Warfare and Social Preferences in Children

Michal Bauer[1,2], Alessandra Cassar[3] & Julie Chytilová[1]

[1] *Charles University in Prague, Opletalova 26, Prague 1, 101 00, Czech Republic. bauerm@fsv.cuni.cz*
[2] *CERGE-EI, Politických vězňů 7, Prague 1, 101 00, Czech Republic. chytilova@fsv.cuni.cz*
[3] *University of San Francisco, 2130 Fulton St. , San Francisco, CA 94117, USA. acassar@usfca.edu*

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Abstract

Since Darwin, warfare and inter-group hostilities have been hypothesized as catalysts in explanations for the evolutionary puzzle of human pro-sociality. Lethal conflicts would foster the development of social norms that suppress competition within groups, strengthen preference for ingroup parochialism and promote overall group-level cooperation. However, the evidence is limited to ethnographic accounts on prevalence of warfare in foraging societies and experiments documenting behaviour consistent with parochial altruism in peaceful settings. Moreover, the necessary timescale for the evolution of altruistic traits remains controversial. To address this question, we conducted dictator game experiments with 564 children in the Republic of Georgia six months after the war with Russia over South Ossetia. Our subjects were 3-11-yr-old children, a period during which children are expected to acquire normative rules of society. Our results indicate that 7-11-yr-old children who were exposed to warfare are more likely to choose egalitarian allocations that remove disadvantageous and advantageous inequality, relative to children who had not such experience. Moreover, egalitarian motives strenghten in simultaneity with group identity, measured as ingroup-outgroup gap (ingroup preferential treatment or parochialism). Because egalitarian motives are important factors in suppressing competition and in underlying strong reciprocity, these results support the logic of group-selection models. These findings suggest that the normative content of social norms, according to which children are socialized, may change quite quickly in response to wars and conflicts, further implying that the evolution of norms may go beyond the process of selective extinction and operate on a very rapid timescale.

Motivation

Social preferences ---such as altruism, aversion to inequality and strong reciprocity--- are critical for achieving cooperation in large groups of genetic strangers (Fehr and Schmidt, 1999; Fowler, Johnson and Smirnov, 2007; Fehr and Gächter, 2002; Fischbacher, Gächter and Fehr, 2001). Although pro-social individuals make their groups do better as a whole, they are vulnerable to exploitation by selfish free-riders. These counteractive forces make other-regarding preferences evolutionary unstable. Since Darwin, frequent lethal inter-group conflicts jointly with a long-term process of selection have been hypothesized as a solution to this puzzle with recent works making strides in deriving the implications for properties of human sociality (Bowles, 2008; Bowles 2009, Choi and Bowles, 2007; Gintis et al., 2005). Assuming preferences having a genetic component (nothing in this paper claims they do or don't), for prosocial preferences to be evolutionary stable, wars should simultaneously sharpen an individual's sense of group identity and promote social norms that suppress competition while enhancing within-group cooperation, thus allowing for individually costly but inter-group beneficial behaviours (Gintis et al., 2005; Bowles, 2006). Anthropological studies show that egalitarian motives shaped many human small-scale societies, making leveling practices such as monogamy and sharing of large hunted games a common norm (Boehm, 1999). Using similar logic but working on much shorter timescale, social psychologists argue that warfare intensifies group-based altruism and the punishment of defectors (Bornstein, 2003; Pruitt & Rubin, 1986). Economists have started to produce evidence that conflicts may actually increase the presence of collective actions (Bellows and Miguel, 2009), speculating that such findings could help understand the rapid postwar political and economic recoveries observed after several recent African civil wars. This view is consistent with the observation that wars historically promoted state formation and nation building in Europe (Tilly and Ardant, 1975).

