Warfare and Social Preferences in Children

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Social preferences ---such as altruism, aversion to inequality and strong reciprocity--- are critical for the maintenance of cooperation[1-3]. Although pro-social individuals make their groups do better as a whole, they are vulnerable to exploitation by selfish free-riders. Wars between groups have been hypothesized as an important catalyst of human pro-sociality since Darwin[4]. Recent theories[5] have been predicting that, in order to maximize the likelihood of survival, conflicts should strengthen parochialism[6] (ingroup-outgroup differential treatment), suppress within-group competition[7], and promote within-group cooperation. However, this fundamental hypothesis has not been tested in the context of actual warfare. Here, we report the results of experimental games with young children (n=543) in the Republic of Georgia six months after the war with Russia over South Ossetia. Our results show that children who were affected by warfare are significantly more likely to choose egalitarian allocations and to share within their social group, relative to unaffected children. Moreover, such prosocial motives strengthen simultaneously with parochialism. Because parochial altruism has important survival functions, these results support the logic of group-selection models[5,8]. These results further imply that, given the quick response, the development of norms and associated preferences may operate on a very rapid timescale[9,10].

Human warfare and conflicts are pervasive phenomena throughout history[11,12]. At the same time, humans are unusually cooperative and pro-social[13], often willing to confer personally costly benefits to others[14]. It has been argued that human pro-sociality may have originated precisely in war contexts, when within-group cooperation becomes a matter of individual survival[4,5,9]. Wars are expected to simultaneously sharpen an individual's sense of group identity (parochialism) ---nurturing hostility towards enemies--- and promote social norms that cement group cohesion, to enhance within-group cooperation[5,7]. This kind of social preferences (parochial altruism) make groups more likely to survive relative to groups with more selfish individuals. These models' logic is relevant for group selection's long-term processes, either genetic[11] or cultural[15], as well as for more short-term responses to warfare, such as adaptation of social norms to circumstances or evolution of survival instincts (psychological reaction). For example, egalitarian motives shaped many small-scale societies, making leveling practices such as sharing of large hunted game a widespread norm, particularly strongly enforced during times of evolutionary pressure[16]. Using lab experiments, social psychologists have shown inter-group competition to intensify group-based altruism[9,17]. Economists have produced some evidence that experience of violence during civil wars may actually increase individual participation in voting[18] and local collective action[19] ---finding that could help understand the recently observed rapid post-war political and economic recoveries of several African countries. Historically, wars have promoted state formation and nation building in Europe[20].

However, a direct link between warfare experience and social (other-regarding) preferences has not yet been empirically tested, due to the paucity of experimental measures of preferences from contemporary conflict and post-conflict societies. To achieve this goal, we ran an experiment in the Republic of Georgia six months after the end of the war with Russia. Our subjects were children (N=543) with substantial variation in warfare exposure. The experiment consisted of four dictator games played against an anonymous partner coming from a pool either known or unknown to the subject. Thus, the design and setting were ideal

for studying whether other-regarding preferences and parochialism are strengthened in the context of warfare.

Georgia was the object of rivalry between the Persian, Ottoman, and Russian empires for centuries. Important for our study is the August 2008 war over South Ossetia. The timing of its inception was not anticipated by migration of civilians away from the affected areas[21,22]. The war lasted one week and resulted in substantial devastation of livelihoods in the areas of South Ossetia and the bordering districts of Georgia; more than 100 thousands of civilians were forced to leave their homes[21,22]. Most of the fighting was based on aerial, artillery and tank fire strikes[20] and, thus, unlikely to selectively affect families with certain types of characteristics.

The experiment was conducted six months after the war's end. In addition, we collected individual-level information about warfare exposure. We asked whether the subject heard fighting, saw fighting, saw a soldier, an injured person or had an injured relative; 68% of subjects answered positively to at least one question and were denoted as "affected" with the rest as "non-affected". In addition to being affected, 28% of children were internally displaced persons (IDP) at the time of the experiment. Motivated by previous experimental evidence[23-25] showing other-regarding behaviour developing strongly at the age of 7-8-yr, we studied children between the ages of 3 and 11. Detailed descriptive statistics are in Supplementary Table 1.

The protocol, specifically designed for children[23], consists of four binary choice dictator games. In each game, the subject has to select between two alternative allocations of tokens between self and a partner (see Methods and Supplementary Methods). The children were very motivated to reveal their preferences: Each token allowed them to "buy" one item from a variety of sweets, pencils, and small toys.

In the costly sharing game, the subject chooses between the allocation (1,1) ---one token for himself and one for partner--- and the allocation (2,0) ---both tokens for self. This game measures preference to reduce advantageous inequality. Because choosing the egalitarian option (1,1) provides a benefit to an anonymous partner at a cost to oneself, selfish subjects

should never make the egalitarian choice. In the costly envy game, the decision-maker chooses between (1,1) and (2,3). Here, the choice of (2,3) leads to higher reward for both players, but it leads to a disadvantageous inequality for the decision-maker. Thus, the egalitarian choice (1,1) indicates strong preference to reduce disadvantageous inequality. These two games are particularly interesting because they unambiguously distinguish between other-regarding behaviour and purely selfish behaviour. The costless sharing game [(1,1) vs. (1,0)] and the costless envy game [(1,1) vs. (1,2)] capture similar motives, but equalizing payoff is not costly for the decision-maker; thus, self-interest is not involved. The combination of choices across these four games allows classifying behaviour in types: generous, selfish, ahead-averter, behind-averter, spiteful (Supp. Table S2).

The children were randomly assigned into two treatments. For the ingroup condition, the anonymous partner came from the same class; for the outgroup condition, the anonymous partner was from a different Georgian school, completely unknown to the subject. These treatments allow us to assess the extent of parochialism ---preferential treatment to one's own group members measured as ingroup-outgroup gap in choices.

Our testable hypothesis is not directly derived by group-selection models[5], which would require a long-time horizon to produce results (genetic evolution), but is based on the intuition behind such models and plausibility of faster mechanisms, such as psychological reaction or adaptation of social norms (cultural evolution). We hypothesize that egalitarian and prosocial preferences are intensified with warfare exposure. In particular, exposure should reduce selfish behaviour in the ingroup treatment. Higher prevalence of egalitarianism and altruism should enhance group-level cooperation, crucial when at risk of extinction. The experimental outgroup members are not enemies, thus we don't expect to observe more spiteful actions, but, possibly, more selfish behaviour towards them. Taken together, warfare should induce simultaneous formation of other-regarding behaviour in the ingroup treatment and a significant ingroup-outgroup gap (parochialism). In addition, we expect mostly the older children to follow the hypothesized behaviours, because only the older ones have been found prone to behave in normatively appropriate ways[26].

As expected, our results indicate that exposure to warfare among 7-11-yr-old children is associated with less selfish behaviour towards ingroup and more selfishness towards outgroup members. This pattern is similar for both the costly sharing and the costly envy game. In the costly envy game [(1,1) vs. (2,3)] ingroup treatment, 47% of affected children chose the egalitarian option while only 25% of non-affected children did, a highly significant difference (Supp. Table 3, warfare dummy in probit regression, z=3.41, P=0.0006, n=203). In the outgroup condition, the frequency of egalitarian choices decreases slightly with affected children, but not significantly (warfare dummy, z=-0.98, P=0.325, n=174). The interaction effect between warfare experience and ingroup condition is large and highly significant (z=3.12, P=0.002, n=377), indicating that the difference in frequency of egalitarian choices between ingroup and outgroup conditions strongly increases with warfare experience. Thus, among affected children, we find the simultaneous emergence of a willingness to pay for not being behind in one's group and parochialism (ingroup-outgroup gap). A similar interaction effect stimulates more sharing behaviour in the costly sharing game [(1.1) vs. (2,0)] (Supp. Table 4, warfare*ingroup dummy, z=1.79, P=0.073, n=377).

