

# Trust, Ethnic Diversity, and Personal Contact: Experimental Field Evidence\*

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## Abstract

We combine a lab and a field experiment to study how close personal contact with minorities affects in-group and out-group trust. Soldiers were randomly assigned to rooms with or without ethnic minorities. At the end of the recruit period we measure trust by using a trust game. We find that close personal contact with minorities increases trust towards a generic immigrant. We replicate the result that individuals coming from areas with a high share of immigrants trust minorities less, but random assignment to interact with minority soldiers removes this negative correlation. We conclude 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., Hunt and Gauthier-Loiselle, (2010) and Peri, (2012)), but some argue that it can also lead to less social trust and more tension and conflicts (Alesina and La Ferrara, 2002; Putnam, 2007). The effects of diversity on trust are essential to understand: 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; Guiso, Sapienza, and Zingales, 2011; Guiso, Sapienza, and Zingales, 2008a,b). 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 social contact build trust?

Several empirical studies find patterns that are consistent with what we denote conflict theory; diversity is associated with less trust (Alesina and La Ferrara, 2002; Dinesen and Sønderskov, forthcoming).<sup>1</sup> Putnam, (2007) takes the conflict perspective further, arguing that ethnic diversity may not only lead to 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). Because more diverse US neighborhoods with lower trust levels are also poorer, more nonwhite, and less stable than the more homogenous neighborhoods, it

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<sup>1</sup>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, Harnoss, and Rapoport, (2016), Alesina and La Ferrara, (2005), and Alesina et al., (2003). Another strand of literature study diversity within organizations, see for instance Lyons, (2016) on teams and national diversity, Ottaviano and Peri, (2006) on productivity, 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.

is hard to disentangle the effect ethnic diversity has on trust from the effects of these other features of diverse societies.

In fact, a major limitation of previous studies of ethnic diversity and trust is the inability to control for selection and reverse causality. We randomize soldiers to rooms during boot camp, implying that soldiers from the majority group (ethnic Norwegian soldiers) are randomized to 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 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. As far as we are aware, ours is the first study with a research design allowing for a causal identification of how close contact between majority and minority individuals affects trust.

Conflict is not the only potential outcome from ethnic diversity. The more optimistic contact theory (Allport, 1954) suggests that personal contact with members of out-groups can reduce prejudice and misperceptions, and thereby increase trust. 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, 2017; Finseraas et al., 2016), showing that personal contact reduces prejudice and strengthens cooperation (Goette, Huffman, and Meier, 2006). Rao, (2014) shows how random exposure to poor students affect wealthy students in terms of pro-social behaviour, discrimination, as well as academically. We use our data to contrast and combine the conflict and contact perspective on ethnic diversity, by studying treatment heterogeneity according to previous exposure to diversity.

We find that individuals randomly assigned to close personal contact with minority soldiers send more money to the person with a name signalling minority origin (Ali). Random contact with minority soldiers does not affect the amount sent to the person with

a Norwegian name (Morten). Next we find a negative association between immigrant share in the home municipality and trust in Ali (but not in Morten), which is consistent with the conflict perspective. We further find that the negative relationship between previous exposure and out-group trust is annulled 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. Section 3 illustrates the details of the trust game. Section 4 describes our data, while our empirical strategy is outlined in Section 5. The results are presented in Section 6, with discussion and concluding remarks following in Section 7. Instructions for the trust game and additional analyses are included in the appendix.

## **2 Identifying effects of contact: The Field Experiment**

The sample for the field experiment consists of incoming soldiers of the August 2015-contingent of the North Brigade of the Norwegian Armed Forces (NAF). The first day of service starts 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. In the camps they are assigned to rooms for the eight weeks of 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 into rooms. The personnel officers enter the list of soldiers in the company and specify the size of the rooms in the camp, whereby the excel sheet randomizes soldiers into rooms. This room assignment for the 8 week long recruit period constitutes our main treatment variable (more on this below). Copies of the excel sheets were emailed to the Norwegian Defense Re-

search Establishment (FFI) for verification. We only analyze data from companies for whom we could verify the randomization. The procedure allows for the 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 the room with an ethnic minority soldier. A deviation from the randomization protocol was included so that when possible, women are allocated to rooms in pairs of two. We describe how we handle this in Section 5.

The recruit period is the basic training period, which is known for strict enforcement of military rules and regulations.<sup>2</sup> During the eight weeks, the soldiers are to wear their uniform 24/7 and are not allowed to sleep outside of 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 together. A normal day of boot camp starts with activities within the room, such as cleaning and preparing the room before inspection. Working hours are intense, usually 10-15 hours a day. In addition, soldiers are expected to prepare their individual gear and equipment for the following day after duty ends. This leaves the soldiers with few opportunities for personal chores and socializing outside their own room. The room is also important since it usually constitutes a squad within a platoon in the company. Thus, sharing room during the recruit period constitutes intense treatment in the form of personal contact.

According to contact theory, the positive effects of personal contact are 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, which increases the probability of affective ties and willingness to learn about out-group members (Van Laar et al., 2005). The army context is one where the conditions of contact theory are likely to hold. Soldiers of private rank have equal social status within

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<sup>2</sup>After the recruit period the selection of soldiers for regular infantry and cavalry companies takes place and the soldiers move. Room composition is no longer random after this point.

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. We conducted a trust game at the end of the eight weeks recruit period.

### 3 Measuring trust: The trust game

To measure the trust effect of close contact, we use the trust game developed by Berg, Dickhaut, and McCabe, (1995). The advantage of using an experiment rather than survey questions to capture trust, is that the trust game captures the essence of trust in economic exchange; there is real money at stake for the trustor/sender and a substantial surplus is produced if the resources are handed over to the trustee/responder.<sup>3</sup>

In the standard trust game a person chooses how much to send to an anonymous other person, the responder. The amount sent is typically tripled and the responder decides how much to send back. In our case, the senders (each soldier) choose between sending 0, 25, 50, 75, or 100 NOK out of a total endowment of 100 NOK (12US\$) to a responder.<sup>4</sup> In turn, the experimenters (we), triple the chosen amount to the responder. The responder then decides how much of the received money to transfer back to the sender.

Sending money to an anonymous other does not allow for a distinction between in-group and out-group trust. We therefore use a modified version of the trust game where the senders either play the trust game with a responder with a typical Norwegian name (Morten), or with a responder with a name indicating a ethnic minority origin (Ali). By randomizing the names, we assure that all other factors that may influence how much a person sends does not vary systematically with the ethnic identity of the responder.<sup>5</sup>

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<sup>3</sup>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) argue that the measures are correlated with trustworthiness rather than trust.

<sup>4</sup>The service allowance for Norwegian recruits normally equals about NOK 170 a day, roughly USD 20 at the exchange rate at the time of the experiment.

