Trust, Ethnic Diversity, and Personal Contact: Experimental Field Evidence[*]

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Work in progress

Abstract

We combine a lab and a field experiment in the Norwegian Armed Forces to study how close personal contact with minorities affect in-group and out-group trust. We randomly assign majority soldiers to rooms with or without ethnic minorities and use an incentivized trust game to measure trust. First, we show that close personal contact with minorities increases trust. Second, we replicate the result that individuals coming from areas with a high share of immigrants trust minorities less. Finally, the negative relationship between the share of minorities and out-group trust is reversed for soldiers who are randomly assigned to interact closely with minority soldiers. Hence, our study shows that social integration involving personal contact can reduce negative effects of ethnic diversity on trust.

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1 Introduction

Western societies are becoming more diverse. Diversity can lead to more innovation, creativity and economic growth (e.g., Peri 2002, Hunt and Gauthier-Loiselle 2010), but some fear that it can also lead to less social trust and more tension and conflicts (Alesina and La Ferrara 2002; Putnam 2007). The potential effects of diversity on trust are essential to understand, because when people trust each other, transaction costs are reduced, organizations run better, the need for formal regulation reduces, governments provide services more efficiently, policy promises become more credible, and financial systems develop better (Algan and Cahuc 2013; Arrow 1972; Coleman 1990; Fukuyama 1995; Guiso, Sapienza, and Zingales 2008b, 2008a; Guiso, Sapienza, and Zingales 2011; Knack and Keefer 1997; La Porta et al. 1997; Putnam 1993; Tabellini 2008; Zak and Knack 2001). If migration and ethnic diversity have dismantling effects on the social fabric of societies, it becomes important to find out if and how public policy can mitigate such problems. For instance, can tensions be reduced and trust enhanced if governments create arenas where different ethnic groups regularly encounter each other; will contact build trust?

This paper presents research evidence relevant for these questions. Our results are from a field experiment in the Norwegian Armed Forces. We randomize soldiers to rooms during boot camp. Some soldiers from the majority group (ethnic Norwegian soldiers) share living quarters with at least one minority member, while others live only with members from the majority group. At the end of the boot camp we ran a trust game with real monetary stakes. Soldiers play either against a person with an ethnic minority identity, or against a person from the majority

group. This design allows us to test if close contact with individuals from a minority group causally affects the trust majority members show to a stranger with a minority identity.

The idea that ethnic diversity leads to more prejudice and less social cooperation and civic engagement is denoted the conflict theory, Putnam (2007). Several empirical studies find patterns that are consistent with the conflict theory; more diversity is associated with less trust (Putnam 2007; Dinesen and Sønderskov, forthcoming; Alesina and Ferrara 2000)[1]; people tend to trust those who are similar to themselves (in-group) more than others (out-group) (Alesina and La Ferrara 2002), particularly in situations where they compete with members of other groups for limited resources (Quillian 1995).

Putnam (2007) takes the conflict perspective even further and argues that ethnic diversity may not only lead to more conflict and less trust between the majority and minority groups, it may also be detrimental to trust within the majority group. Putnam (2007) labels this the constrict theory and bases it on findings that less diverse neighborhoods in the US have higher levels of in-group trust. These findings have spurred a debate on how diversity should be conceived and measured (Abascal and Baldassarri 2015). As more diverse US neighborhoods with lower trust levels are also poorer, more nonwhite, and less stable than the more homogenous neighborhoods, it is hard to disentangle the effect ethnic diversity has on

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[1]There is an extensive literature on the effects of ethnic diversity in other domains. For studies on diversity and economic outcomes, see for instance Alesina et al. (2003), Alesina and Ferrara (2005), Alesina, Harnoss, and Rapoport (2016), Easterly and Levine (1997), Collier (2000), and Ashraf and Galor (2013a, 2013b). Another strand of literature study diversity within firms/ organizations, see for instance Rasul and Rogger (2015, 2015, 2016) for studies on bureaucratic efficiency, Lyons (2016) on teams and national diversity, Ottaviano and Peri (2006) on productivity, and Hjort (2014) on team productivity, and Shore et al. 2009 for a review. There is also a literature on ethnic diversity and provision of public goods, see Beach and Jones (2016) for a review.

trust from the effects of these other features of diverse societies.

Against the conflict views on diversity, which emphasizes in-group biases and competition over resources, stands the more optimistic contact theory (Allport 1954). It suggests that personal contact with members of out-groups can reduce prejudice and misperception about out-groups, and thereby increase trust. Contact theory can be expected to apply when certain criteria are met. The contact should take place in a context with equal status, shared common goals, be cooperative, and take place under some form of authority (Pettigrew 1998). Finally, the setting should have friendship potential, as it increases the probability of affective ties and willingness to learn about out-group members (Van Laar et al. 2005). The setting of our experiment, the boot camp in the army, fulfills the conditions for contact theory.

To measure the trust effect of close contact, we use the trust game developed by Berg, Dickhaut, and McCabe (1995). The soldiers can send between 0 and 100 NOK (USD 12) to a stranger either from the out-group (name signaling minority, Ali), or from the in-group (name signaling majority, Morten). The game provides a behavioral measure of trust, in contrast to the survey questions on generalized trust that are often applied.[2] As far as we are aware, this is the first study that has a research design allowing for a causal identification of how close contact between majority and minority members of a society affects trusting behavior across ethnic groups.[3] We also use our data to contrast and combine the conflict

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[2]See Glaeser et al. (2000) and Sapienza, Toldra-Simats, and Zingales (2013) for a discussion on measurement issues associated with survey items.

[3]There is ample evidence from well identified studies using random assignment, either of students (e.g. Boisjoly et al. 2006; Burns, Corno, and La Ferrara 2016) or within the military (Carrell, Hoekstra, and West 2015; Finseraas and Kotsadam 2015; Finseraas et al. 2016), showing that personal contact reduces prejudice.

and contact perspective on ethnic diversity. A greater share of ethnic minorities in a region implies that the majority group is more exposed to minorities, but it does not necessarily imply more of the type of contact that increase social trust. An interesting question is whether contact is especially potent for those who come from regions where ethnic exposure is high at the outset.

We find that individuals randomly assigned to close personal contact with minority soldiers send more to Ali than other individuals. The size of the effect is economically relevant; a one standard deviation difference in the share of minorities in the room implies sending an amount more than 6 percent above the mean. Our data show that there is a negative association between exposure to minorities in the home municipality and trust in minorities. This is in line with the conflict perspective. We also find that the negative relationship between such potentially shallow exposure and out-group trust is reversed for the soldiers that were randomly assigned to close personal contact with a minority soldier.

The rest of the paper is organized as follows: In Section 2 we present the field experiment. In Section 3 the details of the trust game is presented. Section 4 covers our data, and our empirical strategy is derived in Section 5. The result from the regression analysis is presented in Section 6, and discussion and concluding remarks follow in Section 7. Instructions for the trust game and additional analyzes are included in the appendix.

2 Identifying effects of exposure: The Field Experiment

The field experiment involved incoming soldiers of the August 2015-contingent of the North Brigade of the Norwegian Armed Forces (NAF). Their first day in the army was at a military camp close to Oslo. At the camp, the soldiers go through a program of medical and psychological testing and they fill out a survey questionnaire, which constitutes our baseline data.

After completing the program at the camp, soldiers board planes to Northern Norway to start their recruit period. When they arrive in Northern Norway, they are bussed to a number of different military camps where they are assigned to rooms where they live for the eight weeks of the recruit period. During boot camp, working hours doing military activities are intensive, usually 12-15 hours a day. In addition, soldiers are expected to prepare their individual gear and equipment for the following day after ended duty. This leaves the soldiers with few opportunities for personal chores and socializing outside their own room. An average day of boot camp starts with activities within the room, such as cleaning and preparing the room before inspection. The room is also important since it usually constitutes a squad within a platoon in the company. Thus, sharing room during the recruit period constitute intense treatment in the form of personal contact.

The first eight weeks of military service is the basic training period, which is known for strict enforcement of military rules and regulation. During these eight weeks, the soldiers are to wear their uniform 24/7 and are not allowed to sleep outside the base. The first extended leave is normally granted after completion of

the basic training period. Because of the remote location of the bases, the soldiers basically spend all their time with their roommates and fellow conscripts in the company. The context is one where the conditions of contact theory is likely to hold. Soldiers of private rank have equal social status within the army, they share the common goals of their unit, they need to cooperate to solve their tasks, and contact takes place in a context with an explicit, enforcing authority. Moreover, the army explicitly promote views of unity and equality among soldiers of the same rank. After the eight weeks of recruit period the final selection of soldiers for regular infantry or cavalry companies takes place. The soldiers are selected based on their requested position, skills and performance during the recruit period.