To test the effect of warfare across different victimization kinds, we divide the affected children in those exposed to warfare but not internally displaced ("affected & non-IDP") and those displaced in addition to being exposed ("affected & IDP"). We find the simultaneous development of egalitarian motives and ingroup-outgroup gap to be driven by warfare exposure and further cemented by displacement. In the costly sharing game, sharing with the ingroup increases and decreases for the outgroup: there is no ingroup-outgroup gap in egalitarian choices among non-affected children (Fig 1a; Supp. Table 7, ingroup dummy, z=0.13, P=0.894, n=118). The difference in frequencies of egalitarian choices is 16% among the affected and non-IDP children (ingroup dummy, z=2.11, P=0.03, n=184) and reaches 36% among the affected and IDP children (ingroup dummy, z=2.48, P=0.013, n=75). In the costly envy game, the frequency of egalitarian choices in the ingroup treatment increases from 25% among the non-affected children to 43% among the affected and non-IDP children (Fig. 1b; Supp. Table 8, War & Non-IDP dummy, z=2.73, P=0.006, n=203) and reaches 58% among

the affected and IDP children (War & IDP dummy, z=3.62, P=0.0003, n=203). The children who were forced to leave their homes and resettle are the most inequality-averse and make the sharpest distinction between ingroup and outgroup. The few children that were displaced but not affected do not result statistically different than those unaffected, in any of the four games.

Next, we explore which particular types of other-regarding preferences are stimulated by warfare. Behind-averse children are characterized by egalitarian choices in both the costly and costless envy games. A positive interaction effect of ingroup condition and warfare experiences significantly increases a probability of being behind-averse (Fig. 2a, Supp. Table 9). Ahead-averse children are characterized by egalitarian choices in the costly and costless sharing games. We observe a positive ingroup bias among affected children (IDP and Non-IDP) and a smaller, insignificant ingroup bias among non-affected children (Fig. 2b). The difference in the ingroup bias is not, however, statistically significant (Supp. Table 10). It is noteworthy that war slightly reduces the prevalence of generous subjects ---maximizers of partners' payoff in all four games---in the ingroup treatment (Fig. 2c) and it has virtually no effect on the prevalence of spiteful subjects ---minimizers of partners' payoff (Fig. 2d).

We find no effect of warfare exposure on 3-6-yr-old children's preferences in any game (Supp. Tables 14-17), in contrast with the 7-11-yr group. This result is intriguing in light of earlier experimental evidence that shows other-regarding behaviour to develop strongly after the age of 7 years, when children acquire the normative rules of the society surrounding them[23-26].

Warfare experience is not a completely random event allowing for clear causal inference. For instance, some of the regions covered in our sample were affected more than others and, it can be argued, social norms governing pro-social behaviour could vary across regions independently of warfare. In further multivariate analysis we control for location differences in a detailed way, including one dummy variable for each of the 15 regions our subjects come from (Supp. Map 1). This location fixed-effect absorbs away any variation in warfare experience across the regions so that the remaining variation distinguishes children within the same region. The results are similar to our previous estimates, supporting the direct

link between warfare and egalitarian motives (Supp. Tables 22-23). We discuss further tests regarding the underlying causal mechanism in Supplementary Information.

Our study provides experimental evidence that egalitarian and prosocial preferences are intensified after a war. Such motives are important for group cohesion and maintenance of cooperation[2,14]. Behindness-aversion motivates cooperators to punish selfish free-riders ---the other side of altruism[3]. Aheadness-aversion motivates not to defect in the first place. With the simultaneous development of group identity, our findings accord with the logic of group selection models[5]. While the process of selection requires a very long time horizon, we find that warfare can affect human prosociality within a lifetime, indicating that social preferences may adapt relatively quickly and accelerate the development of those types of human preferences identified as favourable by genetic[5] or cultural group selection models[15]. One interesting possibility, consistent with recent evidence demonstrating the effect of oxytocin on promoting parochial altruism[27], is that the human brain evolved to stimulate behaviour critical for survival of one's own group if it experiences a shock. The potential evolutionary roots of such psychological reaction does not preclude the possibility that social norms respond to circumstances[28] and affect socialization of children via parental transmission or peer pressure[10, 29]. The findings may help to explain rapid recoveries observed in many post-conflict societies[12] as well as to caution us that potential positive effects on cooperation may come at the expense of regard for people outside of one's social group.

Methods

Selection of subjects. The children in our sample come from different villages in South Ossetia, Gori town, villages around Gori and Tbilisi, and different parts of Tbilisi (for distribution see Supplementary Map). The children were accessed via 15 primary schools and kindergartens. In each school, we randomly selected classes and all children who were present participated.

Experimental procedures. Game instructions and procedure build upon Fehr, Bernhard and Rockenbach (2008). We added the costly envy game because of our interest in other-regarding choices that could reduce individual payoff. We used tokens as experimental currency, to avoid satiation effects and satisfy variety of tastes. Each token could be exchanged for one item (pencils, erasers, small toys and sweets) in our experimental shop after all the games were completed. Each child played all four games against anonymous partners. In each game, subjects chose between two mutually exclusive options, represented with two cardboards (for more details see Supplementary Information). In the ingroup condition, the photo on the laptop (representing the pool from which to draw randomly and anonymously a partner) showed children from the same class; in the outgroup condition, the photo showed an unknown class of children. The choices were made privately and only the experimenter could observe the subject's choices. We randomized the order of the games as well as whether the egalitarian option was on the right-hand side or left-hand side. Three trained experimenters conducted the experiments. All our game scripts were administered in Georgian language and we used the method of back translation to ensure consistency.

Statistical methods. We examine the choices using a probit regression. In all regressions we control for age. Definitions of variables are provided in the Supplementary Information document.

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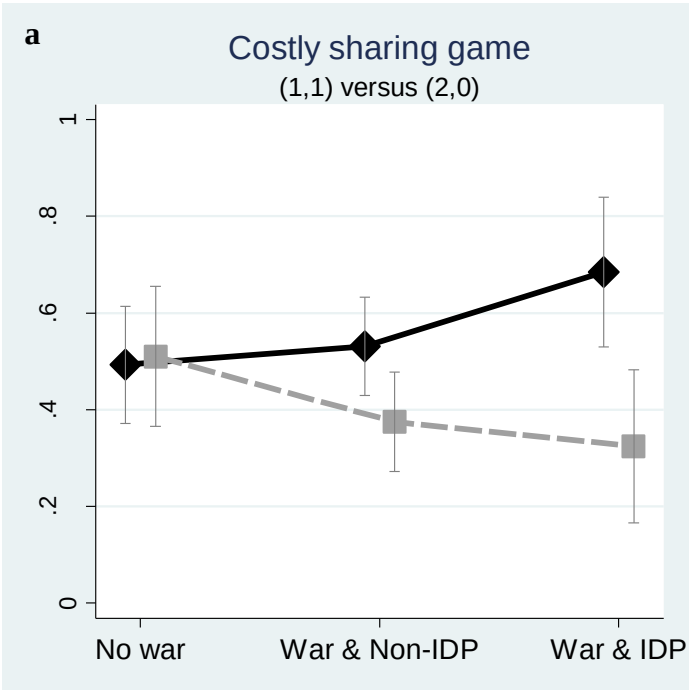
Figure 1. Relative frequency of egalitarian choices and warfare exposure among 7-11-yr-old children. Grey dashed line represents frequencies when the partner was an outgroup member, whereas the black solid line represents frequencies when the partner was an ingroup member. Error bars represent 95% confidence intervals. We distinguish three groups of children: non-affected children (No war), children who were exposed to warfare but not displaced six month later (War & Non-IDP), and children who were IDP in addition to being exposed to warfare (War & IDP). In both games, the simultaneous development of egalitarian motives and a sharper distinction between ingroup and outgroup members emerges with warfare exposure and is strengthened by being internally displaced, suggesting that there is a separate effect of warfare which is further cemented by being displaced.