<sup>5</sup>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 trustworthiness, but also by risk aversion and other-regarding preferences such as altruism (Sapienza, Toldra-Simats,

Hence, with this design we can estimate to what extent beliefs about responder trustworthiness vary depending on the ethnicity of the responder, and most importantly, to what extent exogenous exposure to a minority member modifies the assessment of trustworthiness.

We recruited responders at the University of Oslo before going to the military camps. We announced that we were recruiting participants to an experiment, and then recruited one student with a typical Norwegian name (Morten), and one student with a name indicating ethnic minority origin (Ali). Both responders/trustees were asked to make a back-transfer decision contingent on the amount that they would receive.<sup>6</sup>

In addition to the first name of the responder, the soldiers (senders) are told that the responder (trustee) is a real person living in the eastern part of Norway, that he has been recruited by us to take part in the study and that he received NOK 100 just for participating. The soldiers were also informed that the responder was aware of both the structure of the game and that the sender would be a soldier in the boot camp in Northern Norway. A translated version of the instructions is included in the Appendix Section A.

The experiment was conducted in September 2015 at two different military bases, Setermoen and Skjold, located 60 km apart in a rural area in the northern part of Norway. The Armed Forces decided when different groups of soldiers would attend our sessions based on the soldiers schedule for the given day. The experiment consists of two main treatments: Ali and Morten. We randomized treatments within each session, so that about half of the soldiers in each session play the game with Morten, and half with Ali. One sender in each session is drawn randomly to be paid and the experiment was conducted using pen and paper.

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and Zingales, 2013), as well as inequality aversion and betrayal aversion (Fehr, 2009).

<sup>6</sup>We use the strategy method to obtain the back-transfer from the responder (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 the responders' 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.

## 4 Data

### 4.1 Sample and treatment variable

We conducted the experiments 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. The minority soldiers are not included in the analysis because we want to separate between the ones providing exposure from the ones affected by it (see Angrist 2014). Furthermore, there is no treatment variation at the extensive margin in the field experiment for the minority soldiers as they all live in rooms with majority soldiers. We also exclude soldiers with missing information on parents' birthplace. The analysis sample includes 592 soldiers, spread across 121 rooms.

We define minority background as being born in or having at least one parent being born in South-America, Asia, Oceania, or Africa, as in Finseraas and Kotsadam, (2017). 4.2 percent of the experimental sample have minority background.<sup>7</sup> On average, 18.2 percent of the experimental sample share a room with someone with a minority background.

The rooms vary in size, but the majority of the sample (72 percent) 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 (see Figure A.3 in the appendix).

A high dismissal rate is normal during the recruit 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).

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<sup>7</sup>Only Norwegian citizens are allowed to serve in the Armed Forces and hence our minorities are to a large extent second-generation immigrants. See Table A.5 in the Appendix for details.



## 4.2 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 pre-determined variables in Table 2. We include company fixed effects (9 in total) in all regressions, since room assignment is randomized within companies and we cluster the standard errors at the room level (121 rooms). 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 0.32. 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.<sup>8</sup>

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

Table 1: Background variables and balance across treatment.

	(1)		(2)		(3)		(4)	
	Ali base		Morten base		Ali treat		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 divorced	0.37	(0.48)	0.32	(0.47)	0.27	(0.45)	0.22	(0.42)
Plans 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 same rights	0.68	(0.22)	0.67	(0.21)	0.59	(0.25)	0.66	(0.23)
Immigrants' work ethic	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)	0.06	(0.04)	0.08	(0.05)
Lend money to room mate	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)
Trust: Helpfulness	0.65	(0.18)	0.65	(0.18)	0.59	(0.17)	0.65	(0.16)
Trust: Fairness	0.70	(0.20)	0.68	(0.19)	0.67	(0.15)	0.68	(0.18)
Female	0.12	(0.33)	0.07	(0.26)	0.18	(0.39)	0.11	(0.31)
Females in room	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). *Female:* Share of female soldiers. *Females in room:* Share of majority soldiers who also share room with female soldier (including female soldiers).

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

VARIABLES	(1)		(2)	
	coef	tstat	coef	tstat
Mother has high education	0.04	(1.18)	0.03	(0.67)
Father has high education	0.04	(1.20)	0.02	(0.32)
Mother works	0.01	(0.22)	0.00	(0.03)
Father works	-0.01	(-0.06)	-0.04	(-0.21)
Parents divorced	-0.07*	(-1.97)	-0.06*	(-1.77)
Plans higher education	0.00	(0.09)	-0.02	(-0.47)
Immigration reduces trust	-0.09	(-1.16)	0.01	(0.08)
Immigrants same rights	-0.11	(-1.49)	-0.05	(-0.45)
Immigrants' work ethic	-0.18**	(-2.02)	-0.15	(-1.30)
Lend money to roommate	0.01	(0.08)	0.04	(0.31)
General trust	-0.09	(-1.15)	-0.03	(-0.38)
Trust: helpfulness	-0.21**	(-2.60)	-0.23*	(-1.89)
Trust: fairness	-0.06	(-0.81)	0.08	(0.68)
Female	0.06	(0.86)	0.09**	(2.26)
Females in room	0.00	(0.01)	-0.02	(-0.32)
Observations	592		592	
Company FE	Yes		Yes	
Session FE	Yes		Yes	
F-test of joint significance			1.01, p=0.32	

*Note:* Each row in column 1 presents the results from separate regressions with treated as dependent variable and the pre-determined variable as control. Column 2 reports the coefficients when all pre-determined variables are included in one regression. The bottom panel reports the p-values from an F-test for the joint significance of all the pre-determined variables. Company and session fixed effects are included in all regressions. t-values are adjusted for room clustering, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions.

### 4.3 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. Nonetheless, 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.

Finseraas and Kotsadam, (2017) compare the soldiers of the 2014 contingent to a sample of men aged 18-30 years from the general population. They find that the soldiers have more liberal attitudes towards immigrants. With respect to the minority soldiers, we know that most of them are second-generation immigrants, and 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 differs from the general population with respect to trust we asked three general trust questions at baseline that also appear in the European Social Survey (ESS).<sup>9</sup> We compare the soldiers' answers to those of young Norwegian males aged between 18 and 30. We find that ethnic Norwegian soldiers are similar to the general population with one exception (the soldiers are more inclined to think that people are helpful). As compared to minorities in the ESS data, defined as in the army data, 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

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<sup>9</sup>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?*

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.

## 5 Empirical strategy

We estimate the following regression to identify the treatment effect:

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

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 4.2), and the error term,  $\epsilon_{irt}$ , 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. We add a vector of individual level controls, including demographics and attitudes at baseline. To make the models fully saturated, we partition the covariate space and add these control variables as indicator variables rather than using their multi-valued codings (Athey and Imbens, 2016). As the randomization procedure deviates by adding two women to a room when possible, and as female soldiers are more likely to be Norwegian, we control for having females in the room in all regressions. We show all results with and without the other individual level covariates.<sup>10</sup> The regression is estimated separately for sending to Ali and to Morten, but we also present results from an interaction model that tests the difference across the models.