Despite these studies, the extreme scarcity of individual-level data ---not to mention experimental measures of preferences or propensity to punish from contemporary conflict and post-conflict societies--- has not allowed to test such fundamental predictions empirically. To address this void, in this paper we report the results of our study which analyzes the linkages between warfare and social (other-regarding) preferences. The empirical data come from experiments conducted with 564 children in the Republic of Georgia (only six months after the end of war with Russia over South Ossetia) and across several regions that suffered different degrees of warfare. Relative to other conflicts, this war was unexpected, fast, largely based on fire strikes and, thus, affected indiscriminately large proportions of civilians (Human Rights Watch, 2009; EU, 2009). To measure variation in exposure to warfare across regions as well as within regions, we collected information both on self-reported child war-related experiences and objective idp (internally displaced person) status. Motivated by previous experimental evidence (Fehr et al., 2008; Camerer, 2003) showing other-regarding behavior developing strongly at the age of 7-8-yr (when children acquire the normative rules of the society surrounding them) we studied children between the ages of 3 and 11. The experimental games were a series of one-shot dictator games played against anonymous partners to isolate other-regarding preferences from other forms of prosocial behavior that might be driven by selfish motives, such as expectation of future benefits. We focused primarily on strong form of other-regarding behavior, i.e. when subjects are willing to change the partner's payoff at a cost to oneself, thus reducing individual fitness. We used a between-subjects design with a two-group treatment. To assess the strength of ingroup bias, anonymous partners belonged either to the child's ingroup (classmates) or outgroup (other Georgian school children). Thus, the environment, the subjects and the experimental design were ideal for studying whether other-regarding preferences and a common group identity are

strengthened in the context of warfare. Our results significantly support this hypothesis.

Related Literature

Although group conflict and warfare play a prominent role in explanations of the evolution of human social behavior (e.g. Bowles, 2008; Fehr and Fischbacher, 2003), the existing evidence is only suggestive. There is quite strong evidence that group conflicts and warfare were wide-spread in foraging societies (Keeley, 1996; Bowles, 2009). Predicted properties of human altruism, namely ingroup favoritism and other-regarding behavior (a.k.a. parochialism), have been documented as common human traits in experiments among subject pools in peaceful settings (Bernhard et al., 2006), and social norms seem to have evolved and responded to potential for cooperation in everyday life (Henrich et al., 2001). If warfare has been an important force in cultural evolution then the prevalence of other-regarding motives, which affect propensity to reward and punish altruistically, should be systematically affected by warfare. In particular, people should be more willing to share and punish defection (Fehr and Fischbacher, 2003). The evidence from inter-group conflict games among students indicates that altruistic cooperation in prisoner's dilemma games increases if groups compete (Bornstein and Ben-Yossef, 1994; Bornstein 2003). However, there is no experimental evidence on whether conflict stimulates motives to punish non-cooperators (Fehr and Gachter, 2002). In addition, inter-group conflict games do not allow to test whether conflict induces simultaneous development of ingroup bias, relative to a group which is not involved in the conflict, a pattern predicted by theory. Most importantly, it's hard to be conclusive unless we test the predictions in the context of actual warfare when the group pressure is not artificially created in the experimental lab. Therefore, a direct test of the link between warfare and group-based preferences requires a setting where subjects vary with respect to their warfare experiences and an experimental design which measures prevalence and types of other-regarding motives as well as their differential application (parochialism or ingroup bias).

Sample and experimental design

Situated at the strategic crossroads where Europe meets Asia, Georgia was the object of rivalry between the Persian, Ottoman and Russian empires for centuries. As such, the location is ideal to study social norms in the context of conflicts and wars. Important for our study is the August 2008 war over South Ossetia between Georgia and Russian forces supported by Ossetian separatist groups. Although the war was preceded by an extended period of provocations, the timing of its inception was unexpected and not anticipated by migration of civilians off the affected areas. The war lasted one week and its intensive fighting, indiscriminately affecting civilians, resulted in substantial human losses and 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 (Human Rights Watch, 2009; EU, 2009). Most of the fighting was based on aerial, artillery and tank fire strikes (Human Rights Watch, 2009) and thus, conditional on location, unlikely to affect selectively families with certain type of traits or observable characteristics, compared to other types of conflicts. For this reason, we consider self-selection into victimization highly unlikely. Six months after the war's end we conducted the experiments and collected individual-level information about warfare exposure with five questions on war-related experiences (Table 1) in addition to other controls. As expected, we find a substantial variation in warfare exposure both across regions as well as within regions.

To measure prosocial behavior, we built upon and extended the protocol of Fehr et al. (2008). We utilized a series of four binary choice dictator games that explore the prevalence of advantageous and disadvantageous inequality aversion as well as pure selfishness, generosity or spitefulness. A total of 564 children distributed across the age of 3-11-yr participated, each

one of them paired with one anonymous partner and making choices in all four games. In each game, the decision-maker had to select between two alternative allocations of tokens between self and a partner. The children were very motivated to reveal their preferences: One token gave them the right to choose one item from a variety of sweets, pencils and small toys. Much care has been devoted to ensure that the subjects understood the experiment (see Methods and Supplementary Methods). To be absolutely sure, the children were allowed to make their choices in each game only after answering correctly all the questions on the payoff consequences of both options.