We provided the personnel officers in charge of room assignment with an excel sheet which they were instructed to use to randomize soldiers within companies into rooms. The excel sheet randomized soldiers into rooms when the personnel officer entered the list of soldiers in the company and the size of the rooms. A deviation from the randomization protocol was included so that women are allocated to rooms in pairs of two if possible. As a higher share of women serving are ethnic Norwegians we take this into account in our regressions by controlling for sharing room with a female soldier (as this affects the probability of being exposed to a minority soldier). Copies of the excel sheets where emailed to the Norwegian Defense Research Establishment (FFI) for verification. The procedure allows for a construction of a treatment group consisting of soldiers with an ethnic Norwegian background who were randomized into a room with at least one soldier with an ethnic minority background (see definitions of majority and minority backgrounds in Section 4). The control group consists of soldiers who did not share room with an ethnic minority soldier. A high dismissal rate is normal during the recruit

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period. Importantly, we test and confirm that attrition in the panel is unrelated to treatment status (see Appendix Table A.1 and the discussion there).

3   Measuring trust: The trust game

We use a trust game to measure trust. An advantage with using an experiment rather than survey questions to capture trust, is that the trust game captures the essence of trust in economic exchange; there are real money at stakes for the trustor and a substantial surplus is produced if the resources are handed over to the trustee.[4] We are not the first to use a trust game to study whether nationality/ethnicity/other group identities matter for trust (Fershtman and Gneezy 2001; Falk and Zehnder 2013), but with the exception of Goette, Huffman, and Meier (2006), exposure to the out-group is not random in these studies, they are therefore not able to identify the effect of ethnic diversity on trust.

In the standard trust game a person chooses how much to send to an anonymous other person. The amount sent is typically tripled and the receiver decides how much to send back. In our case, the participants (each soldier) received an endowment of 100 NOK (12US$). They could "send" 0, 25, 50, 75 or 100 NOK to a recipient, and we, the experimenters, would triple the amount that was sent to the recipient. The recipient then decided how much of the received money to transfer back to the sender. A translated version of the instructions is included in the Appendix Section A.

Sending money to an anonymous other does not allow for a distinction between

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[4]There is an ongoing discussion about what is captured by general trust questions, see Sapienza, Toldra-Simats, and Zingales (2013) for an overview. In particular, Glaeser et al. (2000) argues that the measures are correlated with trustworthiness rather than trust.

in-group and out-group trust. We therefore ran a modified version of the trust game where the soldiers were told that the recipient (trustee) was a real person living in the eastern part of Norway, that he was recruited by us to take part in the study and that he received NOK 100 just for participating. The trustee had already made a back-transfer decision, contingent on the amount he received.[5] The soldiers were also informed that the person they could send money to knew the structure of the game and that the sender was a soldier in the boot camp in Northern Norway.

In addition to this information, common to all the participants, soldiers were told the name of the recipient. We announced to students at the University of Oslo that we were recruiting people to participate in an experiment. We then recruited two students, one with a typical Norwegian name, and one with a name indicating ethnic minority origin. We randomly varied the name of the trustee; some played the game with Morten (typical Norwegian name) and some with Ali (a name indicating a ethnic minority origin). By randomizing the names (ethnicity) we assure that all other factors that may influence how much a person would send does not vary systematically with the identity of the recipient.[6] Hence, with this design we can estimate to what extent beliefs about trustworthiness vary between

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[5]We use the strategy method to obtain the back-transfer from the trustee (see Stanley et al. 2011, for a similar set-up). There is a discussion in the literature if this method gives different results than the direct response method. In most cases it appears that the choice of method does not matter for the outcomes (Brandts and Charness 2011). In our study the strategy method was the only viable option, and since we are only interested in the senders decision, the way we extract recipients return decision should be of second order importance. It is further unlikely that the strategy method induces a differential impact across our treatment and control groups.

[6]There is a debate about what is measured in the standard trust game. In particular, sending behavior in the standard game is affected not just by the sender's belief in the receivers trust-worthiness, but also by risk aversion and other-regarding preferences such as altruism (Sapienza, Toldra-Simats, and Zingales 2013), as well as inequality aversion and betrayal aversion (Fehr 2009).

the ethnicity of the recipient and, most importantly, to what extent exogenous exposure to a minority modifies the assessment of trustworthiness.

4   Data

The Trust Game

We conducted the experiments with on a subset of 656 subjects in 12 sessions in September 2015. The sessions ranged from 46 to 100 individuals. In our analysis sample we only include observations from companies which have confirmed that they followed our randomization protocol. Individuals with missing information on parents' birthplace and minorities are not included in the analysis, which leaves us with a sample of 594 individuals.

Minority background is defined as born in or having at least one parent being born in South-America, Asia, Oceania, or Africa.[7] 4.2 percent of the experimental sample have minority background. On average, 18.2 percent of the experimental sample share a room with someone with a minority background.

The rooms vary in size, but 72 percent of the sample live in 6 person rooms. Of the 108 treated soldiers, 14 share room with two persons of a minority ethnic background, while the remaining 94 share room with one person of minority background. Since the rooms also vary in size, we have variation in the share of minority exposure in the room, ranging from zero to 40 percent.

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[7]Only Norwegian citizens are allowed to serve in the Armed Forces and hence our minorities are to a large extent second-generation immigrants.

4.1 Control variables and balance

Table 1 presents means on background variables in the four groups which constitute our experiment. We regress being treated in the field experiment on predetermined variables in Table 2. We include company fixed effects in all regressions, since room assignment is randomized within companies. Some coefficients are statistically significant, which is not surprising given the number of variables tested, but most importantly, the F-test of joint significance produces a p-value of 0.97. Thus, we conclude that the background variables do not predict treatment status. In the regressions below we present results both with and without control variables.[8]

As we know where the soldiers are coming from, we also integrate data on municipality and share of immigrants. The municipality immigration share data are provided by Statistics Norway (Table 9817). Immigrants include both immigrants and Norwegian-born to immigrant parents in 2015.[9] Non-western immigration encompass immigrants from countries outside of the EEA/ EU, the US, Canada, Australia, and New Zealand, and our measure of non-western immigration is the sum of these municipality shares of immigrants from these so-called non-western countries.

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[8]In Appendix Tables A.2 and A.3, we report results from regressions of the treatment indicator interacted with recipient in the trust game on the pre-determined variables (one-by-one). We again conclude that randomization has achieved balance.

[9]According to Statistics Norway, immigrants are persons born abroad of two foreign-born parents and four foreign-born grandparents. Norwegian-born to immigrant parents are born in Norway of two parents born abroad, and who in addition have four grandparents born abroad.

Table 1: Background variables and balance across treatment.

	(1) Ali base		(2) Morten base		(3) Ali treat		(4) Morten treat	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mother has high education	0.60	(0.49)	0.63	(0.48)	0.63	(0.49)	0.68	(0.47)
Father has high education	0.75	(0.43)	0.75	(0.43)	0.76	(0.43)	0.80	(0.40)
Mother works	0.91	(0.28)	0.94	(0.24)	0.94	(0.24)	0.93	(0.26)
Father works	0.99	(0.11)	0.99	(0.09)	0.98	(0.14)	1.00	(0.00)
Parents are divorced	0.37	(0.48)	0.32	(0.47)	0.27	(0.45)	0.22	(0.42)
Plan higher education	0.69	(0.46)	0.67	(0.47)	0.69	(0.47)	0.64	(0.48)
Immigration reduces trust	0.66	(0.18)	0.64	(0.19)	0.62	(0.17)	0.61	(0.15)
Immigrants' work ethic	0.68	(0.22)	0.67	(0.21)	0.59	(0.25)	0.66	(0.23)
Immigrants same rights	0.77	(0.19)	0.76	(0.19)	0.69	(0.20)	0.72	(0.18)
Share non-west immig muni	0.07	(0.05)	0.07	(0.05)	0.07	(0.05)	0.08	(0.05)
Lend money to roommate	0.84	(0.13)	0.85	(0.13)	0.85	(0.17)	0.84	(0.17)
General trust	0.69	(0.20)	0.69	(0.20)	0.65	(0.21)	0.67	(0.19)
Helpfulness	0.65	(0.18)	0.65	(0.18)	0.59	(0.17)	0.65	(0.16)
Fairness	0.70	(0.20)	0.68	(0.19)	0.67	(0.15)	0.68	(0.18)
Females	0.12	(0.33)	0.07	(0.26)	0.18	(0.39)	0.11	(0.31)
Share room with women	0.24	(0.43)	0.28	(0.45)	0.26	(0.45)	0.26	(0.44)
N	245		240		51		56	

Note: *Ali base* denotes soldiers from majority rooms who played the trust game with Ali, *Morten base* denotes soldiers from majority rooms who played the trust game with Morten. *Ali treat* denotes soldiers who did share room with minorities who played the trust game with Ali, *Morten treat* denotes soldiers who did share room with minorities who played the trust game with Morten. Background characteristics: *Immigration reduces trust*: "Immigration leads to lower trust between the citizens of a country." Do you agree/ disagree (0-1]. *Immigrants' work ethics*: "In general, immigrants have poorer work ethic than Norwegians." Do you agree/ disagree (0-1]? *Immigrants same rights*: "During the first years of their stay in Norway, immigrants should receive lower social benefits than Norwegians." Do you agree/ disagree (0-1]?. *Municipality's imm. share*: Share of population in municipality with a non-western background. *Lend money to roommate*: "If one of your room mates lost their wallet, would you lend them money?" Unwilling/ willing (0-1]. *General trust*: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?", distrust/ trust (0-1]. *Helpfulness*: "Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves?", not helpful/ helpful (0-1]. *Fairness*: "Do you think most people would try to take advantage of you if they got the chance, or would they try to be fair?", unfair/ fair (0-1]. *Treated with gender*: Share of male majority soldiers who also share room with female soldier.