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<sup>10</sup>We create an indicator for missing values in the controls and include the missing indicator in the regressions in order not to lose observations.

## 6 Empirical results

### 6.1 Main results

The main results are presented in Tables 3 and 4. In Table 3 we present regression results of equation (1) using the amount sent in the trust game as the dependent variable and an indicator variable for treatment. 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 level of trust is comparable with what has been found in previous trust games in Scandinavia.<sup>11</sup>

In column 1 of Table 3 we see that individuals sharing room with a minority soldier send around 10 NOK more to Ali. The estimate is similar when we add the controls (column 2). In both columns, the estimate is statistically significant at the 10 percent level. In columns 3-4, we present 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 Putnam's (2007) 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 group who played against Morten (omitted group) is not statistically significant.

In Table 4, we investigate whether the share of minority soldiers among the roommates matters for how much the soldiers send to Ali/Morten. The share of minority soldiers among the roommates vary from zero to 40 percent and has a standard deviation of 8 percent. We standardize the variable share of minority soldiers (to have a mean of zero and standard deviation of 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

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<sup>11</sup>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.

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*	11.24*	2.65	3.13	1.72	1.55
	(5.36)	(5.99)	(7.03)	(6.77)	(6.84)	(6.17)
Treated*Ali					7.52	11.18
					(8.21)	(7.30)
Ali					-0.66	0.33
					(3.01)	(3.36)
Observations	296	296	296	296	592	592
R-squared	0.06	0.23	0.08	0.27	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:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. *Treated* denotes soldiers from mixed rooms. 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. All regressions include a dummy for whether the living quarters include female soldiers. Individual controls 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 gender. Mean and standard deviation of dependent and independent variables below. Robust standard errors in parentheses clustered on rooms (121 rooms), \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions.

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** (2.02)	4.81** (2.25)	0.46 (2.70)	0.37 (2.64)	0.24 (2.61)	0.03 (2.43)
Share of minority soldiers*Ali					3.64 (3.03)	5.04* (2.69)
Ali					0.70 (2.79)	2.36 (2.99)
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:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. *Share of minority soldiers in room* is the standardized variable of share of minority soldiers within each room (mean 0, sd 1). 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. All regressions include a dummy for whether the living quarters include female soldiers. Individual controls 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 gender. Mean and standard deviation of dependent and independent variables below. Robust standard errors in parentheses clustered on rooms, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . OLS regressions.

trust towards Ali. The estimate is similar when we add controls.

In columns 3 and 4 we find that intense contact with out-group members does not affect their trust in a stranger from the in-group, as the amount sent to Morten is not correlated with share of minority soldiers. In columns 5-6 we present the interaction models. We 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 5. The result is significant at the 10 percent level when the control variables are included.



## 6.2 Integrating the conflict and contact perspectives

Thus far we have found support for contact theory. Next we want to integrate our results with the conflict theory of diversity. Previous research has found a negative relationship between trust and the level of ethnic diversity in the respondents' area of residence (Alesina and La Ferrara, 2000; Dinesen and Sønderskov, forthcoming; Putnam, 2007). We are particularly interested in whether contact can reduce this negative 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), however, 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 shows how trust towards Ali/Morten correlate with previous exposure to immigrants, measured by the share of non-western immigrants in the municipalities the soldiers' come from.<sup>12</sup> Obviously, people were not randomly assigned to different municipalities or previous exposure, thus we do not interpret this relationship as a causal effect of immigrant share. In the left panel we group all soldiers within each treatment into equal sized bins based on this immigrant share. Trust in Morten (in blue) is not correlated with share of immigrants, but the figure shows that soldiers from municipalities with a high share of immigrants send less to Ali (in red). 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.<sup>13</sup>

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<sup>12</sup>Immigrants include immigrants and Norwegian-born to immigrant parents in 2014. Non-western immigration encompass immigrants from countries outside of the EEA/EU, the US, Canada, Australia, and New Zealand.

<sup>13</sup>In Section G we run all the analyzes also at the postcode level. The results are very similar.

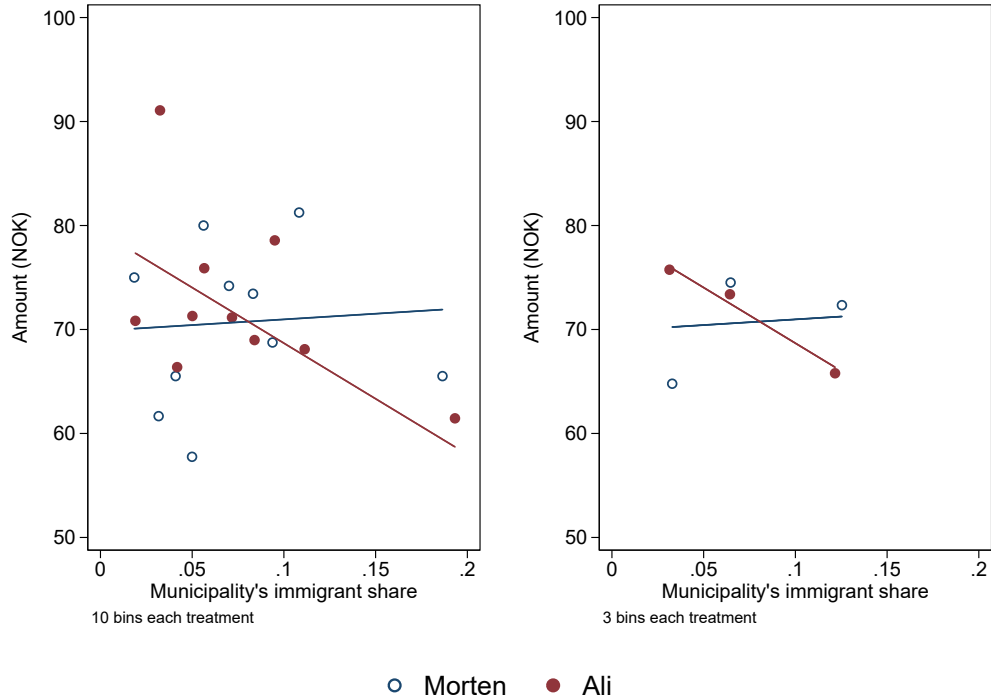


Figure 1: Trust and previous exposure.

*Note:* Trust in Morten represented by blue line/hollow blue dots, trust in Ali by red line/solid red dots. Amount sent in NOK on vertical axis, share of immigrants in the municipality on the horizontal axis. Subjects in the 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 non-western immigration share in each soldier's home-municipality. We have standardized the variable 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 5.53, which corresponds to about eight 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 the interaction models we find that the relationship between amount sent to Morten and Ali is significantly different as a function of immigrant share.