Figure 2. Behavioural types and warfare exposure among 7-11-yr-old children. Aheadness-averse subjects choose the (1,1) option in both the costly sharing game [(1,1) vs. (2,0)] and the costless sharing game [(1,1) vs. (1,0)]. Behindness-averse subjects choose the (1,1) option in both the costly envy game [(1,1) vs. (2,3)] and the costless envy game [(1,1) vs. (1,2)]. Generous subjects maximize payoff of their partners in all four games, whereas spiteful subjects minimize payoff of their partners in all games. Selfish types choose (2,0) option in the costly sharing game and (2,3) option in the costly envy game. Error bars represent 95% confidence intervals. If the partner is an ingroup member (solid black line), the percentage of behindness-averse subjects increases steeply with warfare exposure, whereas warfare slightly reduces the percentage of behindness-averse types if the partner is an outgroup member (grey dashed line). Children affected by warfare are more aheadness-averse towards their ingroup than outgroup, relative to non-affected children. Being affected is associated with a lower prevalence of selfish types in the ingroup condition and higher prevalence in the outgroup condition and it is not associated with higher prevalence of generous or spiteful types.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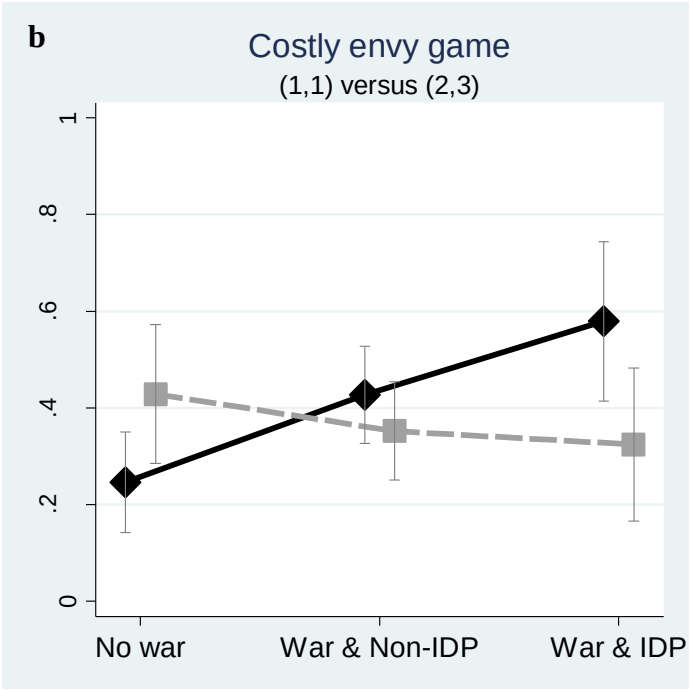
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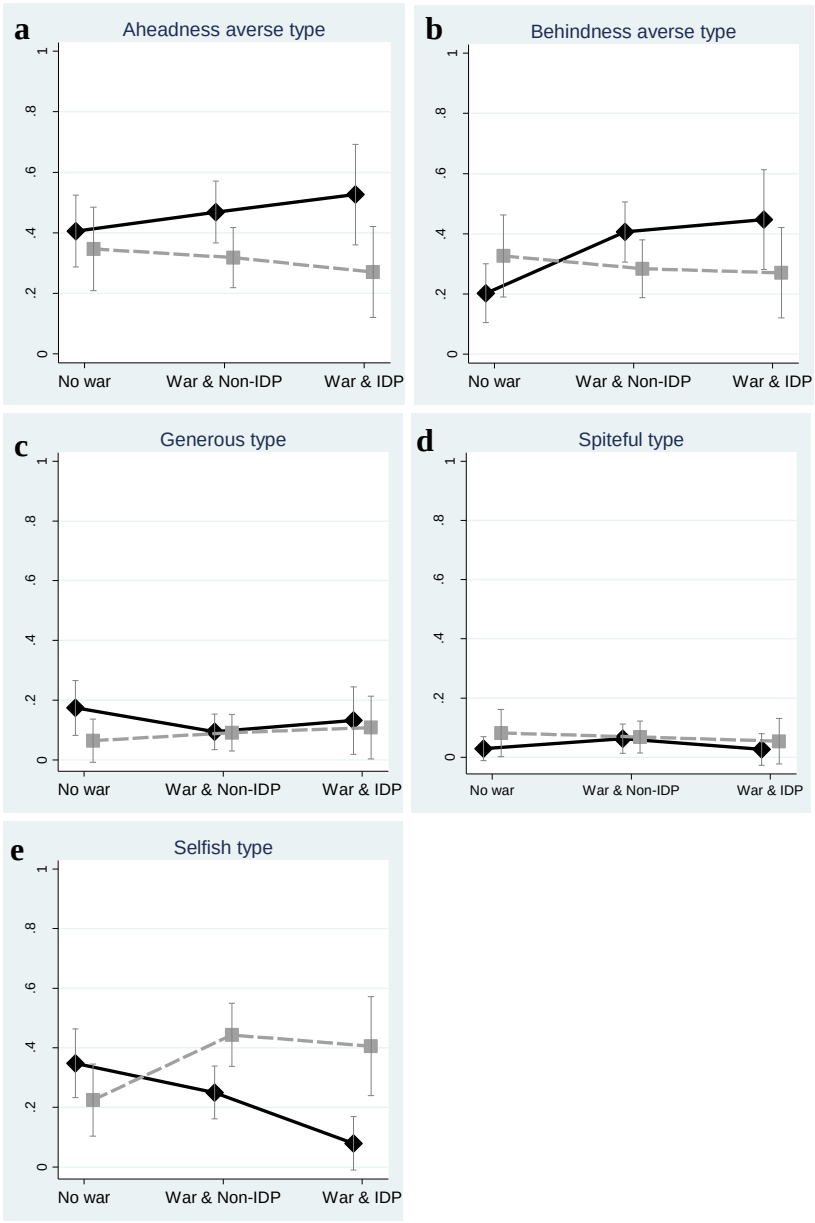
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Supplementary Information Guide

Supplementary Methods:

This file contains detailed information about the sample selection, the experimental procedure, the choice situation, the rewards, the experimental protocol and the survey instruments.

Supplementary Tables:

This file contains the summary statistics of our sample, the classification of behavioural types based on behaviour across games, and the definitions of all variables used in the analysis. It contains the results and the statistical tests referenced in the paper.

Supplementary Discussion:

This file contains a brief description of the war between Georgia and Russia over South Ossetia. It contains a map with information about geographical pre-war distribution of the subjects within Georgia. It includes further results and a discussion about the causal mechanism behind the observed link between being affected by war and other-regarding preferences.

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Supplementary Methods

This file contains detailed information about the sample selection, the experimental procedure, the choice situation, the rewards, the experimental protocol and the survey instruments.

Sample selection

A total of 543 children aged 3 through 11 years from the Republic of Georgia participated in the experiment during January-February 2009 ---6 months after the war with Russia. The children come from different regions within South Ossetia, Gori region, villages between Gori and Tbilisi, and different parts of Tbilisi (for distribution see Supplementary Map 1 in Supplementary Discussion). Children were accessed via 15 primary schools and kindergartens located across all these regions except South Ossetia which had, and still has, closed borders. Nevertheless, many children from South Ossetia are in our sample because Georgian families from South Ossetia were internally displaced to these other regions and their children attended local schools. In each school, we randomly selected classes and all children who were present participated in the experiment. We had the official approval from the Georgian Ministry of Education and the school principals to conduct the experiment. Summary statistics of our sample are in Table S2 (Supplementary Tables).