	All	Warfare exposure	
		Yes	No
	(N=553)	(N=385)	(N=188)
Heard fighting	54%	80%	0%
Saw fighting	21%	31%	0%
Saw an injured person	9%	14%	0%
Saw soldier	42%	63%	0%
Relative injured	7%	11%	0%
Exposed to warfare	68%	100%	0%
Displaced due to warfare	28%	35%	13%

Table 1: Exposure to war-related experiences. 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 exposed to warfare if they answered positively to any of those five questions. The differences between exposed and non-exposed children are significant for each type of war experience. In addition to being exposed to warfare, a substantial proportion of children was internally displaced at the time of the experiment.

In two of the games, the costly sharing game and the costly envy game, altering a partner's payoff is costly and thus selfish motives compete with other-regarding motives. 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 motives 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 can choose between (1,1) and (2,3). Here, the choice of (2,3) leads to higher reward for the decision-maker as well as for the partner, but it leads to a disadvantageous inequality for the decision-maker. Thus, the egalitarian choice (1,1) indicates strong motives to reduce disadvantageous inequality. These two games are particularly interesting because they unambiguously distinguish between other-regarding behavior and purely selfish behavior. In the other two games, the costless sharing game and the costless envy game, equalizing payoff does not incur at a cost for the decision-maker, and thus economic self-interest is not involved. In the costless sharing game, the subjects can choose between (1,1) and (1,0). In the costless envy game, the decision-maker can choose between (1,1) and (1,2). The combination of choices across these four games allow us to further classify behaviour according to several types (generous, homo economicus, ahead-averter, behind-averter, spiteful).

With respect to the treatment, the children were randomly selected into two experimental conditions, based upon the identity of the (always anonymous) partner. For the ingroup condition, the anonymous partner came from the same class. For the outgroup condition, the partner was from a different school, completely unknown to the subject. Thus, the subjects did not have any specific knowledge about the outgroup partners that could influence their choices, except of the fact that the partner lives in Georgia (to make it clear that such outgroup partner doesn't come from groups that were hostile to Georgia during the conflict). These two treatment conditions allow us to assess the extent of parochialism ---a sense of group identity measured as ingroup-outgroup gap in choices.

Our testable hypotheses (advanced by group-selection models (e.g. Choi and Bowles, 2007) based on the idea that human altruism can evolve only in the context of lethal intergroup

conflict) is that prosocial norms are intensified under the threat of extinction associated with warfare. Thus, theory gives the following predictions. Exposure to warfare should reduce selfish motives in the ingroup treatment. In particular, we should observe higher prevalence of either egalitarian or altruistic motives because these traits enhance group-level cooperation. The outgroup members are not members of the hostile ethnicity or nation, thus we should not observe more spiteful actions, but perhaps more selfish behavior because the social norms are typically ingroup-specific and war sharpens a sense of group identity. Taken together, the theory predicts that warfare should induce simultaneous formation of cooperation-conducive types of other-regarding behavior in the ingroup treatment and a bigger ingroup-outgroup gap (parochialism). If the normative content of social norms, which children are learning from parents and peers, does not respond to warfare situation, we should not observe any difference in other-regarding behavior across children with different warfare exposure. On the contrary, we expect to find differences if social norms respond to circumstances. In addition, with respect to age, we expect especially older children's behaviour (rather than the younger ones') to follow the advanced prosocial predictions, because older children are more prone to behave in normatively appropriate way (Eisenberg and Mussen, 1989).

Results: Warfare and Self-interest

As predicted by theory, we find that exposure to warfare is associated with a significant reduction of selfish behavior towards ingroup members and more selfish behavior towards outgroup members among 7-11-yr-old children (Fig. 1, Supplementary Table 2). This pattern is similar for the costly sharing game [(1,1) vs. (2,0)] where the children who select the (1,1) option are willing to pay for reducing advantageous inequality, as well as for the costly envy game [(1,1) vs. (2,3)] where the children who opt for the egalitarian choice pay to reduce

disadvantageous inequality. In both games, the egalitarian choice is inconsistent with purely selfish motives.