Our design with random assignment to rooms allows us to investigate if close contact with immigrants changes the relationship between the immigrant share in home munic-

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

VARIABLES	(1) Ali	(2) Ali	(3) Morten	(4) Morten	(5) All	(6) All
Municipality's immigrant share	-5.53*	-6.40**	1.19	2.30	1.05	1.53
Ali	(2.81)	(2.99)	(2.36)	(2.55)	(2.30)	(2.16)
Municipality's immigrant share*Ali					0.39	2.08
					(2.82)	(3.06)
					-6.77*	-8.27**
					(3.60)	(3.49)
Observations	296	296	296	296	592	592
R-squared	0.07	0.24	0.10	0.28	0.07	0.15
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	-0.03	-0.03	0.02	0.02	0.00	0.00
SD Muni share	1.00	1.00	1.00	1.00	1.00	1.00

*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game (can also be interpreted as percent). *Municipality's immigrant share:* Non-western immigration share in each soldier's home-municipality (standardized, mean 0, sd 1). 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. All regressions include a dummy for whether the living quarters include female soldiers. Individual controls 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 gender. Mean and standard deviation of dependent and independent variables below. Robust standard errors in parentheses clustered on rooms, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions.

ipalities and trust. 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 treated room and those who lived in a control room. In the right panel, we show sending to Morten by treatment status. The patterns in the two panels are completely different: Close contact with a minority member breaks the negative association between municipality diversity and trust in out-group individuals. 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 of in-group trust, rather the opposite.

In Table 6 we report the regression results for how the relationship between the share of immigrants in the home municipality and trust is affected by treatment. We find that within the control group, trust decreases in the share of immigrants, while this is not the case for the treatment group (if we add the share variable and the interaction the sum is close to zero). We run the same regressions for those who played against Morten. 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 in column 4 where controls are included.<sup>14</sup>

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<sup>14</sup>The coefficient for immigrant share times treatment changes a lot from column 3 to column 4. This hints to a correlation between immigrant share in the municipality and observables, which is not surprising as immigrant share is not random. In Table A.7 we show correlations between our baseline variables and immigrant share and we note that the latter correlates with parental education and employment as well as with attitudes regarding immigration and trust.

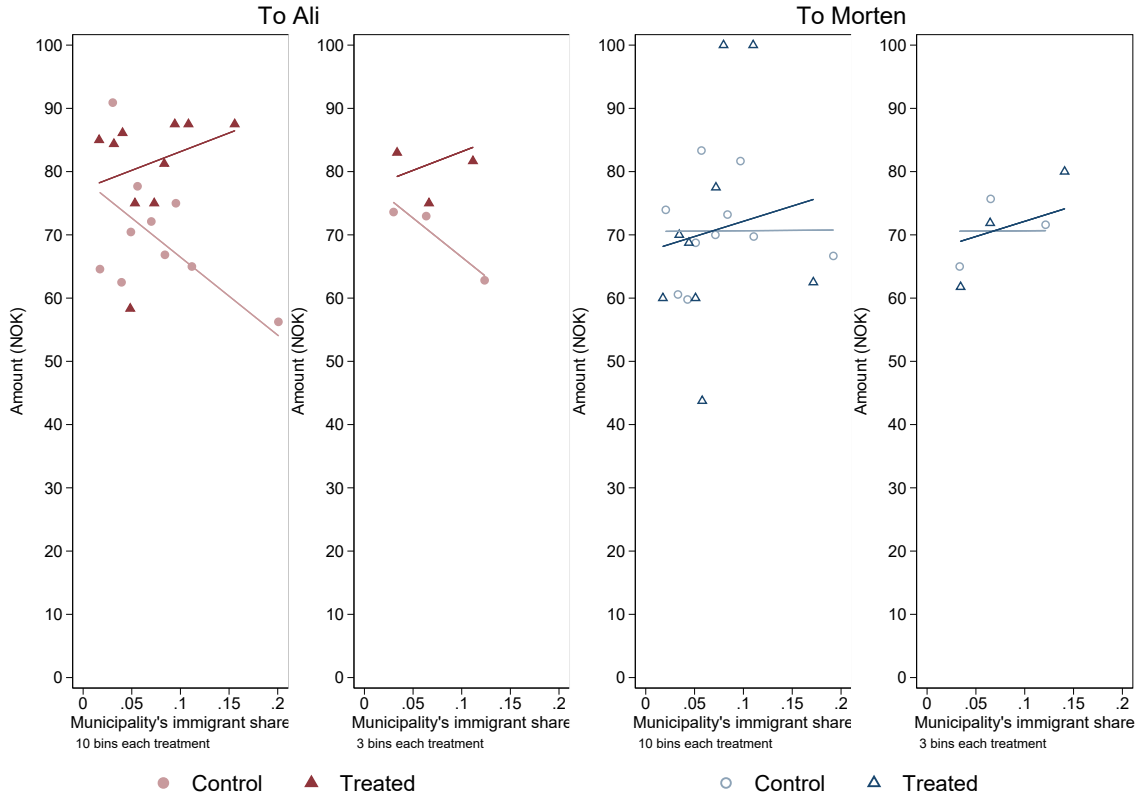


Figure 2: Amount sent in the trust game and share of immigrants

*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.

Table 6: Integrating the conflict and contact hypotheses: Amount sent, treatment status, and share of immigrants in the home municipality

	(1)	(2)	(3)	(4)
	Ali	Ali	Morten	Morten
Treated	10.05*	11.18*	3.21	4.17
	(5.16)	(5.82)	(6.96)	(6.36)
Municipality's immigrant share	-6.05*	-7.26**	0.78	0.43
	(3.07)	(3.19)	(2.38)	(2.66)
Municipality's immigrant share*Treated	5.58	9.46	1.88	11.46*
	(5.61)	(7.33)	(6.66)	(5.83)
Observations	296	296	296	296
R-squared	0.08	0.26	0.10	0.29
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	-0.03	-0.03	0.02	0.02
SD Muni share	1.00	1.00	1.00	1.00

*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game (can also be interpreted as percent). *Treated* denotes soldiers from mixed rooms. *Municipality's immigrant share:* Non-western immigration share in each soldier's home-municipality (standardized, mean 0, sd 1). 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. All regressions include a dummy for whether the living quarters include female soldiers. Individual controls 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 gender. Mean and standard deviation of dependent and independent variables below. Robust standard errors in parentheses clustered on rooms, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions.

### 6.3 Heterogeneous effects

In this section, we investigate heterogeneous effects along two additional dimensions: the aptitude of the minority soldiers and the baseline attitudes of the majority soldiers. Do high aptitude minority soldiers affect their fellow roommates in a different manner compared to low-aptitude 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 - self-reported average GPA during the last year of upper secondary school.<sup>15</sup>

In Table 7 we test whether the GPA of the minority roommate affects the trust level of the majority soldiers in the trust game. We divide the treated soldiers into two equally sized groups: having a high or low GPA minority roommate (if there is more than one we use the average). We compare these two groups with the control group. We see in columns 1 and 2 that the academic achievement of the minority roommate does not affect trust in Morten. However, in columns 3 and 4 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.<sup>16</sup>

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<sup>15</sup>This ranges from 1 (fail) to 6 (best). Appendix Figure A.5 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.