Experimental procedures

The instructions are based on the written experimental protocol developed by Fehr, Bernhard and Rockenbach (2008) for the specific purpose of conducting experiments among children. We are very grateful to the authors for allowing us to base our experiment on their fundamental work. Relative to their work, we added a fourth game, the costly envy game [(1,1) vs. (2,3)], because we are primarily interested in other-regarding choices that reduce individual payoff: Costly envy game is a natural complement to costless sharing game [(1,1) vs. (1,2)], similarly as costly sharing game [(1,1) vs. (2,0)] complements costless sharing game [(1,1) vs. (1,0)]. Another departure from the original protocol has been the use of tokens instead of sweets as experimental currency, to avoid satiation effects and satisfy a wide variety of tastes.

Each child played all four games against an anonymous partner either from their class (ingroup condition) or from another unknown class (outgroup condition). In each game, the subjects chose between two mutually exclusive options, represented on two cardboards (see

Supplementary Fig. 1). On each cardboard there were two circles, each one with one arrow directed either to the decision-maker or to the anonymous partner displayed on a laptop screen. We placed the tokens inside the circles. An arrow directed towards the decision-maker illustrated that (s)he will be the recipient of the tokens placed inside that circle, whereas the tokens in the other circle, with an arrow towards the laptop picture, illustrated how much the partner would get. Ingroup and outgroup conditions were randomly assigned to the subjects. If the ingroup condition was applied, the photo on the laptop showed a class photo of children from the same class whereas the photo showed an unknown class of children for the outgroup condition. The decision-maker was told that the tokens in the circle with an arrow pointing to the picture would be given to one of the children in that picture. A bag with the appropriate number of tokens was set aside and later anonymously delivered.

The treatment, the order of the games, the allocation of the egalitarian option on either the right hand side or the left hand side, and the experimenter (out of three) were randomly determined before the actual experiment. The results reported in the paper are robust to controlling for order effect, the spatial allocation of the egalitarian option and the experimenter effect [results available upon request].

Supplementary Figure 1: Choice situation. The children made choices between two mutually exclusive options represented by cardboards. The allocation of rewards

to the decision-maker and the partner was illustrated by circles with arrows and a photo displayed on a laptop screen.

The choices were made privately and only the experimenter could observe the subject's choices (it is very difficult to conduct a double blind protocol with children). The experimenters explained to each child that nobody including their parents and teachers would be informed about their choices. Three trained experimenters conducted the experiments and two other research assistants helped with filling questionnaires and distributing rewards in the experimental shop. All our game scripts were administered in the Georgian language by native speakers and we used the method of back translation to ensure consistency. The English version of the experimental protocol is a part of this file.

Supplementary Figure 2: Making choices. Experimenters explained the games individually to each subject. In each game, the subjects made their choices only after they answered correctly to the questions on the payoff consequences of the two options.

The children were very motivated to truthfully reveal their preferences. After the experiments were completed, the children were taken to the experimental shop where they could exchange the gained experimental tokens for various items ranging from different kinds of sweets, pencils, erasers, stickers to other small toys. For simplicity, the price was always

one token for one item. To stress the link between tokens and rewards in the shop and to increase the salience of rewards, the children received one token as a show-up fee and were allowed to exchange it for a reward before the actual experiment. At the end, after each child exchanged all her tokens, we placed all her rewards into a paper bag and requested the child not to open it before the end of the school-day, so that other children could not observe its content when the subject returned to her classroom.

Supplementary Figure 3: Experimental shop. After the experiments were completed, the children exchanged the tokens earned during the experiment for a range of items (pencils, erasers, candies and small toys) in the "experimental shop".

The experiments were complemented with short questionnaires administered to the children, their teacher and their parents. In terms of our analysis, the most important questions were the ones focusing on warfare exposure that asked whether the child saw fighting, heard fighting, saw an injured person, saw soldiers, whether (s)he had a relative injured and whether her/his family was internally displaced. The complete questionnaires are shown below.

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Supplementary Tables

This file contains the summary statistics of our sample, the classification of behavioural types based on behaviour across games and the definitions of all variables used in the analysis. It contains all the results and the statistical tests referenced in the paper.

Table S1: Summary statistics.

	All		Affected by warfare				Treatment			
			Yes		No		Ingroup		Outgroup	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Panel A: Warfare experiences										
Affected by warfare	0.68	(0.47)	1.00	(0.00)	0.00	(0.00)	0.65	(0.48)	0.72	(0.45)
Heard fighting	0.54	(0.50)	0.80	(0.40)	0.00	(0.00)	0.50	(0.50)	0.58	(0.49)
Saw fighting	0.21	(0.41)	0.31	(0.46)	0.00	(0.00)	0.19	(0.40)	0.23	(0.42)
Saw an injured per.	0.09	(0.29)	0.14	(0.34)	0.00	(0.00)	0.07	(0.26)	0.12	(0.32)
Saw soldier	0.42	(0.49)	0.63	(0.48)	0.00	(0.00)	0.40	(0.49)	0.44	(0.50)
Relative injured	0.07	(0.26)	0.11	(0.32)	0.00	(0.00)	0.05	(0.23)	0.10	(0.29)
Displaced (IDP)	0.28	(0.45)	0.35	(0.48)	0.13	(0.33)	0.27	(0.44)	0.29	(0.46)
Panel B: Child's characteristics										
Female	0.48	(0.50)	0.47	(0.50)	0.52	(0.50)	0.49	(0.50)	0.47	(0.50)
Age (years)	7.72	(2.07)	7.83	(2.12)	7.49	(1.93)	7.76	(2.09)	7.69	(2.04)
Number of siblings	1.05	(0.60)	1.10	(0.59)	0.96	(0.60)	1.07	(0.58)	1.03	(0.61)
Number of brothers	0.56	(0.50)	0.57	(0.50)	0.52	(0.50)	0.57	(0.50)	0.54	(0.50)
Number of sisters	0.54	(0.50)	0.57	(0.50)	0.48	(0.50)	0.54	(0.50)	0.54	(0.50)
Height (cm)	130	(13.2)	131	(13.4)	130	(12.9)	131	(13.4)	130	(13.1)
Panel C: Experimental responses: Percentage of egalitarian responses										
Costly envy game	0.38	(0.49)	0.40	(0.49)	0.35	(0.48)	0.41	(0.49)	0.35	(0.48)
Costless envy game	0.68	(0.47)	0.68	(0.47)	0.68	(0.47)	0.69	(0.46)	0.67	(0.47)
Costly sharing game	0.45	(0.50)	0.44	(0.50)	0.47	(0.50)	0.50	(0.50)	0.39	(0.49)

Costless sharing game	0.73 (0.45)	0.72 (0.45)	0.74 (0.44)	0.78 (0.41)	0.67 (0.47)
N	565	385	180	301	264

Children answered 5 questions on their experience during the war in August 2008: whether they heard fighting, saw fighting, saw a soldier, an injured person or had an injured relative. We denote children as being affected by warfare if they answered positively to any of those five questions. The differences between affected and non-affected children are significant for each type of war experience. In addition to being exposed to warfare, 28% children were internally displaced at the time of the experiment.

Table S2: Classification of types based on behaviour across games.

	Choice in:				Observed frequency
	Costly sharing game (1,1) vs.(2,0)	Costless sharing game (1,1) vs.(1,0)	Costly envy game (1,1) vs.(2,3)	Costless envy game (1,1) vs.(1,2)	in %
Aheadness averse	(1,1)	(1,1)	any	any	0.36
Behindness averse	any	any	(1,1)	(1,1)	0.32
Inequality averse	(1,1)	(1,1)	(1,1)	(1,1)	0.11
Generous	(1,1)	(1,1)	(2,3)	(1,2)	0.10
Spiteful	(2,0)	(1,0)	(1,1)	(1,1)	0.06
Selfish	(2,0)	any	(2,3)	any	0.33

Classification of types is based on behaviour across games. Aheadness-averse types choose the egalitarian option in the costly sharing game and the costless sharing

game, that is in the two games in which they can reduce advantageous inequality. Behindness-averse types choose the egalitarian option in the costly envy game and the costless envy game, that is in games in which they can reduce disadvantageous inequality. Inequality-averse types choose the egalitarian option in all four games. Generous subjects always choose the allocations that maximize the payoff of their partner. Spiteful subjects choose the allocations that minimize the payoff of their partner. Selfish subjects choose allocations that maximize their own payoff.