Table 2: Living in an ethnically mixed room and pre-determined variables.

	(1) coef	(2) t-stat
Mother has high education	0.04	(1.18)
Females	0.06	(0.86)
Father has high education	0.04	(1.20)
Mother works	0.01	(0.22)
Father works	-0.01	(-0.06)
Parents divorced	-0.07*	(-1.97)
Plan higher education	0.00	(0.09)
Immigration reduces trust	-0.09	(-1.16)
Lend money to roommate	0.01	(0.08)
General trust	-0.01	(-1.15)
Trust: helpfulness	-0.02**	(-2.60)
Trust: fairness	-0.01	(-0.81)
Immigrants' work ethic	-0.04**	(-2.02)
Immigrants same rights	-0.02	(-1.49)
Treated with gender	0.00	(0.01)
Observations	592	
Company FE	Yes	
Session FE	Yes	
F-test of joint significance	0.00	
	(p=0.97)	

Note: t-values adjusted for room clustering, *** p<0.01, ** p<0.05, * p<0.1. OLS regressions. Each row presents the results from one regression. Company and session fixed effects are included in all regressions.

Representativeness of the Sample

Norway has military conscription, but the military's demand for soldiers is lower than the size of the age cohorts. The soldiers are therefore positively selected on background characteristics such as grades in high school and physical capacity. Motivation for military service also weigh in when selecting soldiers and a majority of the soldiers are therefore doing military service voluntarily. According to a previous survey, 34 percent of the soldiers are unsure of whether they would have served in the military if it was completely voluntary. The positive selection into the army does not invalidate our experiment, but it might have consequences for the external validity of our results. In particular, the selection of (majority as well as minority) soldiers is a factor that should be considered when generalizing the results. Another factor is the special setting in which the interaction occurs. Despite the fact that the military stresses the importance of ethnic diversity in recruiting personnel, ethnicity is not a common subject among the conscripted personnel. Furthermore, from talking with officers in the infantry companies, we have no reasons to believe that soldiers and officers are biased in their expectation on mixed-squad performance.

Finseraas and Kotsadam (2015) compare the soldiers of the 2014 contingent to a sample of men aged 18-30 years from the general population, and they find that the soldiers have more liberal attitudes towards immigrants. In particular, they are more likely to think that immigrants should have the same rights as Norwegians, and they are less likely to think that immigrants have poorer work ethics. There is no difference between the general population and the recruits regarding a question on the overall benefits of immigration, however. With respect to the minority soldiers, we know that most of them are second-generation immigrants. Furthermore,

they are likely to be better integrated than a random sample of second-generation immigrants. For instance, the share having mothers that are working is higher for our soldiers than in the population of second-generation immigrants in general.

To check if our soldier sample differ from the general population with respect to trust we collected answers to three general trust questions at baseline. Since these questions also appear in the European Social Survey (ESS)[10], we can compare the soldiers' answers to those of young Norwegian males aged between 18 and 30. We also define majority and minority according to the same criterions as for the soldiers to ensure comparability. We find that ethnic Norwegian soldiers are similar to the general population. Soldiers from the majority group report trust levels within the range of the ESS distribution with one exception (the soldiers are more inclined to think that people are helpful). The minority soldiers report trust levels that are higher on both the generalized trust question and the question regarding whether most people try to be helpful. The results are displayed in Figure A.4 in the appendix. Hence, we conclude that our sample of soldiers are slightly more trusting than the sample in the ESS surveys and the immigrant soldiers are more selected with respect to beliefs about trustworthiness. We return to the implications of this selection for the external validity of our results in the conclusion.

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[10]The questions are the following: *Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?*; *Do you think most people would try to take advantage of you if they got the chance, or would they try to be fair?*; *Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves?*

5 Empirical strategy

Identifying peer effects is difficult as people self-select into networks and outcomes are affected by correlated effects (Manski, 1993). With random variation in peer contact we get around most of the challenges associated with identifying network effects. Nonetheless, as Angrist (2014) points out, even with random exposure it is important to separate the ones providing exposure from the ones affected by it. We therefore restrict the sample to ethnic Norwegians only and estimate the following regression:

$$Sent_{irt2} = \beta_1 Treated_r + \alpha_J + \gamma_S + \beta_1 X_{irt1} + \epsilon_{irt}, \tag{1}$$

where i indexes individuals, r rooms, t is time (either baseline 1 or follow up 2), J company, S session, $Sent_{irt2}$ is the amount sent, $Treated_r$ is a dummy equal to 1 if this person shares room with a minority soldier (or the share of minority soldiers in some specifications), X_{irt1} is a set of individual level control variables measured at baseline (described in section 4.1), and the error term, ϵ_{irt}, is clustered at the room level as treatment is at this level. The company fixed effects are included as the randomization was conducted within companies and session fixed effects are included to remove the influence of common experiences during the lab session. To increase precision we add a vector of individual level controls, including demographics and attitudes at baseline. These control variables are all in the form of indicator variables. We show results with and without controls.[11]

The regression is estimated separately for sending to Ali and to Morten, but

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[11]We create an indicator for missing values in the controls and include the missing indicator in regression in order not to lose observations.

we also present results from an interaction model that tests the difference across the models.

6 Empirical results

6.1 Main results

The main results are presented in Table 3. The table presents OLS regression results of equation (1) using amount sent in the trust game as the dependent variable. The mean amount sent, reported at the bottom of the table, is similar across treatment states and is around 70 NOK, i.e. 70 percent of their endowment. This number is high relative to previous research using the trust game, but comparable to what has previously been found in Scandinavia.[12]

In column 1 of Table 3, we see that individuals that share room with a minority soldier sends around 10 NOK more to Ali. In column 2 we add the controls, and we see that the estimates are very similar. Hence, we find that treated individuals seem to send more to Ali, but the results are only statistically significant at the 10 percent level. In columns 3-4, we show the same regressions but with sending to Morten as the dependent variable. The treatment effect is smaller, but it is not negative as suggested by the constrict theory. The last two columns show the results of the interaction model. Here we find that the difference between those in the treatment group who played against Ali (Treated*Ali) and those in the control

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[12]In a meta study of the trust game, Johnson and Mislin (2011) find that there are large variations in how much subjects send on average, ranging from 22 to 96 percent of the total amount, but the average is equal to 50 percent of the endowment. The average fraction sent is 74 percent in the four studies from Sweden included in their review. Johnsen and Kvaløy (2016) also find that Norwegian students on average send 71 percent of their endowment.

group who played against Morten (omitted group) is not statistically significant.

The share of minority soldiers among the roommates vary from zero to 40 percent (see Table A.5). In Table 4, we investigate whether the share matters for how much the soldiers are sending to Ali/Morten. The dependent variable is as before how much they sent in the trust game. The variable share of minority soldiers is standardized (with mean zero and standard deviation one) in order to simplify interpretation. We see in the first column that the share of minority soldiers in the room is positively associated with trust towards an out-group member, Ali. Adding controls does not change this result. In columns (3) and (4) we study the amount sent to Morten, and find that intense contact with out-group members does not affect their trust in a stranger from the in-group. In columns (5)-(6) we interact the variables, and find that a one standard deviation difference in the share of minority soldiers in the room implies higher trust in an out-group stranger by NOK 4.9. The result is significant at the 10 percent level in column 6 where control variables are added.

Table 3: Amount sent in the trust game and contact.

VARIABLES	(1) Ali	(2) Ali	(3) Morten	(4) Morten	(5) All	(6) All
Treated	9.92*	10.82*	2.65	2.46	1.72	1.09
	(5.36)	(5.90)	(7.03)	(6.90)	(6.84)	(6.24)
Treated*Ali					7.52	11.03
					(8.21)	(7.27)
Ali					-0.66	0.14
					(3.01)	(3.25)
Observations	296	296	296	296	592	592
R-squared	0.06	0.23	0.08	0.26	0.06	0.14
Company FE	yes	yes	yes	yes	yes	yes
Session FE	yes	yes	yes	yes	yes	yes
Individual controls	no	yes	no	yes	no	yes
Mean trust	71.45	71.45	71.28	71.28	71.37	71.37
SD trust	36.54	36.54	35.99	35.99	36.23	36.23
Mean treated	0.17	0.17	0.19	0.19	0.18	0.18
SD treated	0.38	0.38	0.39	0.39	0.39	0.39

Note: Robust standard errors in parentheses clustered on rooms, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. OLS regressions. The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. Regressions (1)-(2) only include observations from the out-group treatment (Ali), regressions (3)-(4) only include observations from the in-group treatment (Morten). Regressions (5)-(6) include observations from both treatments. Mean and standard deviation of dependent and independent variables below. Control variables include whether mother/ father work, mother's/ father's education, whether parents are divorced, the soldier's educational plans, attitudes towards immigration, response to questions regarding trust, and whether they share living quarters with female soldiers.

Table 4: Amount sent in the trust game and the extent of contact - share of minority soldiers in the room.