<sup>16</sup>We show in Appendix Table A.8 that results are similar if we use a continuous measure of minority soldier GPA.

Table 7: Minority roommates' GPA and trust.

VARIABLES	(1) Morten	(2) Morten	(3) Ali	(4) Ali
High GPA	3.34 (15.64)	0.91 (13.72)	15.86** (7.35)	19.48** (7.47)
Low GPA	0.58 (6.26)	2.87 (6.81)	2.12 (7.17)	-0.81 (7.67)
Observations	296	296	296	296
R-squared	0.09	0.27	0.07	0.25
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:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game (can also be interpreted as percent). *High GPA* is an indicator variable equal to 1 for those whose minority roommate has a high GPA score (above sample average), *Low GPA* is an indicator for those whose minority roommate has a low GPA score (below sample average). Regressions (1)-(2) only include observations from the in-group treatment (Morten), (3)-(4) only include observations from the out-group treatment (Ali). 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. Robust standard errors in parentheses clustered on rooms, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . OLS regressions.

These 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) 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.<sup>17</sup>

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.<sup>18</sup>

In Table 8 we interact treatment status with the baseline attitudes. In column 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 effect is not statistically significantly different for conservatives (as captured by the interaction term). In column 4 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 more liberal, see Table A.6 in the appendix, we also control for the municipality's immigration share in columns 2 and 5. We also add individual level controls in columns 3 and 6. The interpretation of the results remains the same.

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<sup>17</sup>In terms of actual trustworthiness we show in Appendix Section F that Ali sent back a little more money than Morten.

<sup>18</sup>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.

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, p. 11) for evidence consistent with this mechanism). However, later research 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, p. 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 with 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 8: Attitudes towards immigration/ immigrants and trust.

VARIABLES	(1) Mort	(2) Mort	(3) Mort	(4) Ali	(5) Ali	(6) Ali
Conservative	-0.15 (4.58)	-0.15 (4.65)	3.79 (5.51)	4.94 (5.06)	3.58 (5.00)	4.97 (5.29)
Treated*conservative	7.17 (10.81)	6.79 (10.73)	10.10 (11.84)	-18.87* (10.20)	-16.99 (10.41)	-24.74** (11.60)
Treated	-1.92 (11.73)	-1.04 (11.53)	-2.80 (11.40)	22.92*** (8.34)	21.02** (8.42)	27.67*** (9.57)
Municipality's immigrant share		1.12 (2.41)	2.63 (2.59)		-5.10* (2.77)	-6.35** (3.11)
Observations	296	296	296	296	296	296
R-squared	0.09	0.10	0.26	0.07	0.09	0.18
Company FE	yes	yes	yes	yes	yes	yes
Session FE	yes	yes	yes	yes	yes	yes
Individual controls	no	no	yes	no	no	yes
Mean	71.28	71.28	71.28	71.45	71.45	71.45

*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. *Treated* denotes soldiers from mixed rooms. *Conservative* is equal to one for the half of the sample who holds more conservative views towards immigration. *Municipality's immigrant share* standardized with mean 0 and standard deviation 1. *Municipality's immigrant share*: Non-western immigration share in each soldier's home-municipality (standardized, mean 0, sd 1). Regressions (1)-(3) only include observations from the in-group treatment (Morten), (3)-(6) only include observations from the out-group treatment (Ali). Robust standard errors in parentheses clustered on rooms, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions. Individual controls do not include attitudes towards immigration.

## 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 (Alesina and La Ferrara, 2000; Dinesen and Sønderskov, forthcoming; Putnam, 2007). There are, however, three important limitations to the 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 the 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. Bauer, Fiala, and Lively, 2017; Boisjoly et al., 2006; Burns, Corno, and La Ferrara, 2016; Carrell, Hoekstra, and West, 2015; Finseraas and Kotsadam, 2017; 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, and some argue that they 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 until 2015 (from 2016, it is mandatory for both men and women), conscription is based on need, and only about one in six men serve. 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: Instructions

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.

For each amount sent, **Ali/Morten** has selected 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** does 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 add the set of controls used in the main analysis in the paper and the results do not change.

Table A.1: Attrition and exposure

VARIABLES	(1) Attrition	(2) Attrition
Treated	-0.00 (0.03)	0.02 (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 share room with minority soldiers. Control variables are the same as in main analysis.

## C More on balance

Table A.2: Balance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Females in room	Mother high education	Female	Father high education	Mother works	Father works	Parents divorced	Plans higher education
Treated	0.01 (0.12)	0.06 (0.08)	0.05 (0.05)	0.06 (0.07)	-0.01 (0.04)	0.01 (0.01)	-0.09 (0.07)	-0.02 (0.07)
Ali	0.02 (0.04)	-0.03 (0.04)	0.06*** (0.02)	-0.00 (0.04)	-0.03 (0.02)	-0.00 (0.01)	0.05 (0.05)	0.03 (0.04)
Treated*Ali	-0.02 (0.10)	-0.01 (0.12)	-0.01 (0.08)	-0.01 (0.10)	0.04 (0.05)	-0.02 (0.02)	-0.02 (0.11)	0.05 (0.10)
Observations	592	592	592	592	592	592	592	592
R-squared	0.15	0.06	0.04	0.06	0.10	0.27	0.03	0.05
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

	(1) Immigration reduces trust	(2) Lend money to roommate	(3) General trust	(4) Trust: helpfulness	(5) Trust: fairness	(6) Immigrants' work ethic	(7) Immigrants same rights
Treated	-0.01 (0.02)	0.00 (0.03)	-0.01 (0.03)	-0.02 (0.02)	-0.00 (0.03)	-0.03 (0.02)	-0.01 (0.03)
Ali	0.02 (0.02)	-0.00 (0.01)	0.00 (0.02)	-0.00 (0.02)	0.01 (0.02)	0.01 (0.02)	0.00 (0.02)
Treated*Ali	-0.01 (0.03)	-0.00 (0.04)	-0.03 (0.04)	-0.06* (0.04)	-0.02 (0.04)	-0.02 (0.04)	-0.07 (0.05)
Observations	592	592	592	592	592	592	592
R-squared	0.03	0.23	0.08	0.11	0.08	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	0.68	0.65	0.69	0.75	0.67
SD dep.var.	0.47	0.14	0.20	0.18	0.19	0.19	0.22

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.