Notations and definitions of variables

- Throughout the text we use (1,1) option and egalitarian option as synonyms.
- The variable age is measured in years.
- The variable Ingroup is 0-1 variable, which is equal to 1 if the partner is an ingroup member and equals to 0 if the partner is an outgroup member.
- The variable "Affected by war" is 0-1 variable, which is equal to 1 if the subject answered positively to any of the five questions on war-related experiences: whether (s)he saw fighting, heard fighting, saw soldier, saw an injured person, had an injured relative; and it is equal to 0 otherwise.
- The variable "War & IDP" is 0-1 variable, which is equal to 1 if the subject was affected by war (as defined above) and at the same time internally displaced in January 2009 and 0 otherwise.
- The variable "War & Non-IDP" is 0-1 variable, which is equal to 1 if the subject was affected by war (as defined above) and at the same time was not internally displaced in January 2009 and 0 otherwise.
- The variable Behindness-averse is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in costly envy game and costless envy game and 0 otherwise.
- The variable Aheadness-averse is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in costly sharing game and costless sharing game and 0 otherwise.
- The variable Inequality-averse is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in all four games and 0 otherwise.
- The variable Spiteful is 0-1 variable, which is equal to 1 if the subject chooses those options which minimize payoff of the partner in all four games and 0 otherwise.
- The variable Generous is 0-1 variable, which is equal to 1 if the subject chooses those options which maximize payoff of the partner in all four games and 0 otherwise.
- The variable Gender is 0-1 variable, which is equal to 1 if the subject is female and 0 if he is male.
- The variable Height is an integer variable, which carries the number of centimeters the child was high.

Results

The egalitarian choices in different games and the prevalence of different other-regarding types are examined using a binary response model which employs a probit link function (estimated using standard maximum likelihood procedure), also known as probit regression. We report marginal effects, i.e. the change in probability for a small change in each independent variable. We control for age in all regressions.

Table S3: War experience and egalitarian choices in the costly envy game.

Estimation: Probit regressions

Sample: 7-11yr old children

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0816	0.253***	-0.0808		
	(0.324)	(0.000639)	(0.325)		
Ingroup	-0.209**			0.142**	-0.197**
	(0.0247)			(0.0219)	(0.0268)
War aff. * Ingroup	0.349***				
	(0.00181)				
Age	-0.0500***	-0.0458*	-0.0547*	-0.0526**	-0.0430
	(0.00929)	(0.0820)	(0.0511)	(0.0228)	(0.206)

N	377	203	174	259	118

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Note that the interaction term "War exp.*Ingroup" measures how the difference in egalitarian choices between the ingroup and outgroup changes with warfare experience. The positive coefficient means that the (ingroup-outgroup) difference is greater for children affected by war.

Table S4: War experience and egalitarian choices in the costly sharing game.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.159*	0.0347	-0.155*		
	(0.0613)	(0.650)	(0.0646)		
Ingroup	0.00185			0.206***	0.0128
	(0.984)			(0.00101)	(0.894)
War aff. * Ingroup	0.203*				
	(0.0727)				
Age	0.0569***	0.0713***	0.0384	0.0440*	0.0883**
	(0.00431)	(0.00852)	(0.176)	(0.0622)	(0.0177)
N	377	203	174	259	118

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S5: War experience and egalitarian choices in the costless envy game.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Egalitarian choice in the costless envy game [(1,1) vs. (1,2)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.111	0.0895	-0.108		
	(0.159)	(0.210)	(0.166)		
Ingroup	-0.154*			0.0590	-0.141
	(0.0787)			(0.305)	(0.113)
War aff. * Ingroup	0.200**				
	(0.0470)				
Age	0.0220	0.0351	0.00752	0.00357	0.0694**
	(0.224)	(0.162)	(0.774)	(0.867)	(0.0458)
N	376	203	173	259	117

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S6: War experience and egalitarian choices in the costless sharing game.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Egalitarian choice in the costless sharing game [(1,1) vs. (1,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0262	0.00474	-0.0276		
	(0.713)	(0.939)	(0.719)		
Ingroup	0.0466			0.0823	0.0495
	(0.567)			(0.128)	(0.547)
War aff. * Ingroup	0.0345				
	(0.721)				
Age	0.0238	0.0266	0.0203	0.0204	0.0321
	(0.155)	(0.223)	(0.429)	(0.304)	(0.302)
N	376	203	173	259	117

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S7: War experience, IDP status and egalitarian choices in the costly sharing game.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	-0.152*	-0.0108	-0.143			
	(0.0903)	(0.894)	(0.102)			
War&IDP	-0.173	0.151	-0.168			
	(0.115)	(0.141)	(0.105)			
Ingroup	0.00184			0.0128	0.155**	0.305**
	(0.984)			(0.894)	(0.0349)	(0.0133)
(War&Non-IDP)*Ingroup	0.152					
	(0.204)					
(War&IDP)*Ingroup	0.320**					
	(0.0266)					
Age	0.0568***	0.0721***	0.0369	0.0883**	0.0118	0.142***
	(0.00457)	(0.00777)	(0.199)	(0.0177)	(0.667)	(0.00422)
N	377	203	174	118	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions are run separately for children not affected by warfare, affected & non-IDP and affected and IDP, respectively.

As noted in Table 2, the interaction term measures how the difference in egalitarian choices between the ingroup and outgroup changes with warfare experience. The positive coefficients for both interaction terms ("War&IDP*Ingroup" and War&Non-IDP*Ingroup") mean that the (ingroup-outgroup) difference is greater for both these groups, relative to non-affected children.

Table S8: War experience, IDP status and egalitarian choices in the costly envy game.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	-0.0635	0.224***	-0.0615			
	(0.464)	(0.00631)	(0.475)			
War&IDP	-0.117	0.375***	-0.117			
	(0.257)	(0.000299)	(0.249)			
Ingroup	-0.209**			-0.197**	0.0818	0.293**
	(0.0243)			(0.0268)	(0.259)	(0.0153)
(War&Non-IDP)*Ingroup	0.297**					
	(0.0137)					
(War&IDP)*Ingroup	0.478***					
	(0.000798)					
Age	-0.0516***	-0.0464*	-0.0576**	-0.0430	-0.0547**	-0.0550
	(0.00784)	(0.0802)	(0.0427)	(0.206)	(0.0422)	(0.241)
N	377	203	174	118	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions

are run separately for children not affected by warfare, affected & non-IDP and affected and IDP, respectively.

Table S9: War experience, IDP status and prevalence of behindness averse types.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Being behindness averse (as defined in Table S1).

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	-0.0322	0.239***	-0.0283			
	(0.700)	(0.00279)	(0.726)			
War&IDP	-0.0671	0.293***	-0.0676			
	(0.501)	(0.00490)	(0.480)			
Ingroup	-0.149*			-0.134	0.131*	0.184
	(0.0992)			(0.105)	(0.0638)	(0.107)
(War&Non-IDP)*Ingroup	0.288**					
	(0.0159)					
(War&IDP)*Ingroup	0.375**					
	(0.0135)					
Age	-0.0438**	-0.0345	-0.0545**	-0.0337	-0.0616**	-0.0116
	(0.0171)	(0.174)	(0.0400)	(0.280)	(0.0194)	(0.789)
N	377	203	174	118	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions are run separately for children not affected by warfare, affected & non-IDP and affected and IDP, respectively.