VARIABLES	(1) Ali	(2) Ali	(3) Morten	(4) Morten	(5) All	(6) All
Share of minority soldiers	4.23**	4.55**	0.46	0.11	0.24	-0.15
	(2.02)	(2.24)	(2.70)	(2.64)	(2.61)	(2.42)
Share of minority soldiers*Ali					3.64	4.93*
					(3.03)	(2.67)
Ali					0.70	2.13
					(2.79)	(2.91)
Observations	296	296	296	296	592	592
R-squared	0.07	0.23	0.08	0.26	0.06	0.14
Company FE	yes	yes	yes	yes	yes	yes
Session FE	yes	yes	yes	yes	yes	yes
Individual controls	no	yes	no	yes	no	yes
Mean trust	71.45	71.45	71.28	71.28	71.37	71.37
SD trust	36.54	36.54	35.99	35.99	36.23	36.23
Mean share	-0.02	-0.02	0.02	0.02	0.00	0.00
SD share	0.98	0.98	1.02	1.02	1.00	1.00

Note: Robust standard errors in parentheses clustered on rooms, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. OLS regressions. The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. Regressions (1)-(2) only include observations from the out-group treatment (Ali), regressions (3)-(4) only include observations from the in-group treatment (Morten). Regressions (5)-(6) include observations from both treatments. Mean and standard deviation of dependent and independent variables below. Control variables include whether mother/ father work, mother's/ father's education, whether parents are divorced, the soldier's educational plans, attitudes towards immigration, response to questions regarding trust, and whether they share living quarters with female soldiers.

6.2 Integrating the conflict and contact perspectives

At the face of it, our results appear to refute the conflict theory. It is, however, important to note that contact and exposure is, or can be, two very different things that may have completely different effects on out-group trust. The conflict view on diversity depicts a situation in which the majority group and the minorities are segregated, although they live in the same area: There is exposure but not contact. It is interesting to see if we find the same pattern in our data, and especially if contact can change this relationship. Carrell, Hoekstra, and West (2015) find the largest effect of exposure for whites coming from American states with a low share of African Americans. Burns, Corno, and La Ferrara (2016), on the other hand, find similar effects of exposure for South African students having been exposed to different degrees of racial heterogeneity during their high school education.

Figure 1 depicts how trust towards Ali/Morten vary with previous exposure, measured by the share of non-western immigrants in the soldiers' home-municipalities. In the left panel we group all soldiers in the main sample into equal sized bins within each treatment based on the immigrant share. People send about the same to Morten (in blue) irrespective of what municipality they come from. However, they send less to Ali (in red) if they come from a municipality with a relatively high share of immigrants. These results are consistent with the conflict hypothesis. In the right panel of the figure we group the sample into three equal sized bins by treatment. Trust towards Ali is still considerably lower for the subjects from the most diverse municipalities.
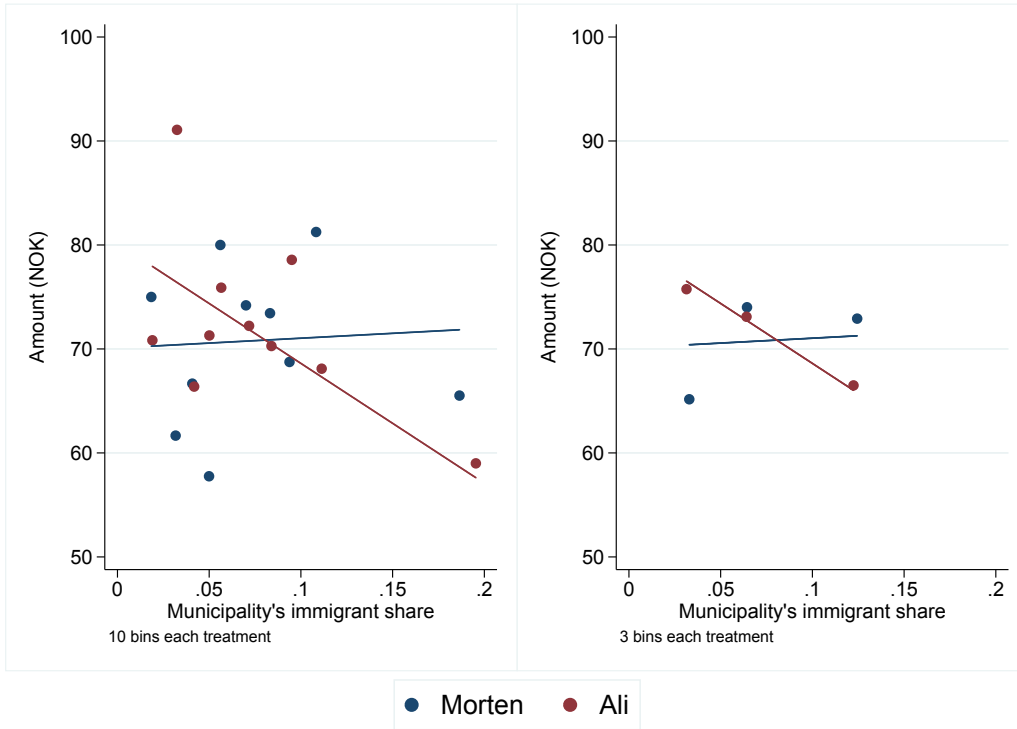
Figure 1: Trust and previous exposure.

Note: Note: Amount sent in NOK on vertical axis, share of immigrants in the municipality on the horizontal axis. Subjects in main sample are grouped into equal sized bins within each treatment based on the municipality's immigration share. 10 bins each treatment: Each dot represents the average trust and average immigration share for about 30 soldiers. 3 bins each treatment: Each dot represents the average trust and average immigration share for about 100 soldiers.

We investigate this relationship more formally in Table 5. The dependent variable is as before how much they send to Ali/Morten (in NOK). *Municipality's immigrant share* gives the average non-western immigration share in each soldier's home-municipality, and is standardized to simplify interpretation. In column (1) we see that an increase in the municipality's immigrant share by one standard deviation reduces trust towards Ali by NOK 5.34, which corresponds to a 7 percent reduction from the mean. The result is similar when we add control variables

in column 2. We do not find any significant relationship between trust towards Morten and the municipality's immigrant share in columns (3)-(4). In columns (5)-(6) we interact sending to Ali with share of immigrants and we see that the relationship between amount sent to Morten and Ali is statistically significantly different as a function of municipality level immigrant share.

People are not randomly assigned to different municipalities, hence we do not interpret the relationship as a causal effect of shallow exposure. Nonetheless, the results show that soldiers from municipalities with a high share of immigrants send less to Ali, a pattern that is consistent with conflict theory and with the findings from previous literature.

A crucial component of contact theory is friendship potential. It is therefore interesting to investigate whether actual friendship with immigrants moderates the relationship between municipality level exposure and trust in Ali. One way of doing this is to split the sample into two groups based on how many minority friends they had in high school. In Table 6 we again regress how much money is sent to Ali on the share of immigrants in the municipality but split the sample into those having few or no minority friends in high school (columns 3 and 4) and those with many minority friends (columns 1 and 2). The negative coefficient for immigrant share in the municipality is larger and statistically significant only for the soldiers who have few or no immigrant friends. It is naive, however, to give this finding a causal interpretation, as it is likely to be driven by selection: People choose their friends, it is less likely that people with a high degree of mistrust towards immigrants would have many immigrant friends.[13]

Our design with random assignment to rooms allow us to estimate how close

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[13]Furthermore, the difference between the two groups is not statistically significant.

Table 5: Testing the conflict hypothesis: Amount sent in the trust game and previous exposure.

| | Sent amount in trust game | | | | | |
| | (1)
Ali | (2)
Ali | (3)
Morten | (4)
Morten | (5)
All | (6)
All |
VARIABLES						
Municipality's immigrant share	-5.34*	-5.65*	1.60	2.51	1.40	1.70
	(2.77)	(3.02)	(2.39)	(2.49)	(2.32)	(2.18)
Ali					0.46	1.71
					(2.82)	(2.91)
Mun.'s imm. share*Ali					-6.94*	-8.39**
					(3.60)	(3.37)
Observations	296	296	296	296	592	592
R-squared	0.07	0.23	0.09	0.27	0.07	0.13
Company FE	yes	yes	yes	yes	yes	yes
Session FE	yes	yes	yes	yes	yes	yes
Individual controls	no	yes	no	yes	no	yes
Mean trust	71.45	71.45	71.28	71.28	71.37	71.37
SD trust	36.54	36.54	35.99	35.99	36.23	36.23
Mean Muni share	-0.02	-0.02	0.02	0.02	0.00	0.00
SD Muni share	1.01	1.01	0.99	0.99	1.00	1.00

Note: Robust standard errors clustered on rooms in parentheses, *** p<0.01, ** p<0.05, * p<0.1. OLS regressions. *Treated* denotes soldiers who shared living quarters with minority soldiers. *Share* denotes municipality share of immigrants with non-western background (2014), and *Treated*Share* is the interaction variable.

contact with immigrants causally interact with the immigration share in home municipality. The left panel of Figure 2 depicts how sending to Ali in the trust game varies with immigration share for those who lived in a mixed room (are treated) and those who lived in a non-mixed room. In the right panel, we show sending to Morten by treatment status. The patterns in the two panels are completely different: Close contact annuls, even turns around, the negative correlation between municipality diversity and trust in an out-group member for those who do not share a room with a minority member. Minority shares in the municipality where one lives is not correlated with trust to an in-group member, and being treated does not reduce the level the level of in-group trust, rather the opposite.