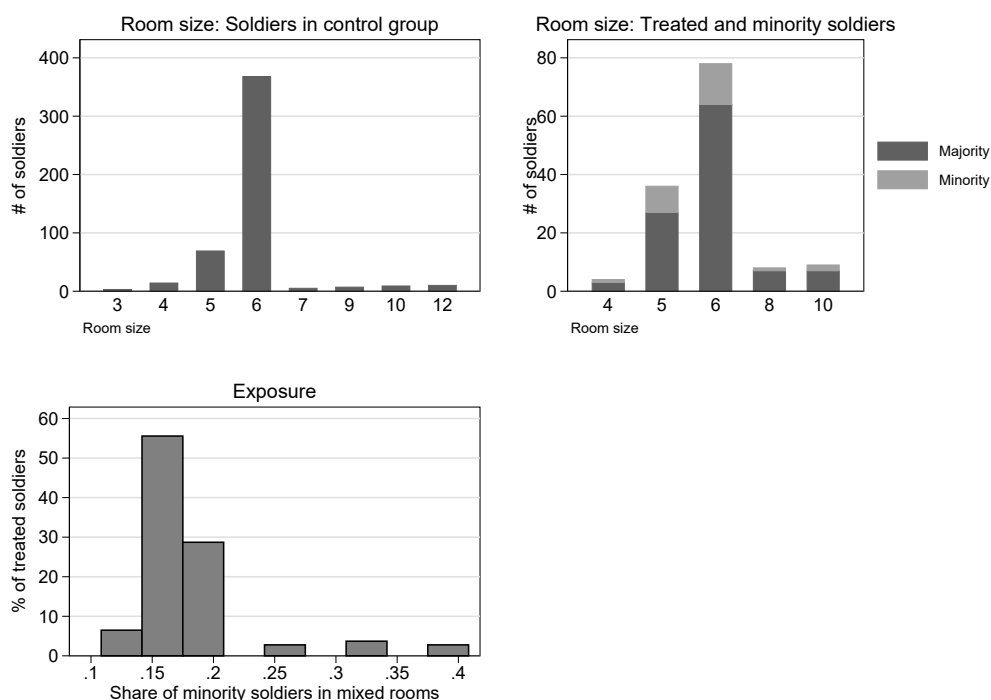
## D Descriptive statistics



Table A.4: Session characteristics

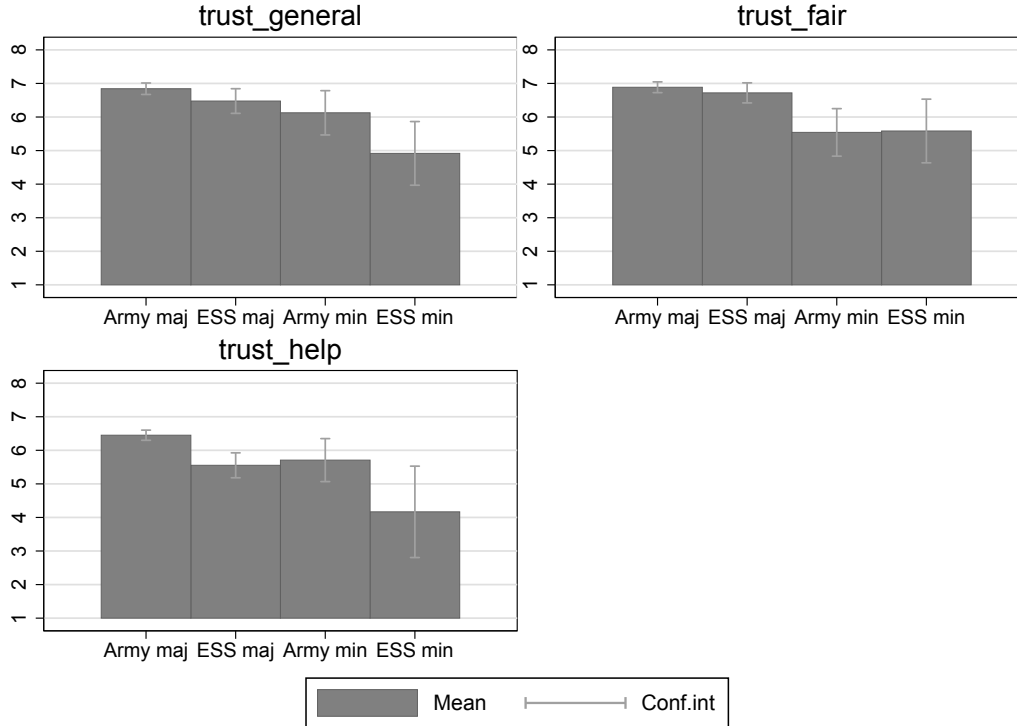
Session	Subjects	No. Minority soldiers	Treatment Ali	Treated (mixed room)
1	48	3	0.54	0.20
2	51	1	0.51	0.20
3	46	2	0.54	0.12
4	55	0	0.47	0.00
5	52	1	0.48	0.15
6	57	1	0.53	0.06
7	48	2	0.52	0.23
8	47	2	0.47	0.21
9	46	3	0.46	0.28
10	100	8	0.52	0.31
11	47	1	0.47	0.18
12	59	2	0.54	0.17
	656	26	Mean 0.50	Mean 0.18

Figure A.3: Room size and exposure



*Note:* Upper left panel: Room size and the distribution of soldiers the control group (not mixed rooms). Upper right panel: Room size and the distribution of soldiers in treatment group (mixed rooms), as well as minority soldiers. Lower panel: Exposure is defined as the share of minority soldiers within rooms. 56 percent of the treated soldiers live in rooms where the share of minority soldiers is equal to 0.17.

Figure A.4: Comparing answers to general trust questions to a sample of young Norwegian men the European Social Survey (ESS).



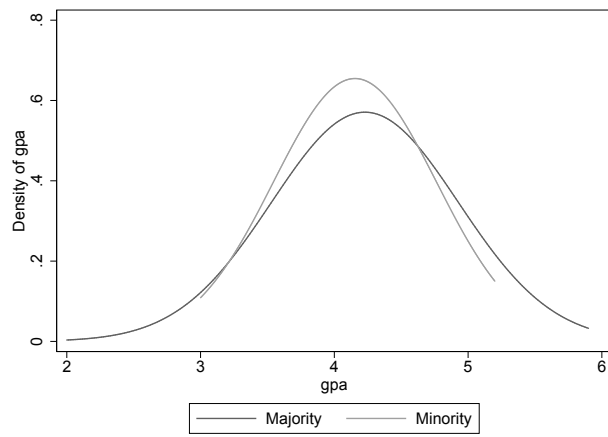
*Note:* Mean and 95 percent confidence interval, scale 1-10. *trust\_general*: "Generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?" *trust\_fair*: "Do you think most people would try to take advantage of you if they got the chance, 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.5: Minority soldiers: Parental background

Mother born in	Father born in					Total
	Norway	Europe	S-America	Asia	Africa	
Norway	0	0	2	0	2	4
S-America	1	0	1	0	0	2
Asia	8	0	0	10	0	18
Africa	1	1	0	0	0	2
Total	10	1	3	10	2	26

*Note:* This table displays the birthplace of both mother and father of the 26 minority soldiers in our experimental sample. *Europe* excludes the Nordic countries.