Table S10: War experience, IDP status and prevalence of aheadness averse types.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Being aheadness averse (as defined in Table S1).

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	-0.0412	0.0173	-0.0340			
	(0.643)	(0.832)	(0.680)			
War&IDP	-0.0668	0.0770	-0.0671			
	(0.542)	(0.458)	(0.502)			
Ingroup	0.0781			0.0854	0.149**	0.199*
	(0.397)			(0.355)	(0.0396)	(0.0946)
(War&Non-IDP)*Ingroup	0.0696					
	(0.559)					
(War&IDP)*Ingroup	0.157					
	(0.308)					
Age	0.0495**	0.0681**	0.0266	0.0696*	0.0192	0.106**

	(0.0113)	(0.0120)	(0.330)	(0.0540)	(0.477)	(0.0242)
N	377	203	174	118	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions are run separately for children not affected by warfare, affected & non-IDP and affected and IDP, respectively.

Table S11: War experience, IDP status and prevalence of generous types.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Being generous (as defined in Table S1).

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	0.0307	-0.0916*	0.0285			
	(0.623)	(0.0842)	(0.596)			
War&IDP	0.0622	-0.0473	0.0514			
	(0.440)	(0.429)	(0.462)			
Ingroup	0.108*			0.106*	0.000228	0.000521
	(0.0718)			(0.0939)	(0.996)	(0.995)
(War&Non-IDP)*Ingroup	-0.0908					
	(0.160)					
(War&IDP)*Ingroup	-0.0739					
	(0.294)					

Age	0.0112	0.0187	0.00306	-0.0117	0.0177	0.0289
	(0.367)	(0.307)	(0.854)	(0.628)	(0.278)	(0.354)
N	375	203	172	116	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions are run separately for children not affected by warfare, affected & on-IDP and affected and IDP, respectively.

Table S12: War experience, IDP status and prevalence of spiteful types.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Being spiteful (as defined in Table S1).

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	-0.00148	0.0393	0.00129			
	(0.965)	(0.235)	(0.975)			
War&IDP	-0.0202	0.000325	-0.0245			
	(0.597)	(0.994)	(0.592)			
Ingroup	-0.0547			-0.0474	-0.00348	-0.0199
	(0.198)			(0.190)	(0.922)	(0.632)
(War&Non-IDP)*Ingroup	0.0615					
	(0.316)					

(War&IDP)*Ingroup	0.0295					
	(0.716)					
Age	-0.0195**	-0.0110	-0.0308**	-0.0253*	-0.0172	-0.0150
	(0.0194)	(0.276)	(0.0292)	(0.0673)	(0.204)	(0.324)
N	377	203	174	118	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions are run separately for children not affected by warfare, affected & non-IDP and affected and IDP, respectively.

Table S13: War experience, IDP status and prevalence of selfish types.

Estimation: Probit regressions

Sample: 7-11yr old children.

Dependent variable: Being selfish (as defined in Table S1).

Sample	All	Partner from ingroup	Partner from outgroup	Subject not affected by war	Subject affected by war but not displaced	Subject affected by war and displaced
	(1)	(2)	(3)	(4)	(5)	(6)
War&Non-IDP	0.214***	-0.0704	0.228**			
	(0.00923)	(0.285)	(0.0108)			
War&IDP	0.185*	-0.230***	0.201*			
	(0.0803)	(0.00414)	(0.0733)			
Ingroup	0.120			0.112	-0.194***	-0.296***
	(0.163)			(0.191)	(0.00576)	(0.00379)
(War&Non-IDP)*Ingroup	-0.261***					

	(0.00557)					
(War&IDP)*Ingroup	-0.319***					
	(0.000750)					
Age	-0.0134	-0.0239	7.71e-06	-0.0353	0.0120	-0.0488
	(0.465)	(0.301)	(1.000)	(0.296)	(0.646)	(0.199)
N	377	203	174	118	184	75

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4), (5) and (6) the regressions are run separately for children not affected by warfare, affected & non-IDP and affected and IDP, respectively.

Table S14: War experience and egalitarian choices in the costly envy game among 3-6yr old children.

Estimation: Probit regressions

Sample: 3-6yr-old children.

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	0.0468	-0.0323	0.0534		
	(0.692)	(0.759)	(0.622)		
Ingroup	0.193			0.112	0.197
	(0.130)			(0.199)	(0.122)
War aff. * Ingroup	-0.0833				
	(0.588)				
Age	-0.000357	0.0649	-0.0729	0.0133	-0.0344

	(0.993)	(0.283)	(0.221)	(0.793)	(0.668)
N	186	96	90	125	61

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S15: War experience and egalitarian choices in the costly sharing game among 3-6yr old children.

Estimation: Probit regressions

Sample: 3-6yr-old children.

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	0.0529	-0.0981	0.0553		
	(0.646)	(0.339)	(0.622)		
Ingroup	0.141			-0.0124	0.139
	(0.263)			(0.885)	(0.276)
War aff. * Ingroup	-0.148				
	(0.320)				
Age	-0.0192	0.00531	-0.0475	-0.0295	0.00650
	(0.651)	(0.928)	(0.442)	(0.555)	(0.935)
N	188	98	90	126	62

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S16: War experience and egalitarian choices in the costless envy game among 3-6yr old children.

Estimation: Probit regressions

Sample: 3-6yr-old children.

Dependent variable: Egalitarian choice in the costless envy game [(1,1) vs. (1,2)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0332	-0.000134	-0.0262		
	(0.762)	(0.999)	(0.819)		
Ingroup	0.0558			0.0819	0.0526
	(0.651)			(0.339)	(0.666)
War aff. * Ingroup	0.0266				
	(0.858)				
Age	0.0542	0.0889*	0.00934	0.0484	0.0682
	(0.190)	(0.0995)	(0.883)	(0.330)	(0.365)
N	188	98	90	126	62

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S17: War experience and egalitarian choices in the costless sharing game among 3-6yr old children.

Estimation: Probit regressions

Sample: 3-6yr-old children.

Dependent variable: Egalitarian choice in the costless sharing game [(1,1) vs. (1,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0276	-0.0137	-0.0309		
	(0.793)	(0.876)	(0.791)		
Ingroup	0.188			0.204**	0.196
	(0.122)			(0.0158)	(0.104)
War aff. * Ingroup	0.0118				
	(0.936)				
Age	-0.000654	-0.00166	0.000726	0.0170	-0.0474
	(0.987)	(0.973)	(0.991)	(0.731)	(0.550)
N	188	98	90	126	62

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Warfare and Social Preferences in Children