In the costly envy game [(1,1) vs. (2,3)], the frequency of (1,1) choices in the ingroup condition is 25% among the children without exposure to warfare and increases to 47% among the children exposed to warfare. This difference is highly significant (warfare dummy in probit regression, P=0.001, n=203). The frequency of egalitarian choices in the outgroup condition decreases slightly with warfare exposure, although this is not significant (warfare dummy in probit regression, P=0.325, n=174).[1] We observe a highly significant interaction effect between exposure to warfare and ingroup condition (probit regression, P=0.002, n=377), indicating that the difference in frequency of egalitarian choices between the ingroup and outgroup conditions strongly increases with exposure to warfare and is associated with strong ingroup bias among the affected children (controlling for age in the probit regression, ingroup dummy, P=0.022, n=259) in contrast to children not exposed to warfare who are more egalitarian towards the outgroup (controlling for age in the probit regression, ingroup dummy, P=0.027, n=118). Thus, the willingness to pay for not being behind and the ingroup-outgroup gap emerges simultaneously among the children exposed to warfare.

The interaction effect of warfare exposure and ingroup condition stimulates not only aversion to receiving less but also more sharing behavior in the costly sharing game [(1.1) vs. (2,0)] (Fig. 1; Supplementary Table 2, probit regression, P=0.073, n=376). We find no difference between sharing with ingroup and outgroup among the children who were not exposed to warfare (probit regression, ingroup dummy, P=0.894, n=118) in contrast to children exposed to warfare who share significantly more with ingroup members (probit regression, ingroup

[1] The number of observations in different regressions vary because we use different sub-samples: out of 377 children of the age 7-11 years 203 children were in the ingroup condition, 174 children were in the outgroup condition, 259-children were exposed to warfare and 118 children were not exposed to warfare.

dummy, P=0.001, n=259). Thus, willingness to share, when having more, emerges simultaneously with parochialism (ingroup-outgroup gap).

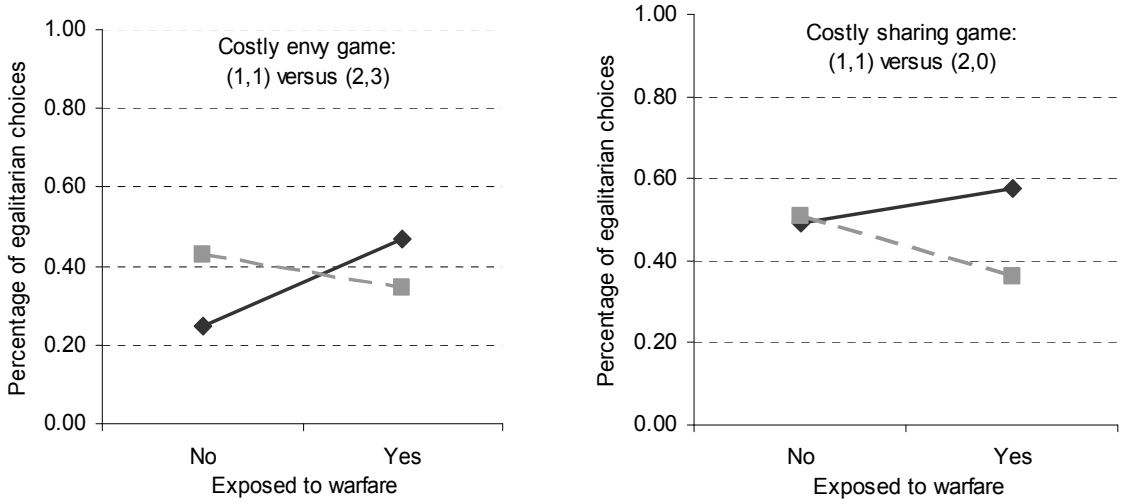


Figure 1: Warfare exposure and relative frequency of other-regarding choices among 7-11-yr-old children. Grey dashed line represent when the partner was an outgroup member, whereas the black solid line represent when the partner was an ingroup member. Being exposed to warfare denotes children who either heard fighting, saw fighting, a soldier, an injured person. In the costly envy game, the children in the ingroup condition pay more to remove disadvantageous inequality if they are exposed to warfare than if they are not, whereas egalitarian choices towards the outgroup strongly decrease with warfare exposure. In the costly sharing game, the children pay to remove inequalities that favor themselves, the frequency of egalitarian choices slightly increase with war exposure in the ingroup condition whereas it decreases in the outgroup condition. Egalitarian behavior either in the costly envy or the costly sharing game unambiguously rule out purely selfish preferences, and therefore the results provide strong evidence for the link between warfare exposure and simultaneous formation of other-regarding preferences and a sense of group identity (ingroup-outgroup gap).