Figure A.5: GPA distribution, by majority/ minority.



## E Other regression tables discussed in the text

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

VARIABLES	(1) Conservative	(2) Conservative
Municipality's immigrant share	-0.05*** (0.02)	-0.05*** (0.02)
Observations	592	592
R-squared	0.04	0.14
Company FE	yes	yes
Session FE	yes	yes
Individual controls	no	yes
Mean	0.57	0.57

*Note:* The dependent variable is a dummy variable equal to one for the conservative half of the sample. *Municipality's immigrant share:* Non-western immigration share in each soldier's home-municipality (standardized, mean 0, sd 1). In (2) we add the standard controls used throughout the paper, excluding attitudes towards immigrants/ immigration. Robust standard errors in parentheses clustered on rooms, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions. Individual controls do not include attitudes towards immigration.

Table A.7: Baseline characteristics and municipality's immigration share

VARIABLES	(1) Municipality's immigrant share
Mother has high education	-0.00 (0.01)
Father has high education	0.01** (0.01)
Mother works	0.00 (0.01)
Father works	0.03*** (0.01)
Parents divorced	0.01 (0.00)
Plans higher education	0.00 (0.00)
Immigration reduces trust	0.03** (0.01)
Immigrants same rights	0.02 (0.01)
Immigrants work ethic	-0.02 (0.01)
Lend money to roommate	0.02 (0.02)
General trust	0.01 (0.01)
Trust: helpfulness	-0.02* (0.01)
Trust: fairness	0.01 (0.01)
Sex of respondent	-0.00 (0.01)
Females in room	0.00 (0.00)
Observations	578
R-squared	0.06

*Note:* The dependent variable is *Municipality's immigrant share*. Robust standard errors in parentheses clustered on rooms, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A.8: Minority roommates' GPA and trust.

Dependent variable trust and minority GPA				
VARIABLES	(1)	(2)	(3)	(4)
	Mort	Mort	Ali	Ali
Standardized minority GPA	-2.87 (9.30)	-2.64 (9.20)	6.11 (3.73)	8.89** (3.68)
Treated	1.64 (7.23)	1.99 (7.07)	9.12* (5.37)	9.42 (5.80)
Observations	296	296	296	296
R-squared	0.09	0.27	0.07	0.25
Company FE	yes	yes	yes	yes
Session FE	yes	yes	yes	yes
Individual controls	no	yes	no	yes
Mean trust	71.28	71.28	71.45	71.45
SD trust	35.99	35.99	36.54	36.54
Mean std mino GPA	0.00	0.00	0.00	0.00
SD std mino GPA	0.94	0.94	1.07	1.07

*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game (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). 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. Robust standard errors in parentheses clustered on rooms, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . OLS regressions.

## F Trustworthiness of Ali and Morten

Only two responders participate in the strategic trust game, Ali and Morten. We asked what amount they would like to return contingent on the amount they received. In Table A.9 below, we can see their full responses. First, we see that both responders are trustworthy, and it always payed off to trust for the soldiers who play the trustor role. Second, Ali was more generous than Morten.



Table A.9: How trustworthy are the responders

Ali:				
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
Morten:				
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.

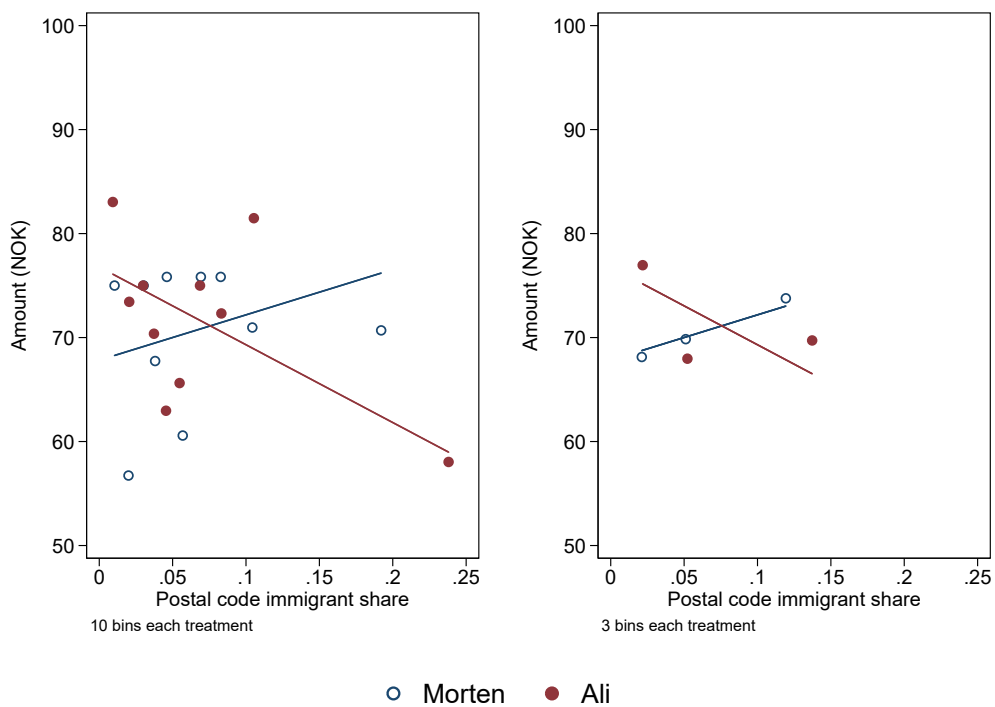
## G Finer level of aggregation: Postal codes

Table A.10: The conflict hypothesis: Amount sent in the trust game and previous exposure.

VARIABLES	(1) Ali	(2) Ali	(3) Morten	(4) Morten	(5) All	(6) All
Postal code immigrant share	-5.27** (2.36)	-6.07** (2.47)	3.67 (2.22)	4.13 (2.73)	3.41 (2.06)	2.98 (2.27)
Ali					0.44 (2.79)	2.08 (3.04)
Postal code immigrant share*Ali					-8.74*** (3.14)	-8.76*** (3.32)
Observations	296	296	296	296	592	592
R-squared	0.08	0.25	0.10	0.28	0.07	0.15
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
Postal code share	0.02	0.02	-0.02	-0.02	0.00	0.00
SD Muni share	1.13	1.13	0.85	0.85	1.00	1.00