Michal Bauer, Alessandra Cassar & Julie Chytilová

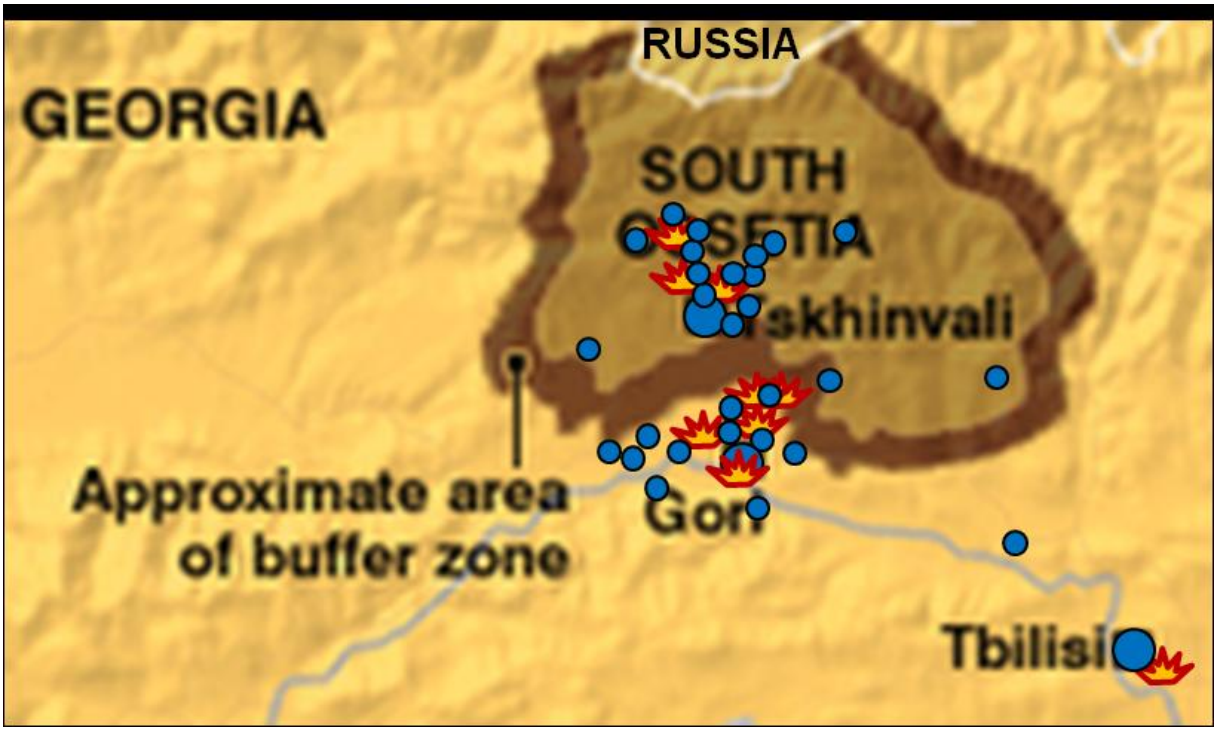
Supplementary Discussion

This file contains a brief description of the war between Georgia and Russia over South Ossetia. It contains a map with information about geographical pre-war distribution of the subjects within Georgia. It includes further results and a discussion about the causal mechanism behind the observed link between being affected by the war and other-regarding preferences.

Situated at the strategic crossroads where Europe meets Asia, Georgia was the object of rivalry between the Persian, Ottoman and Russian empires for centuries. Since independence after the collapse of communism in the USSR in 1991, the population of Georgia has endured several periods of unrest as well as violent wars related to the aspirations of independence of the breakaway regions of Abkhazia and South Ossetia. For this project, we focus on the August 2008 conflict over South Ossetia, when Georgia tried to regain control of the area to be subsequently defeated by Russian forces supported by Ossetian separatist groups.

Although provocations took place for extended periods before the inception of the war[1], its timing was unexpected and not preceded by migration of civilians away from the affected areas[1,2]. The war lasted one week and intensive fighting, indiscriminate to civilians, resulted in substantial human losses and devastation of livelihoods in South Ossetia and bordering districts. Most of the fighting was based on aerial, artillery and tank fire strikes[2,3] and the fighting affected most heavily villages around Tskhinvali (major town within South Ossetia) and Gori (sixth largest city in Georgia, located close to the borders with South Ossetia). More than 100 thousands of civilians were forced to leave their homes[2,3]. More than 35 thousands were still internally displaced at the time of our experiments and not expected to return to their homes in the foreseeable future, owing to the continued insecurity of the situation or to the destruction of their homes and property. Thus, the patterns and speed of bombing makes it a reasonable case for treating individual exposure to warfare as random (especially after controlling for average location differences). In the manuscript, we consider exposure to warfare as a "natural experiment" and compare the affected children with those in a control group (individuals with no exposure to warfare).

Map S1: Distribution of subjects across locations in the Republic of Georgia (before August 2008).



Before August 2008, our subjects lived in various locations across South Ossetia, Gori region, villages between Gori and Tbilisi, and different parts of Tbilisi. The blue dots denote villages or towns where our subjects lived before the war. The yellow-red fire symbols denote locations with aerial fire strikes (Source: Human Rights Watch 2009).

Nevertheless, exposure to warfare may not be a purely random event allowing for clear causal inferences about its effects. Below we describe the major possible concerns related to our interpretation that the observed correlations with preferences are driven by causal effect of warfare and robustness checks which indicate that the alternative explanations are unlikely to drive our results.

The main concern is that some towns or villages were affected more than others and social norms governing pro-social behaviour could vary across locations, independently of warfare. In particular, people in regions where people are more egalitarian and have bigger ingroup bias could be, coincidentally, those regions that were more heavily affected.

Motivated by previous evidence showing a link between market integration and human prosociality[4], we divide our sample on children who come from urban areas (Tbilisi, Gori, Tskhinvali) and children who come from villages. We find qualitatively similar effects of warfare on social preferences in both rural and urban areas (Supp. Tables 18-21). In further multivariate analysis we control for location differences in a detailed way and include one dummy variable for each of the 15 regions from which the children in our sample come from.[1] This absorbs any variation in warfare exposure across the regions so that the remaining variation essentially distinguishes children within the same region (Supplementary Tables 22-23). The results are similar to our previous estimates, supporting the direct link between warfare and egalitarian motives.

It's also theoretically possible that children with certain types of characteristics would be more likely target of violence and these characteristics drive differences in preferences. The form of fighting in Georgia and the fact that we focus on children who are less likely to be singled out, attenuate this concern. But similar argument may also apply to their parents, because the exposure of children may correlate with parental characteristics that may also drive prosocial behaviour of their children. We test the importance of this issue in two ways. First, we use information about children's characteristics. In Tables S24 and S25 we show our results to be robust to controlling for a child's gender, age, height and number of siblings. Second, although the war was quick, intensive and without repeated attacks it might be possible that the separatist fighters knew personally villagers in South Ossetia and, potentially, could target more cooperative households or households of local leaders. In contrast, there has been virtually no pre-war personal interactions between separatist groups (as well as Russian soldiers) and civilians in the Gori area (undisputed area). Thus, selective targeting in regions other than South Ossetia is very unlikely. In Tables S26 and S27 we

[1] Eleven dummy variables denote towns and villages where more than five subjects lived before the war (Tbilisi, Gori, Sveneti, Tserovani, Tskhinvali, Achabeti, Achalgori, Eredvi, Kemerti, Kheiti and Kurta). One dummy variable denotes villages in South Ossetia where less than six subjects lived and which we were able to locate on a map. Similar dummy is for the Gori region. One dummy variable denotes children who lived in South Ossetia before the war but were either too young to know the name of their village or the village was too small to be located on a map. We use a similar dummy for places we could not locate in the Gori region.

restrict the sample on children who don't come from South Ossetia and observe qualitatively similar patterns, but with less statistical power in costly sharing game.

Table S18: War experience and egalitarian choices in the costly envy game among children from urban areas.

Estimation: Probit regressions

Sample: 7-11yr-old children from urban areas (Gori, Tskhinvali and Tbilisi).

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.105	0.240**	-0.104		
	(0.346)	(0.0235)	(0.355)		
Ingroup	-0.233*			0.128	-0.227*
	(0.0564)			(0.159)	(0.0630)
War aff. * Ingroup	0.363**				
	(0.0183)				
Age	-0.0778***	-0.0728*	-0.0838**	-0.0804**	-0.0729
	(0.00685)	(0.0626)	(0.0489)	(0.0260)	(0.125)
N	185	100	85	118	67

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S19: War experience and egalitarian choices in the costly envy game among children from rural areas.

Estimation: Probit regressions

Sample: 7-11yr-old children from rural areas.