Results: Warfare and Egalitarian Motives

Next, we pool the choices across various games to explore which particular type of other-regarding preferences is stimulated by warfare. Behind-ness averse children are characterized by egalitarian choices in both the costly envy game [(1,1) vs. (2,3)] and costless envy game [(1,1) vs. (1,2)] (as in Bartling et al., 2009). Because the effect of warfare in the costless envy game is qualitatively similar to its costly counterpart (Supplementary Table 3), we observe a strong interaction effect of ingroup condition and warfare exposure on higher prevalence of

behind-averter individuals (Fig. 2; Supplementary Table 3, probit regression, P=0.006, n=377). Ahead-averse children are characterized by egalitarian choices in both the costly sharing game and the costless sharing game. We observe large and significant ingroup bias among affected children (probit regression, p=0.005, n=259) and smaller insignificant ingroup bias among non-affected children (Table S4, probit regression, p=0.355, n=118). The interaction of warfare exposure and ingroup status is not, however, significant statistically (Fig. 2; probit regression, P=0.409, n=377) because there is not much variation in costless sharing behavior across warfare exposure. It's also noteworthy that the interaction of war and ingroup treatment seem to reduce the prevalence of subjects who are generous ---maximize partner's payoff in all four games (Table S4, probit regression, P=0.15, n=375)--- and it has virtually no effect on the prevalence of subjects who are spiteful ---minimize the payoff of their partner (Table S4, probit regression, P=0.335, n=377).

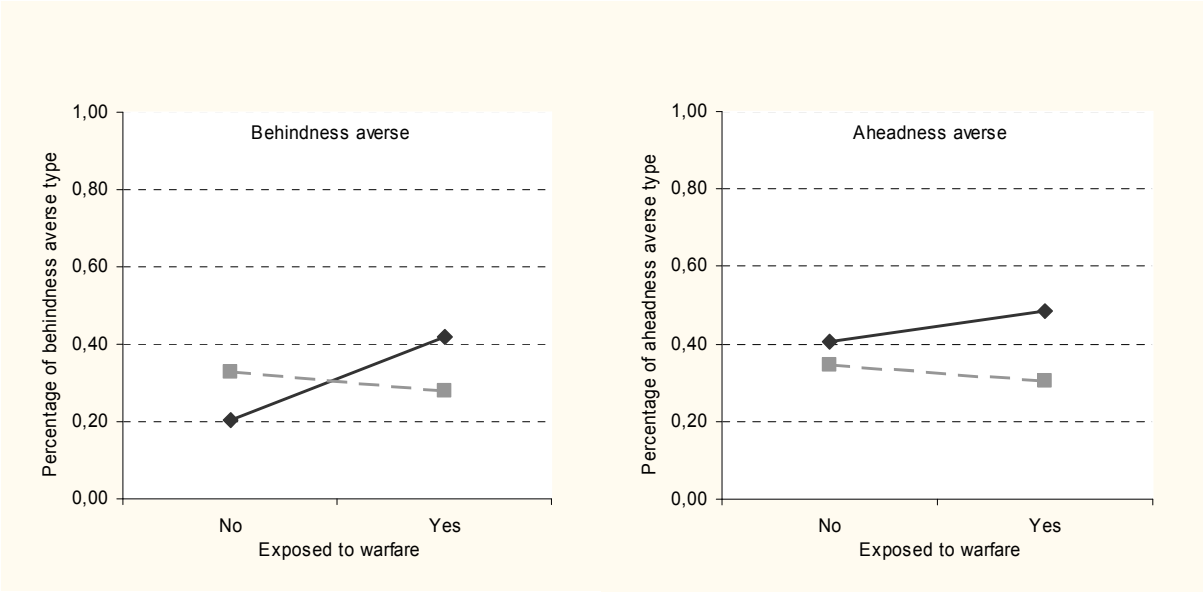


Figure 2: The relative frequency of aheadness averse types and behindness averse types among 7-11-yr-old children. We classify the children on two behavioral types, according to how they treat inequality across the games. Aheadness averse subjects choose the (1,1) option in both the costly sharing game and the costless prosocial game. Behindness averse subjects choose the (1,1) option in both the costly envy game and the costless envy game. 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-exposed children. Together, these results provide evidence for simultaneous formation ingroup-outgourp gap and egalitarian motives, being driven by warfare.

Further results

We find no effect of warfare exposure on preferences for 3-6-yr-old children in any of the four games. Comparing exposed to not-exposed children, we observe no significant differences in the relative frequencies of egalitarian choices across experimental conditions (ingroup vs. outgroup) as well as no effect on the relative size of the ingroup-outgroup gap (Sup. Fig. 4, Sup. Table 4). These results contrast with the observed effect of warfare among the 7-11-yr-old group. This is intriguing at the 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 (Fehr et al. 2008, Camerer 2003) and in line with theories of mind and perspective taking abilities (Eisenberg and Mussen 1989; Wellman et al 2001). In this context, it is interesting that egalitarian motives in particular, and not motives of generosity or spitefulness, develop further among the affected children. This is suggestive about the normative content of the rules which children acquire during socialization in warfare setting.