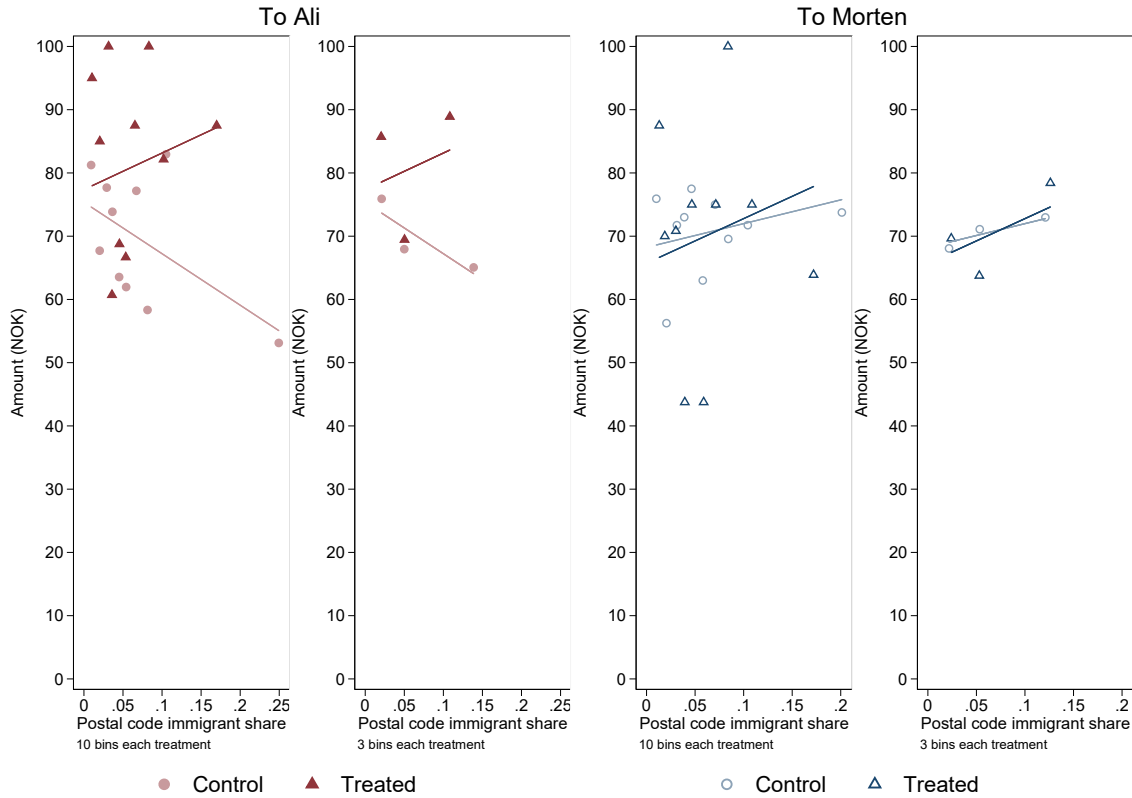
*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game (can also be interpreted as percent). *Postal code immigrant share:* Non-western immigration share on postal code level for each soldier (standardized, mean 0, sd 1). Regressions (1)-(2) only include observations 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. 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. Mean and standard deviation of dependent and independent variables below. Robust standard errors in parentheses clustered on rooms, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . OLS regressions.

Figure A.6: Trust and previous exposure (postal code).



*Note:* Trust in Morten represented by blue line/hollow blue dots, trust in Ali by red line/solid red dots. Amount sent in NOK on vertical axis, share of immigrants on the postal code level on the horizontal axis. Subjects in the main sample are grouped into equal sized bins within each treatment based on the 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.

Figure A.7: Amount sent in the trust game and share of immigrants (postal code)



*Note:* Amount sent in NOK on vertical axis, share of immigrants on the postal code level 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 postal code 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.

Table A.11: Integrating the conflict and contact hypotheses: Amount sent, treatment status, and share of immigrants on the postal code level

VARIABLES	(1) Ali	(2) Ali	(3) Morten	(4) Morten
Treated	9.80* (5.27)	10.58* (5.72)	2.72 (7.03)	2.83 (6.76)
Postal code immigrant share	-5.63** (2.35)	-6.32** (2.46)	3.09 (2.23)	2.92 (2.73)
Postal code immigrant share*Treated	7.05 (6.07)	6.21 (7.91)	2.73 (4.97)	6.05 (6.00)
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 postal code share	0.02	0.02	-0.02	-0.02
SD postal code share	1.13	1.13	0.85	0.85

*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game (can also be interpreted as percent). *Treated* denotes soldiers from mixed rooms. *Postal code immigrant share*: Non-western immigration share on postal code level for each soldier (standardized, mean 0, sd 1). 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. 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. Mean and standard deviation of dependent and independent variables below. Robust standard errors in parentheses clustered on rooms, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. OLS regressions.

Table A.12: Attitudes towards immigration/ immigrants and trust.

VARIABLES	(1) Mort	(2) Mort	(3) Mort	(4) Ali	(5) Ali	(6) Ali
Conservative	-0.15 (4.58)	-0.20 (4.63)	3.64 (5.45)	4.94 (5.06)	3.67 (5.13)	5.40 (5.56)
Treated*conservative	7.17 (10.81)	8.56 (10.38)	11.73 (11.68)	-18.87* (10.20)	-16.49 (10.72)	-25.26** (11.83)
Treated	-1.92 (11.73)	-2.53 (11.15)	-4.64 (11.26)	22.92*** (8.34)	21.04** (8.58)	28.50*** (9.55)
Postal code immigrant share		3.82* (2.26)	4.66* (2.80)		-4.96** (2.30)	-5.77** (2.62)
Observations	296	296	296	296	296	296
R-squared	0.09	0.11	0.26	0.07	0.09	0.18
Company FE	yes	yes	yes	yes	yes	yes
Session FE	yes	yes	yes	yes	yes	yes
Individual controls	no	no	yes	no	no	yes
Mean	71.28	71.28	71.28	71.45	71.45	71.45

*Note:* The dependent variable is amount in NOK sent to the responder Ali/Morten in the trust game, which can also be interpreted as percent. *Treated* denotes soldiers from mixed rooms. *Conservative* is equal to one for the half of the sample who holds more conservative views towards immigration. *Postal code immigrant share*: Non-western immigration share on postal code level for each soldier (standardized, mean 0, sd 1). Regressions (1)-(3) only include observations from the in-group treatment (Morten), (3)-(6) only include observations from the out-group treatment (Ali). Robust standard errors in parentheses clustered on rooms, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . OLS regressions. Individual controls do not include attitudes towards immigration.

Table A.13: Attitudes and postal code immigration share

VARIABLES	(1) conserv	(2) conserv
Postal code immigrant share	-0.04** (0.02)	-0.05** (0.02)
Observations	592	592
R-squared	0.03	0.13
Company FE	yes	yes
Session FE	yes	yes
Individual controls	no	yes
Mean	0.57	0.57

*Note:* The dependent variable is a dummy variable equal to one for the conservative half of the sample. *Postal code immigrant share*: Non-western immigration share on postal code level for each soldier (standardized, mean 0, sd 1). In (2) we add the standard controls used throughout the paper, excluding attitudes towards immigrants/ immigration. Robust standard errors in parentheses clustered on rooms, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . OLS regressions.