Table 7 reports regression results for how the relationship between the share of immigrants in the home municipality and trust is affected by treatment. We interact the share variable and the treatment dummy, and find that within the control group, trust decreases in the share of immigrants, while the relationship is the opposite for the treatment group. We run the same regressions for those who were given the in-group player (Morten), and we again see that share of immigration in the home municipality is uncorrelated with in-group trust and that treatment does not lower it. If anything, there is a positive interaction also for in-group trust and the coefficient is statistically significant at the 10 percent level in column 4 where controls are included.

Table 6: Sent amount in trust game and minority friends in upper secondary school.

	(1) Ali w/friends	(2) Ali w/friends	(3) Ali w/o friends	(4) Ali w/o friends
Municipality's immigrant share	-3.44	-2.20	-8.23**	-8.76**
	(3.44)	(4.16)	(3.69)	(3.55)
Observations	147	147	149	149
R-squared	0.12	0.38	0.17	0.47
Company FE	yes	yes	yes	yes
Session FE	yes	yes	yes	yes
Individual controls	no	yes	no	yes
Mean trust	70.24	70.24	72.65	72.65
SD trust	37.62	37.62	35.52	35.52
Mean Muni share	0.23	0.23	-0.26	-0.26
SD Muni share	1.10	1.10	0.85	0.85

Note: Robust standard errors in parentheses clustered on rooms, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. OLS regressions. The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. Regressions (1)-(4) only include observations from the out-group treatment (Ali). Regressions (1)-(2) only include observations who reported that they had more than few/ no friends (*w/friends*) with minority background during upper secondary school. (3)-(4) only include observations who reported that they had few/ no friends (*w/o friends*) with minority background during upper secondary school. Control variables include whether mother/ father work, mother's/ father's education, whether parents are divorced, the soldier's educational plans, attitudes towards immigration, response to questions regarding trust, and whether they share living quarters with female soldiers.
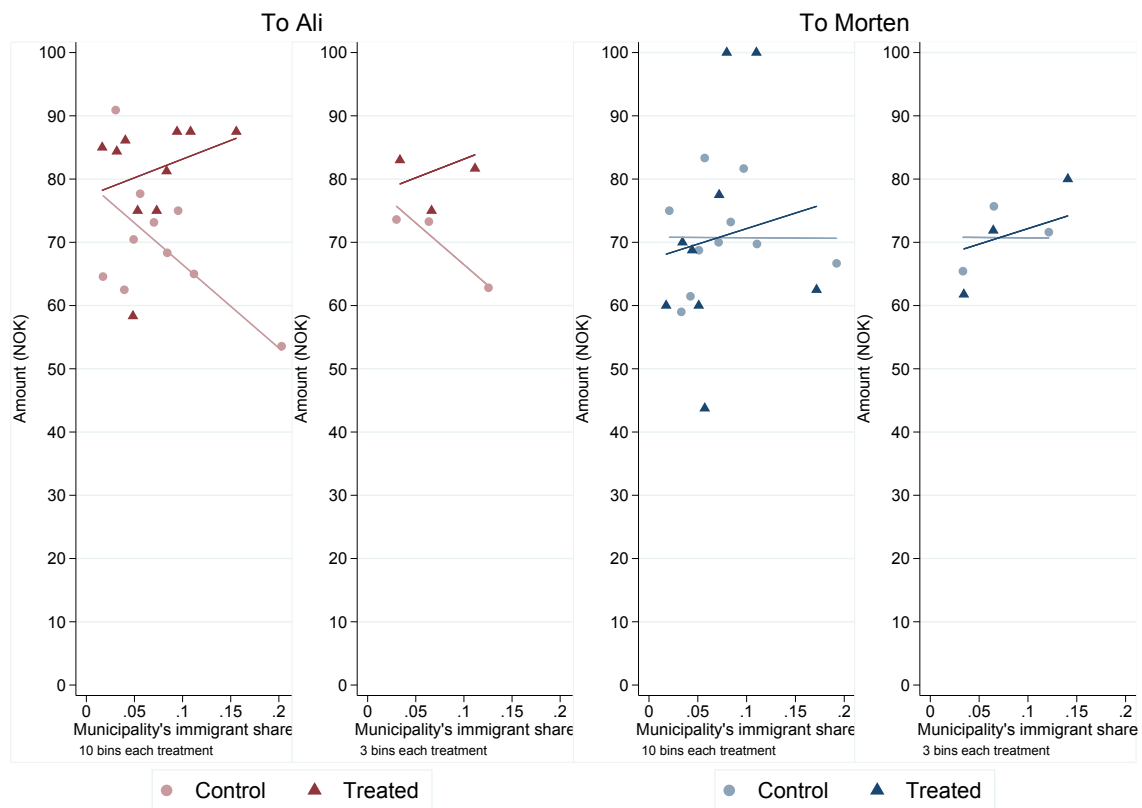
Figure 2: Amount sent in the trust game and share of immigrants

Note: Note: Amount sent in NOK on vertical axis, share of immigrants in the municipality on the horizontal axis. Dark red line captures those who received the Ali treatment who lived in mixed rooms. Light red line illustrates observations from homogenous rooms in treatment Ali. Dark blue line captures those who received the Morten treatment who live in mixed rooms/ treated. Light blue captures those in Morten treatment from homogenous rooms. Subjects in main sample are grouped into equal sized bins within each treatment based on the municipality's immigration share. 10 bins each treatment: Each dot represents the average trust and average immigration share for around 25 subjects in the control group, and around 5 subjects in treatment group. 3 bins each treatment: Each dot represents the average trust and average immigration share for about 80 subjects in control, and 17-19 subjects in treated.

27

Table 7: Integrating the conflict and contact hypotheses: Amount sent, treatment status, and share of immigrants in the home municipality

	(1) Ali	(2) Ali	(3) Morten	(4) Morten
Treated	10.28*	11.26*	3.06	3.12
	(5.24)	(5.74)	(6.98)	(6.48)
Municipality's immigrant share	-6.48**	-7.70**	1.27	0.68
	(3.04)	(3.29)	(2.41)	(2.59)
Municipality's immigrant share*Treated	8.63*	14.50**	1.58	11.69*
	(5.00)	(6.85)	(6.82)	(5.94)
Observations	296	296	296	296
R-squared	0.09	0.26	0.10	0.28
Company FE	yes	yes	yes	yes
Session FE	yes	yes	yes	yes
Individual controls	no	yes	no	yes
Mean trust	71.45	71.45	71.28	71.28
SD trust	36.54	36.54	35.99	35.99
Mean Muni share	-0.02	-0.02	0.02	0.02
SD Muni share	1.01	1.01	0.99	0.99

Note: Robust standard errors clustered on rooms in parentheses, *** p<0.01, ** p<0.05, * p<0.1. OLS regressions. *Treated* denotes soldiers who shared living quarters with minority soldiers. (1)-(2) only include observations in out-group treatment Ali, (3)-(4) only include observations in in-group treatment Morten.

6.3 Playing the trust game with roommates

An interesting feature of our field experiment is that it creates small social units with different levels of ethnic heterogeneity. Hence, by analyzing trusting behavior within the room unit, we can assess how ethnic heterogeneity within groups affects trust. To explore this question, we let the soldiers play an incentivized trust game with their roommates. We told them that we first randomly draw a sender, who we would match with a randomly drawn responder within the room (in each session). We simplified this trust game to amounts of zero, NOK 50, and NOK 100. In essence, we are now testing whether people trust another member of their group more or less if that group is more or less ethnically heterogeneous.

We see in Table 8 that the average amount sent is much higher when sending to someone in your own room; the soldiers send over 88 percent of the total endowment. We also see in column (1) that soldiers from mixed rooms trust more than soldiers from majority rooms do. In (2) we add controls, and the result holds. Columns 3 and 4 show that trust increases as the share of minority soldiers increase within each room.

Table 8: Sent amount in incentivized trust game within room

VARIABLES	(1) Trust	(2) Trust	(3) Trust	(4) Trust
Treated	3.92*	3.67*		
	(2.10)	(2.07)		
Share of minority soldiers			1.62**	1.46**
			(0.74)	(0.73)
Observations	590	590	590	590
R-squared	0.06	0.13	0.06	0.13
Company FE	yes	yes	yes	yes
Session FE	yes	yes	yes	yes
Individual controls	no	yes	no	yes
Mean trust	88.22	88.22	88.22	88.22
SD trust	24.92	24.92	24.92	24.92
Mean ind.var.	0.18	0.18	0.00	0.00
SD ind.var.	0.39	0.39	1.00	1.00

Note: Robust standard errors clustered on rooms in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The dependent variable is how much they send to a fellow roommate in NOK. *Treated* denotes soldiers from mixed rooms, *Share of minority soldiers in room* is the standardized variable of share of minority soldiers within each room (mean 0, sd 1).