Furthermore, we find suggestive evidence that warfare shifts attention towards ingroup members relative to outgroup members, in line with our previous results on choice. For each game, we measured whether a child needed more than three seconds to decide about the allocation of rewards. The sum of the cases in which (s)he did is our proxy for attention which we used to study differences across treatments. Among 7-11-yr-old children, those exposed to warfare pay significantly more attention to their ingroup (Fig. 3, Sup. Table 5, ordered probit, p-value 0.084) whereas non-affected children pay somewhat less attention (ordered probit, p-value=0.263). All together, we find that the interaction of warfare and ingroup status affects

decision-making time (ordered probit, p-value=0.060), suggesting that children affected by warfare take relatively more seriously the welfare consequences of their behavior towards their ingroup.

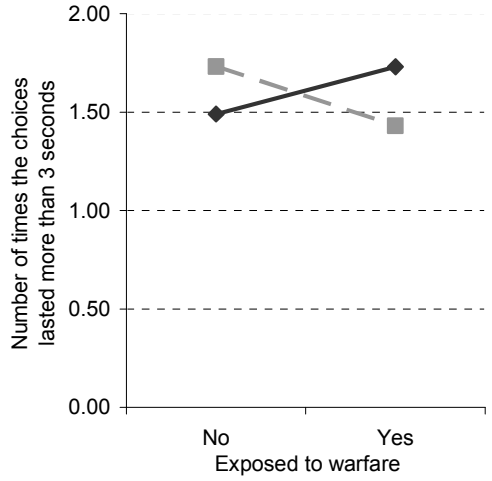


Figure 3: Decision-making time across ingroup-outgroup conditions and war exposure among 7-11-yr-old children. In each of the four games we recorded whether a child needed more than three seconds to make a decision. To approximate whether attention paid to ingroup and outgroup members differs with warfare exposure, we sum the cases with longer decision-making time. The children exposed to warfare pay more attention to their ingroup relative to outgroup, compared to non-affected children, suggesting that exposure to warfare shifts individual focus towards the ingroup.

Another important refinement is to test whether the effects of warfare differ across different types of victimization. To this goal, we divide the exposed children in two groups: those who were exposed to warfare but not internally displaced, and those displaced in addition to being exposed to warfare. In Fig. 4 (and Sup. Table 6) we observe simultaneous development of egalitarian motives and ingroup-outgroup gap to be driven by warfare exposure separately, and further cemented by displacement. In the costly sharing game, there is no ingroup-outgroup gap in frequency of egalitarian choices among the non-affected children, the difference is 16% among the exposed but not displaced children and reaches 36% among the exposed and displaced children. In the costly envy game, the frequency of egalitarian choices in the ingroup condition increases from 25% among non-affected children to 43% among

exposed but not displaced children and reaches 58% among the exposed and displaced children. Intuitively, the children who were not only exposed to warfare, but also forced to leave their homes and resettle, are the most inequality averse and they make the sharpest distinction between ingroup and outgroup members.

