12	15		10	5	4	6	

*Notes:* The table reports averages about team characteristics from the intervention session, several variables from the survey questions and socio-economic background of the areas where the schools are located across eight groups of high school students: those in *Control* and in *Treated* intervention, whether they are matched with a minority or a majority game partner in the ultimatum game (UG) (the game partner is from the other ethnic background in the Communication game (CG)), for high school students with and without prior contact with ethnic minorities. The last columns for each prior contact group report the *p*-value of the Fisher's exact test for categorical variables (gender and team strategy), the *p*-value of a two independent samples t-test for continuous variables (team size, proportion of bachelor university students, population density and proportion of non-Western migrants) and the *p*-value of a Kruskal-Wallis rank test with tied data for all other variables.