6.4 Heterogeneous effects

So far, we have investigated how living and working together with a minority soldier affects trust. We have also seen that the effects are different for people coming from different municipalities. In this section, we investigate heterogeneous effects further along two dimensions: the skills of the minority soldiers and the baseline attitudes of the majority soldiers. Do highly skilled minority soldiers affect their fellow roommates in a different manner compared to low-skilled minority soldiers? Similar to Burns, Corno, and La Ferrara (2016) and Carrell, Hoekstra, and West (2015), we use a measure of the soldiers' academic achievement - the soldiers' self-reported average GPA during the last year of upper secondary school. Figure 3 shows the distribution for the average GPA for minority and majority soldiers in our sample. There is less spread in the variation of GPA for minority soldiers but otherwise the distributions are very similar.

In Table 9 we test whether the GPA of the minority roommate affect the trust level of the majority soldiers in the trust game. We divide the treated soldiers into two equally sized groups of those with a minority roommate with a relatively high and a relatively low GPA score. We compare these two groups with the control group. We see in (1) and (3) that the academic achievement of the minority roommate does not affect trust in Morten. However, we see that there is a positive and significant association between trust in Ali and living and working together with a minority soldier in the upper part of the academic distribution, while there is no treatment effect if the minority soldier has a low GPA. With controls, the difference between high GPA and low GPA is statistically significant.
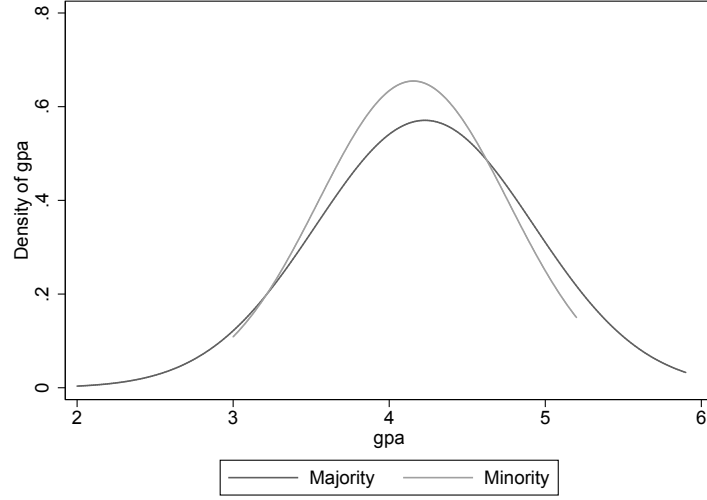
31

Figure 3: GPA distribution, by majority/ minority.

Table 9: Minority roommates GPA and trust.

VARIABLES	(1) Mort	(2) Mort	(3) Ali	(4) Ali
High GPA	3.34	0.45	15.86**	18.07**
	(15.64)	(13.69)	(7.35)	(7.30)
Low GPA	0.58	1.51	2.12	-2.17
	(6.26)	(6.83)	(7.17)	(7.80)
Observations	296	296	296	296
R-squared	0.09	0.26	0.07	0.23
Company FE	Yes	Yes	Yes	Yes
Session FE	yes	yes	yes	yes
Individual controls	no	yes	no	yes
Mean dep.var.	71.28	71.28	71.45	71.45
SD dep.var.	35.99	35.99	36.54	36.54

Note: Robust standard errors in parentheses clustered on rooms, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. OLS regressions. The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. Regressions (1)-(2) only include observations from the in-group treatment (Morten), (3)-(4) only include observations from the out-group treatment (Ali). High GPA is an indicator for those whose minority roommate have a high GPA score, low GPA is an indicator for those whose minority roommate have a low GPA score. We first present the results without controls in columns 1 and 3, then we add the standard controls used throughout the paper in columns 2 and 4.

Our results are similar to the results of Carrell, Hoekstra, and West (2015), who find that the effect of sharing a room with a high aptitude black student has a larger positive effect than sharing a room with a low aptitude black student on future cross-racial roommate matches in The United States Air Force Academy. Burns, Corno, and La Ferrara (2016) also study roommate matching of white and black students in South Africa. They use their baseline data to measure pre-existing beliefs about the academic ability of black students and hence, have a more refined measure of belief updating potential based on the actual ability of the roommate. They measure beliefs and prejudice by two different implicit association tests, one regarding academic abilities and one regarding positive and negative attributes in general. They find that only white students who are positively surprised change their implicit bias about the relative academic ability of blacks. For the more general bias, there was a reduction for all exposed white students, irrespective of the academic ability of the roommate. We do not have any measure on initial beliefs about trustworthiness for our soldiers, but we can investigate whether the treatment is affecting different people differently depending on their baseline attitudes towards immigration and immigrants. In the baseline survey we collected two questions related to attitudes towards immigration: *In general, immigrants have poorer work ethic than Norwegians*; and *During the first years of their stay in Norway, immigrants should receive lower social benefits than Norwegians*. We create an index based on these questions and define those who overall disagree with these statements as liberals (257 individuals). The ones who overall agree with these statements are classified as conservatives (335 individuals). We realize that this labelling is somewhat inaccurate since the index captures a mix of concerns, beliefs and policy positions on immigration, but we use it in lack

of better alternatives.[14]

In (1), we see that non-treated conservatives do not trust Morten more or less than liberals, and living in a mixed room does not affect the level of trust of liberals (captured by the Treated dummy) and the effects is not statistically significantly different for conservatives (as captured by the interaction term). In (3) we run the same regression for those who played the trust game with Ali. We see that conservatives from homogenous rooms do not differ from liberals from homogenous rooms, i.e. those expressing skeptical views in the survey do not send less to Ali in the trust game. Living in a mixed room increases trust in Ali significantly for liberals, but not for conservatives, as the interacted effect from being treated and conservative is negative, and of similar magnitude as the coefficient for treated. Hence, treatment affected the liberals, but did not affect those expressing less liberal views at baseline. As individuals from municipalities with many immigrants are on average are more liberal, see Table A.6 in the appendix, we also control for the municipality's immigration share in (2) and (4). Reassuringly, we see that the coefficients do not change much.

The heterogeneity results we uncover are not completely consistent with any single model of prejudice reduction. The original formulation of the contact theory proposes that contact will reduce prejudice because negative stereotypes will be corrected when majority members have contact with representative minority members (Pettigrew 1998). Thus, a possible prediction is then that those holding negative views will react more strongly to treatment (see Carrell, Hoekstra, and West (2015, 11) for evidence consistent with this mechanism). However, later re-

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[14]The results are very similar if we also include a third question: *Immigration leads to lower trust between the citizens of a country.* As this question is even further away from any policy or perception of immigrants we choose to keep it out, however.

search in cognitive psychology on how people process new information questions the importance of learning as a mechanism for why contact might reduce prejudice (Pettigrew 1998, 70). According to this line of research, people holding negative predispositions will not react to contact unless the information shock is very large. Pettigrew (1998) lists three other mechanism, which can explain why contact causes less prejudice. One is a reshaping of the view of the in-group. This mechanism is apparently not at work here, as we find no effect of treatment for those playing against Morten. A second mechanism is the generation of affective ties; Contact creates friendships which spill-over to positive views on the out-group. This mechanism is plausibly at play in our case but does not explain why only liberals are affected, unless they are the only ones becoming friends with the minority soldier. The third mechanism is changing behaviour in response to contact. The claim is that behavioural change happens prior to attitudinal change, and will then cause attitudinal change if there is a dissonance between behaviour and attitude. The trust game measures behaviour, thus this mechanism is clearly in play for the liberal part of the sample. However, contact will not decrease prejudice, since it is those with liberal views that respond to treatment, thus few of those responding to treatment will experience dissonance between behaviour and attitude.

Table 10: Attitudes towards immigration/ immigrants and trust.

	(1) Mort	(2) Mort	(3) Ali	(4) Ali
Conservative	-0.15	-0.24	4.94	3.69
	(4.58)	(4.70)	(5.06)	(4.95)
Treated*conservative	7.17	7.00	-18.87*	-18.41*
	(10.81)	(10.72)	(10.20)	(10.68)
Treated	-1.92	-1.35	22.92***	22.31**
	(11.73)	(11.51)	(8.34)	(8.79)
Municipality's immigrant share		1.54		-5.15*
		(2.45)		(2.72)
Observations	296	296	296	296
R-squared	0.09	0.10	0.07	0.09
Company FE	yes	yes	yes	yes
Session FE	yes	yes	yes	yes
Individual controls	no	no	no	no
Mean	71.28	71.28	71.45	71.45

Note: Robust standard errors in parentheses clustered on rooms, *** p<0.01, ** p<0.05, * p<0.1. OLS regressions. The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. Regressions (1) and (2) only include observations from the in-group treatment (Morten), (3) and (4) only include observations from the out-group treatment (Ali). Municipality's immigrant share standardized with mean 0 and standard deviation 1.

7 Concluding remarks

Based on previous literature on the relationship between trust and ethnic diversity we would expect that increasing diversity leads to lower trust (Putnam 2007; Dinesen and Sønderskov, forthcoming; Alesina and Ferrara 2000). There are, however, three important limitations to existing literature that we address using a combined lab and field experiment.