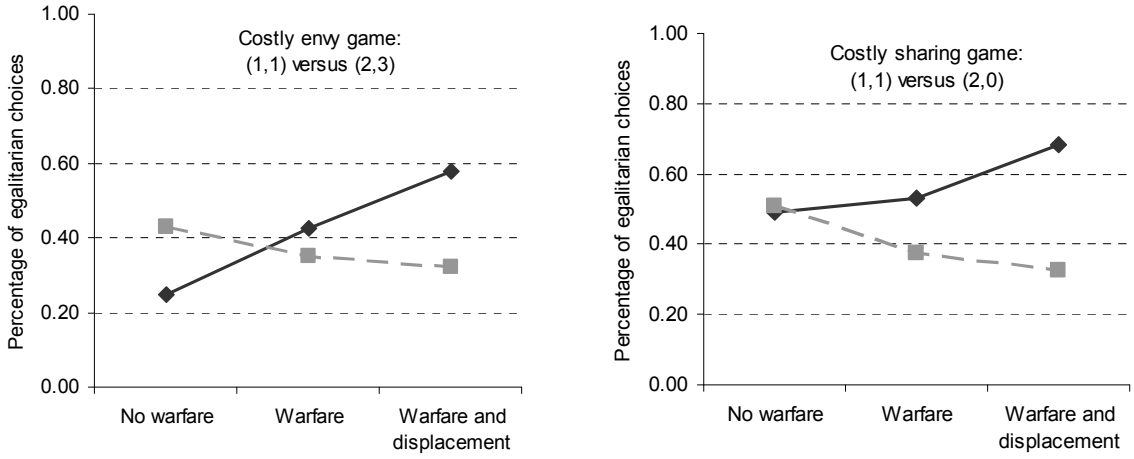


Figure 4: Relative frequency of egalitarian choices among 7-11-yr-old children who were non-affected, exposed to warfare, and displaced. We distinguish three groups of children: non-affected children, children who were exposed to warfare but not displaced six month later, and children who were internally displaced in addition to being exposed to warfare. 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.

Exposure to warfare is not a completely random event allowing for unambiguous causal inference. In fact, some of the regions covered in our sample were affected more than others and, it can be argued that social norms governing pro-social behavior 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 sample children come from (Supplementary Map 1). This location fixed-effect absorbs away any variation in warfare exposure across the regions so that the remaining variation essentially distinguishes children within the same region (Supplementary Table 7). The results are similar to our previous estimates, supporting the direct link between warfare and egalitarian motives.

We discuss further tests regarding the underlying causal mechanism in Supplementary materials.

Discussion

The observed intensification of egalitarian motives in the context of warfare is interesting because such motives (both behindness aversion and aheadness aversion) are important for suppressing competition, and for establishing and sustaining cooperation in large groups (Dawes et al. 2007, Fehr and Fishbacher 2003). Behindness aversion captures the emotions of envy and motivates cooperators to hurt those who are better off and thus punish selfish free-riders ---punishment of non cooperators is the other side of altruism (Fehr and Gachter 2002). Aheadness aversion captures the emotions of guilt and happiness for another's good fortune and motivates to help those who are worse off and thus not to defect in the first place if others cooperate. These results are interesting in the light of ethnographic evidence which shows that egalitarian norms, that shaped many small-scale societies, were particularly strongly enforced at times of evolutionary pressure (Boehm 1999). Our results are also suggestive of the potential mechanism behind recent survey evidence from Sierra Leone showing individuals who experienced more intense war violence to be more likely to vote and contribute to local public goods such as road brushing (Bellows and Miguel 2009).

Our findings, namely that children affected by warfare display more cooperation-harnessing traits and sharper sense of group identity than their non-affected peers, accord surprisingly well with the predictions of current group selection models. Moreover, the findings have important implications for timescale of evolution of norms and preferences. It seems that warfare can affect human prosociality within individual lifetime, because the extent of civilian losses during the Georgian conflict make the extinction of less cooperative phenotypes

unlikely to drive our results. It seems that researchers should take seriously the possibility that social norms may adapt to circumstances relatively quickly, and thus accelerate evolution of those types of human preferences that have been identified as favorable by genetic (Bowles 2006) or cultural group selection models (Boyd and Richerson 2005). The current data doesn't let us further distinguish the process or combination of processes through which social preference are acquired, whether through socialization via parental transmission (Dixit, 2008, 2009; Tabellini, 2009), peer pressure or psychological reaction and we leave this as our next step in the investigation.

In addition, if our results are proved robust in other post-conflict settings, they should motivate further research to study whether observed adaptation of social norms is a temporary phenomena or whether the temporary shift in the composition of selfish and other-regarding types has lasting effects on cooperative equilibrium, as some theories predict (Gintis et al. 2005). In the light of expected effects of climate change (IPCC 2007), further research should also investigate whether similar patterns hold only in the context of warfare, where survival pressures are product of activities of an identifiable hostile group, or whether they generalize to other types of survival pressures including natural disasters or environmental crises.

METHODS

Selection of subjects. A total of 564 children aged 3 through 11 years old from the Republic of Georgia participated in the experiments during January-February 2009 ---only 6 months after the war with Russia. The children in our sample come from different regions within South Ossetia, Gori region, villages between Gori and Tbilisi, and different parts of Tbilisi (for distribution see Supplementary Map). The fighting took place mostly in South Ossetia,

Gori and surrounding areas, but the Russian forces stopped only 30km from Tbilisi. Children were accessed via 15 primary schools and kindergartens located across all these regions except South Ossetia which has closed borders. We were still able to include subjects from South Ossetia since many of those families were internally displaced in the other regions we study and the children attended local schools. In each school, we randomly selected classes and all children who were present at the time of the experiment agreed to participate and therefore entered in the study.