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0630	0.308**	-0.0629		
	(0.646)	(0.0101)	(0.641)		
Ingroup	-0.220			0.168*	-0.200
	(0.170)			(0.0749)	(0.173)
War aff. * Ingroup	0.385**				
	(0.0367)				
Age	-0.0429	-0.0518	-0.0319	-0.0383	-0.0554
	(0.179)	(0.233)	(0.496)	(0.300)	(0.362)
N	154	82	72	113	41

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S20: War experience and egalitarian choices in the costly sharing game among children from urban areas.

Estimation: Probit regressions

Sample: 7-11yr-old children from urban areas (Gori, Tskhinvali and Tbilisi).

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.121	-0.00888	-0.116		
	(0.305)	(0.936)	(0.312)		
Ingroup	0.0742			0.188**	0.114
	(0.558)			(0.0420)	(0.388)
War aff. * Ingroup	0.115				
	(0.467)				
Age	0.0874***	0.0912**	0.0803*	0.0548	0.153***
	(0.00392)	(0.0268)	(0.0638)	(0.139)	(0.00458)
N	185	100	85	118	67

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S21: War experience and egalitarian choices in the costly sharing game among children from rural areas.

Estimation: Probit regressions

Sample: 7-11yr-old children from rural areas.

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.307**	0.0920	-0.310**		
	(0.0255)	(0.450)	(0.0272)		
Ingroup	-0.155			0.259***	-0.152
	(0.337)			(0.00684)	(0.339)
War aff. * Ingroup	0.398**				
	(0.0264)				
Age	0.0723**	0.0847*	0.0520	0.0748*	0.0634
	(0.0297)	(0.0503)	(0.290)	(0.0506)	(0.337)
N	154	82	72	113	41

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S22: Within-region variation in war experience and egalitarian choices in the costly envy game among 7-11yr old children.

Estimation: Probit regressions.

Sample: 7-11yr-old children.

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Independent variables: Age and location fixed effects (15 dummies, one for each region, coefficients not displayed)

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by	Subject not affected by

				war	war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.138	0.228***	-0.154		
	(0.121)	(0.00439)	(0.104)		
Ingroup	-0.220**			0.151**	-0.199**
	(0.0201)			(0.0202)	(0.0362)
War aff. * Ingroup	0.369***				
	(0.00125)				
Age	-0.0734***	-0.0593**	-0.0954***	-0.0884***	-0.0445
	(0.000882)	(0.0487)	(0.00406)	(0.00142)	(0.232)
N	373	202	171	252	111

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S23: Within-region variation in war experience and egalitarian choices in the costly sharing game among 7-11yr old children.

Estimation: Probit regressions.

Sample: 7-11yr-old children.

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Independent variables: Age and location fixed effects (15 dummies, one for each region, coefficients not displayed)

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.160*	0.00296	-0.130		
	(0.0799)	(0.972)	(0.177)		
Ingroup	0.0244			0.208***	0.0728
	(0.801)			(0.00134)	(0.485)
War aff. * Ingroup	0.187				
	(0.106)				
Age	0.0722***	0.0815***	0.0621*	0.0494*	0.115***
	(0.00134)	(0.00727)	(0.0659)	(0.0704)	(0.00616)
N	377	197	172	259	109

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S24: War experience and egalitarian choices in the costly envy game (after controlling for observable characteristics).

Estimation: Probit regressions

Sample: 7-11yr-old children

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Independent variables: Age, gender, height, number of brothers, number of sisters

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war

	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0814	0.233***	-0.0859		
	(0.355)	(0.00458)	(0.326)		
Ingroup	-0.148			0.170**	-0.142
	(0.130)			(0.0120)	(0.138)
War aff. * Ingroup	0.323***				
	(0.00725)				
Age	-0.0245	0.00131	-0.0655	-0.0385	0.0271
	(0.429)	(0.975)	(0.177)	(0.292)	(0.657)
Female	-0.0322	0.0297	-0.108	-0.122*	0.176*
	(0.562)	(0.704)	(0.174)	(0.0763)	(0.0673)
Height (cm)	-2.68e-05	-0.00170	0.00381	0.00337	-0.0118
	(0.995)	(0.769)	(0.580)	(0.518)	(0.166)
Number of brothers	-0.0735	-0.0890	-0.0560	-0.0254	-0.191*
	(0.214)	(0.293)	(0.504)	(0.726)	(0.0746)
Number of sisters	-0.102*	-0.131	-0.0756	-0.0712	-0.219**
	(0.0783)	(0.121)	(0.348)	(0.317)	(0.0329)
N	319	166	153	215	104

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S25: War experience and egalitarian choices in the costly sharing game (after controlling for observable characteristics).

Estimation: Probit regressions

Sample: 7-11yr-old children

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Independent variables: Age, gender, height, number of brothers, number of sisters

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.175*	0.0153	-0.173*		
	(0.0540)	(0.857)	(0.0606)		
Ingroup	-0.0103			0.192***	-0.0151
	(0.918)			(0.00557)	(0.883)
War aff. * Ingroup	0.200*				
	(0.0996)				
Age	0.0404	0.0842*	-0.0270	0.0324	0.0607
	(0.211)	(0.0509)	(0.586)	(0.387)	(0.349)
Female	-0.0519	-0.0364	-0.0919	-0.0536	-0.0480
	(0.371)	(0.647)	(0.274)	(0.450)	(0.641)
Height (cm)	0.00189	-0.00395	0.0121	0.00155	0.00296
	(0.682)	(0.509)	(0.101)	(0.773)	(0.743)
Number of brothers	0.0144	-0.0715	0.121	-0.0175	0.0934
	(0.815)	(0.406)	(0.171)	(0.813)	(0.409)
Number of sisters	-0.0449	-0.0861	-0.0222	-0.0654	0.0123
	(0.456)	(0.313)	(0.792)	(0.370)	(0.910)
N	319	166	153	215	104

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S26: War experience and egalitarian choices in the costly envy game among 7-11yr old children from undisputed areas.

Estimation: Probit regressions

Sample: 7-11yr-old children. Children who come from South Ossetia excluded from the sample.

Dependent variable: Egalitarian choice in the costly envy game [(1,1) vs. (2,3)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.0614	0.255***	-0.0605		
	(0.489)	(0.00130)	(0.497)		
Ingroup	-0.214**			0.120*	-0.204**
	(0.0280)			(0.0917)	(0.0279)
War aff. * Ingroup	0.335***				
	(0.00567)				
Age	-0.0508**	-0.0456	-0.0573*	-0.0496*	-0.0525
	(0.0154)	(0.105)	(0.0689)	(0.0543)	(0.139)
N	302	166	136	194	108

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

Table S27: War experience and egalitarian choices in the costly sharing game among 7-11yr old children from undisputed areas.

Estimation: Probit regressions

Sample: 7-11yr-old children. Children who come from South Ossetia excluded from the sample.

Dependent variable: Egalitarian choice in the costly sharing game [(1,1) vs. (2,0)]

Sample	All	Partner from ingroup	Partner from outgroup	Subject affected by war	Subject not affected by war
	(1)	(2)	(3)	(4)	(5)
Affected by war	-0.126	-0.0299	-0.123		
	(0.170)	(0.716)	(0.176)		
Ingroup	0.0502			0.149**	0.0685
	(0.610)			(0.0374)	(0.495)
War aff. * Ingroup	0.0999				
	(0.414)				
Age	0.0442**	0.0500*	0.0361	0.0219	0.0933**
	(0.0409)	(0.0848)	(0.255)	(0.399)	(0.0171)
N	302	166	136	194	108

Marginal effects (dF/dx) are reported; p-values are in parentheses, *** denotes significance at 1% level, ** at 5% level and * at 10% level. In all regressions we control for age. In columns (2) and (3) the regressions are run separately for ingroup and outgroup. In columns (4) and (5) the regressions are run separately for children affected by warfare and non-affected by warfare.

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