The first limitation concerns biases arising from endogeneity issues. The worry that the correlations between diversity and trust are driven by selection, reverse causality, or both looms large in the previous literature. People self-select into neighborhoods and controlling for selection by including observables is likely to be insufficient. To date, there is no study using exogenous variation to identify the causal effect of diversity on trust. Our research design, involving a randomized field experiment, allows us to make causal inferences.

The second shortcoming of previous literature is a conceptual conflation of exposure and contact. While living in an area with many immigrants increases exposure, it does not necessarily increase contact. A consensus has emerged in social psychology that shallow exposure need not produce the same beneficial effects, instead it is likely to cause opposite effects due to competition about jobs, resources, and cultural hegemony (see Pettigrew 1998 for a review). We investigate the correlations between ethnic diversity in soldiers' municipality of upbringing and trust, and replicate the frequently found result that there is less out-group trust among people from more diverse areas. Well identified studies have shown, however, that close personal contact reduces prejudice (e.g. Boisjoly et al. 2006, Burns et al. 2016, Carrell et al. 2015, Finseraas and Kotsadam 2015, and Finseraas

et al 2016), illustrating the danger of conflating exposure and contact. Our field experiment takes place in a setting which should produce the beneficial effects of contact, and we show that contact overturns the negative correlation between exposure and trust.

The third limitation regards the measurement of trust. Most previous literature on the effects of diversity on trust relies upon survey questions on general trust. There is a debate about what these questions really measure (Sapienza, Toldra-Simats, and Zingales 2013), and some argue that they are correlate with trustworthiness rather than trust (Glaeser et al. 2000; Sapienza, Toldra-Simats, and Zingales 2013). We instead measure trust by conducting an incentivized trust game with both real incentives and people, which provides us with a behavioral measure of trust. More importantly, the generalized trust questions do not separate between in-group and out-group trust. We focus on majority individuals and let them send money to either Ali (signaling out-group) or Morten (in-group). This allows us to test if the correlations as well as the effects are different for in- and out-group trust.

We find that close contact increases trust in Ali, in particular for those from municipalities with a high share of immigrants. The policy implications of the results depend on subjective opinions on the external validity of the findings. In particular, three factors are important in this respect. Firstly, our sample consists of special representatives of the Norwegian population. While military service was mandatory for men in Norway 2015 (from 2016, it is mandatory for both men and women), conscription was based on need, and only about one in six men were needed in duty. The military thereby select people based on ability and motivation. When we compare our sample to other young Norwegians they seem relatively

similar, but they are somewhat more progressive with respect to their attitudes toward immigrants and they seem somewhat more trusting. Secondly, the soldiers are exposed to a highly selected set of immigrants. They are mostly second-generation immigrants, and even as compared to second-generation immigrants in general, they are likely to be better integrated. For instance, their mothers are more likely to work than the mothers of second-generation immigrants in general. Thirdly, and perhaps most important, the setting under which contact occurred is very special. Although the context of our study is in part a necessity for deriving clear theoretical expectations and while it assures a strong internal validity, it restricts external validity to contexts with some similarity to ours. The structure of contact at workplaces, in classrooms, and in team sports are weaker and less streamlined which might imply that treatment effects from direct contact might be weaker than what we find. We strongly urge future studies to vary these different components in order to create a more general knowledge.

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A   The trust game

In this task, you can make money in the form of a gift certificate. Below we explain how the sum of the gift card is determined. We randomly draw one participant from each session to receive gift cards. The amount on the gift card is determined by two choices: Your choice and **Ali**/**Morten**'s choice.

Ali/**Morten** is a real person, living in Eastern Norway, who has signed up as a volunteer to participate in tasks of this sort. **Ali**/**Morten** gets 100 NOK to participate. You do not know his full name or age, and he knows only that he is playing against a recruit in Northern Norway. We write more about his role later. First, we will explain you what to do.

You get 100 NOK. You can choose whether to send all, or part of the amount to **Ali**/**Morten**. We who conduct the survey will then triple the amount you send to **Ali**/**Morten**. He thus receives three times what you choose to send. If you send the whole amount, 100 NOK, **Ali**/**Morten** receives 300 NOK. If you send 50 NOK, Ali gets 150 NOK. If you send 0 NOK, Ali gets 0 NOK.

Ali/**Morten** then selects how much of the money he will return. The amount **Ali**/**Morten** returns to you will not be tripled, and it is up to him how much to return to you: If you choose not to send anything, you get 100 kroner and **Ali**/**Morten** gets 100 kroner. If you send 100 NOK and **Ali**/**Morten** returns 150 NOK, you get 150 NOK and **Ali**/**Morten** gets 250 NOK. If you send 50 NOK and **Ali**/**Morten** returns 25 NOK, you get 75 NOK and **Ali**/**Morten** gets 225

NOK. If you send 100 NOK and **Ali/Morten** do not return anything, he gets 400 and you get 0.

How much do you send to **Ali/Morten**? Circle the amount of your choice: 0, 25, 50, 75, 100.

B   Attrition

We have two sources of attrition. One source is due to people leaving the population because they are discharged from the military. We use these observations to calculate room characteristics, but they are otherwise discarded. The second is due to missing data.

We check whether attrition is related to treatment status by regressing attrition on the treatment dummy variable. We can see in column (1) in Table A.1 that there is no significant relationship between treatment and attrition. In column (2) we control the set of controls used in the main analysis in the paper and the results do not change.

Table A.1: Attrition and exposure

	Attrition	
	(1)	(2)
VARIABLES	Attrition	Attrition
Treated	-0.00	0.02
	(0.03)	(0.02)
Observations	658	658
R-squared	0.01	0.68
Company FE	Yes	Yes
Individual controls	No	Yes
Mean dep.var.	0.10	0.10
SD dep.var.	0.30	0.30
Mean ind.var.	0.18	0.18
SD ind.var.	0.39	0.39

Note: Robust standard errors clustered on rooms in parentheses, *** p<0.01, ** p<0.05, * p<0.1. *Treated* denotes soldiers who shares room with minority soldiers. Control variables the same as in main analysis.

C   More on balance

Table A.2: Balance

Balance

VARIABLES	(1) treated_gender_fem	(2) mother_high_edu	(3) female	(4) father_high_edu	(5) mother_works	(6) father_works	(7) parents_divorced	(8) plan_education
treated_immigrant	0.01	0.06	0.04	0.06	-0.01	0.01	-0.09	-0.02
	(0.12)	(0.08)	(0.03)	(0.07)	(0.04)	(0.01)	(0.07)	(0.07)
Ali	0.02	-0.03	0.05**	-0.00	-0.03	-0.00	0.05	0.02
	(0.04)	(0.04)	(0.02)	(0.04)	(0.02)	(0.01)	(0.05)	(0.04)
treated_immig_Ali	-0.02	-0.00	-0.01	-0.01	0.04	-0.02	-0.02	0.05
	(0.10)	(0.12)	(0.06)	(0.10)	(0.05)	(0.02)	(0.11)	(0.11)
Observations	592	592	592	592	592	592	592	592
R-squared	0.15	0.06	0.25	0.06	0.10	0.27	0.03	0.07
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	No	No	No	No	No	No	No
Mean dep.var.	0.34	0.62	0.10	0.76	0.93	0.99	0.33	0.68
SD dep.var.	0.47	0.49	0.31	0.43	0.26	0.10	0.47	0.47

Note: Robust standard errors clustered on rooms in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. See Table 1 for a detailed description of variables.

Table A.3: Balance continued

Balance

VARIABLES	(1) imm_trust	(2) trust_lend	(3) trust_general	(4) trust_help	(5) trust_fair	(6) immigrant_we_ord	(7) immigrants_sr_ord
treated_immigrant	-0.01	0.00	-0.09	-0.17	-0.04	-0.17	-0.04
	(0.02)	(0.03)	(0.30)	(0.21)	(0.26)	(0.12)	(0.16)
Ali	0.02	-0.00	0.04	-0.02	0.12	0.04	0.01
	(0.02)	(0.01)	(0.16)	(0.17)	(0.17)	(0.08)	(0.10)
treated_immig_Ali	-0.01	-0.00	-0.33	-0.63*	-0.19	-0.11	-0.33
	(0.03)	(0.04)	(0.41)	(0.35)	(0.35)	(0.21)	(0.23)
Observations	592	592	592	592	592	592	592
R-squared	0.03	0.23	0.08	0.11	0.09	0.04	0.03
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Session FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	No	No	No	No	No	No
Mean dep.var.	0.34	0.85	6.85	6.45	6.88	3.76	3.33
SD dep.var.	0.47	0.14	2.01	1.78	1.88	0.95	1.10

Note: Robust standard errors clustered on rooms in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. See Table 1 for a detailed description of variables.

D   Descriptive statistics

Table A.4: Session characteristics

Session	Subjects	# Minority soldiers	Treatment Ali	Treated (mixed room)
1	48	3	0.54	0.20
2	51	1	0.51	0.20
3	46	2	0.54	0.12
4	55	0	0.47	0.00
5	52	1	0.48	0.15
6	57	1	0.53	0.06
7	48	2	0.52	0.23
8	47	2	0.47	0.21
9	46	3	0.46	0.28
10	100	8	0.52	0.31
11	47	1	0.47	0.18
12	59	2	0.54	0.17
	656	26	Mean 0.50	Mean 0.18

Table A.5: Share of minority soldiers within rooms

Share minority soldiers	# Majority solders	Share majority soldiers	Average room size
0.13	7	0.06	8.0
0.17	60	0.56	6.0
0.20	31	0.29	5.8
0.25	3	0.03	4.0
0.33	4	0.04	6.0
0.40	3	0.03	5.0
Mean 0.18	108	1.00	Median 6

Figure A.4: Comparing answers to general trust questions to a sample of young Norwegian men the European Social Survey (ESS).
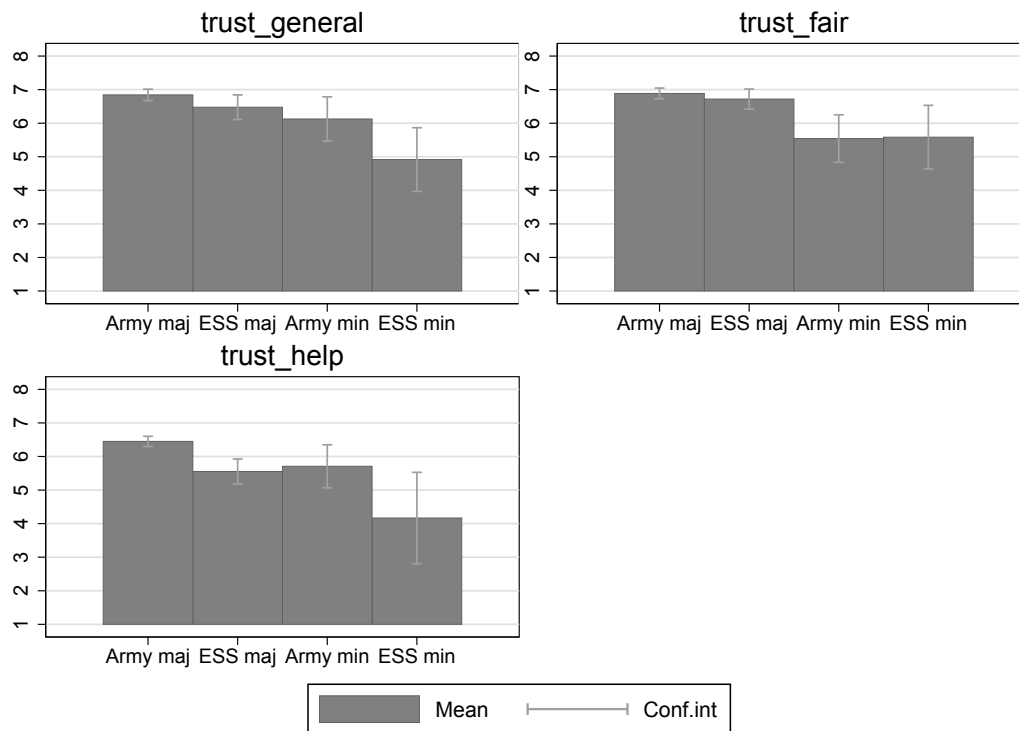
*Note:*Mean and 95 percent confidence interval, scale 1-10. *trust_general*: Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people? *trust_fair*: Do you think most people would try to take advantage of you if they got the chance, or would they try to be fair? *trust_help*: Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves? *Army maj*: Male majority soldiers. *ESS maj*: Male majorities aged 18-30. *Army min*: Male minority soldiers. *ESS min*: Male majorities aged 18-30.

Table A.6: Attitudes and municipality's immigration share

VARIABLES	(1) conserv	(2) conserv	(3) imview	(4) imview
Municipality's immigrant share	-0.06***	-0.06***	0.10**	0.07*
	(0.02)	(0.02)	(0.04)	(0.04)
Observations	592	592	592	592
R-squared	0.03	0.12	0.03	0.14
Company FE	yes	yes	yes	yes
Session FE	no	no	no	no
Individual controls	no	yes	no	no
Mean	0.57	0.57	0.00	0.00

Note: Robust standard errors in parentheses clustered on rooms, *** p<0.01, ** p<0.05, * p<0.1. OLS regressions. The dependent variable in (1) is a dummy variable equal to one for the conservative half of the sample. In (2) we add the standard controls used throughout the paper, excluding attitudes towards immigrants/ immigration. In (3), the dependent variable is the attitudes index. In (4) we add controls. The index and municipality's immigrant share are standardized variables with mean 0 and standard deviation 1.

E More on attitudes

Table A.7: Attitudes towards immigration/ immigrants and trust.

VARIABLES	(1) WE_w2	(2) WE_w2	(3) WE_w2	(4) SW_w2	(5) SW_w2	(6) SW_w2	(7) IT_w2	(8) IT_w2	(9) IT_w2
Immigrants' work ethics lower	0.65***	0.64***	0.64***						
	(0.04)	(0.04)	(0.04)						
Municipality's immigrant share			-0.01			-0.01			-0.00
			(0.04)			(0.04)			(0.03)
Treated	-0.00	-0.03	-0.03	0.18*	0.16*	0.16*	-0.05	-0.11	-0.11
	(0.09)	(0.08)	(0.08)	(0.09)	(0.10)	(0.10)	(0.08)	(0.08)	(0.08)
Immigrants less social benefits				0.65***	0.65***	0.65***			
				(0.03)	(0.03)	(0.03)			
Immigrants reduce trust							0.63***	0.60***	0.61***
							(0.04)	(0.04)	(0.04)
Observations	586	586	586	585	585	585	585	585	585
R-squared	0.44	0.48	0.48	0.47	0.52	0.52	0.38	0.46	0.46
Company FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Session FE	no	no	no	no	no	no	no	no	no
Individual controls	no	yes	yes	no	yes	yes	no	yes	yes
Mean	3.65	3.65	3.65	3.28	3.28	3.28	3.12	3.12	3.12

Note: Robust standard errors in parentheses clustered on rooms, *** p<0.01, ** p<0.05, * p<0.1. OLS regressions. The dependent variable in (1)-(3) is *Immigrants' work ethics lower* at wave 2, the dependent variable in (4)-(6) is *Immigrants less social benefits* at wave 2, and in (7)-(9) it is *Immigrants reduce trust* at wave 2. First we only include the corresponding variable measured at baseline and a dummy variable for *Treated* (from mixed rooms), then we include individual controls (excluding attitudes towards immigration/ immigrants), and finally, we also control for the municipality share of non-western immigrants.

F Trustworthiness of Ali and Morten and of the soldiers in the rooms

Only two responders participate in the strategic trust game, Ali and Morten. Ali and Morten were told that they were assigned the role as responder in a trust game. We asked what amount they would like to return contingent on the amount they received (strategy method). In Table A.8 below, we can see their full responses. First, we see that both responders are trustworthy, and it will always pay off to trust for the soldiers who play the trustor role. Second, Ali is more generous than Morten.

Table A.8: How trustworthy are the responders

		Outgroup:		
Sender sent	Responder received	Ali returns	Sender earns	Ali earns
25	75	50	125	125
50	150	100	150	150
75	225	150	175	175
100	300	200	200	200
		In-group:		
Sender sent	Responder received	Morten returns	Sender earns	Morten earns
25	75	50	125	125
50	150	75	125	175
75	225	125	150	200
100	300	175	175	225

Note: Amounts are given in Norwegian currency, NOK (NOK 100 = USD 12 at the time of the experiment). *Ali* and *Morten* are real people which we contacted before we conducted the experiment in the Armed Forces. Ali and Morten reported how much they would return for each amount that they could receive from the sender. After the experiment was finished, we randomly drew one sender, and Ali and Morten were paid accordingly.

In the trust game within the room, we asked all the soldiers what they would like to return. If they received NOK 150, they could choose between 0, 50, 100, 150. If they received 100, they could return up to NOK 300. This gives us information about the soldiers' degree of trustworthiness. The first finding is that the soldiers are trustworthy - on average, they return more than what was sent to them, regardless of treatment and majority/ minority background. In Table A.9 below, we show that there are no treatment effects on responder behavior. Neither sharing room with, nor the share of minority soldiers in the room affect how much the soldiers return in the trust game within the room.

Table A.9: Returned in incentivized trust game within room

VARIABLES	(1) share	(2) share	(3) share	(4) share
Treated	-0.00	0.00		
	(0.03)	(0.03)		
Share of minority soldiers			-0.00	0.00
			(0.01)	(0.01)
Observations	1,184	1,184	1,184	1,184
R-squared	0.02	0.11	0.02	0.11
Company FE	yes	yes	yes	yes
Session FE	yes	yes	yes	yes
Individual controls	no	yes	no	yes
Mean dep.var.	0.56	0.56	0.56	0.56
SD dep.var.	0.24	0.24	0.24	0.24
Mean ind.var.	0.18	0.18	0.00	0.00
SD ind.var.	0.38	0.38	1.00	1.00

Note: Robust standard errors clustered on rooms in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. OLS regression. The dependent variable is what share they return to a fellow roommate. *Treated* denotes soldiers from mixed rooms, *Share of minority soldiers* is the share of minority soldiers in the room. We have two answers for each subject, hence, the number of observations is doubled.