Experimental procedures. Game instructions and procedure build upon the work of Fehr et al. (2008). We extended their protocol by adding a fourth game, the costly envy game because we are primarily interested in other-regarding choices that reduce individual payoff/fitness. In addition, we used tokens instead of sweets as experimental currency, to avoid satiation effects and satisfy variety of tastes. Each token represented the right to choose and get one item in our experimental shop after all the games were completed. The items ranged from pencils, erasers, small toys to various sweets. To establish the link between tokens and rewards in the experimental shop and to increase salience of rewards, children received one token as a show-up fee and exchanged it for a reward before making any experimental choices.

Each child played all four games against anonymous partners. In each game, subjects chose between two mutually exclusive options, represented with two cardboards (see Supplementary Fig. 1). On each cardboard there were two circles, each with one arrow directed either to the decision-maker or to a partner, displayed on a screen of a laptop. 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 of the circle, whereas the tokens in the other circle, with an arrow towards a picture on a laptop screen, illustrated how much a partner will get. If the ingroup condition was applied, the photo on the laptop showed children from the same class

whereas the photo showed an unknown class of children in 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 on the picture. Brown bags containing the tokens for the partner were then delivered without mentioning who was the child sending them. The choices were made in privacy and only the experimenter could observe the subject's choices. The experimenters explained to each child that nobody including their parents and teachers would be informed about their choices.

We randomized the order of the games as well as whether spatial location of the egalitarian option was on the right-hand side or left-hand side. There were three trained experimenters conducting the experiments and two other research assistants helping with filling questionnaires and distributing rewards in the experimental shop. Two experimenters were graduate economics students and one was an employee of the Georgian Ministry of Education; the results are robust to controlling for experimenter effects. All our game scripts were administered in Georgian language by native speakers and we used the method of back translation to ensure consistency.

Statistical methods. The egalitarian choices in different games and the prevalence of different other-regarding types were examined using a binary response model which employs a probit link function (estimated using standard maximum likelihood procedure), also known as probit regression. To study the decision-making time, we used an ordered probit model. We controlled for age in all regressions. Definitions of all variables used in the analysis are provided in the Supplementary Information document.

References

Bartling, B., Fehr,, E., Maréchal, M.A. & Schunk, D. Egalitarianism and Competitiveness. *American Economic Review 99:2, 93–98, 2009*

Bellows, J. & Miguel, E. War and Local Collective Action in Sierra Leone. *Journal of Public Economics* (2009).

Bernhard, H., Fischbacher, U. & Fehr, E. Parochial altruism in humans. *Nature* **442**, 912–915 (2006).

Boehm, C. *Hierarchy in the forest: The evolution of egalitarian behavior*. (Harvard Univ Pr: 1999).

Bornstein, G. Intergroup conflict: Individual, group, and collective interests. *Personality and Social Psychology Review* **7**, 129 (2003).

Bornstein, G. & Ben-Yossef, M. Cooperation in Intergroup and Single-group social dilemmas. *Journal of Experimental Social Psychology* 52-67 (1994).

Bowles, S. Group competition, reproductive leveling, and the evolution of human altruism. *Science* **314**, 1569 (2006).

Bowles, S. Conflict: Altruism's Midwife. *Nature* **456**, 326-327 (2008).

Bowles, S. Did warfare among ancestral hunter-gatherers affect the evolution of human social behaviors? *Science* **324**, 1293 (2009).

Boyd, R. & Richerson, P.J. *The origin and evolution of cultures*. (Oxford University Press, USA: 2005).

Camerer, C. *Behavioral game theory: Experiments in strategic interaction*. (Princeton University Press Princeton, NJ: 2003).

Choi, J. & Bowles, S. The Coevolution of Parochial Altruism and War. *Science* **318**, 636-640 (2007).

Dawes, C.T. et al. Egalitarian motives in humans. *Nature* **446**, 794–796 (2007).

Dixit, A. Social Formation of Pro-Social Preferences. *manuscript, November* (2008).

Dixit, A. Governance institutions and economic activity. *American Economic Review* **99**, 5–24 (2009).

Eisenberg, N. & Mussen, P.H. *The roots of prosocial behavior in children*. (Cambridge University Press: 1989).

EU Independent International Fact-Finding Mission on the Conflict in Georgia.

Fehr, E. & Fischbacher, U. The nature of human altruism: Proximate patterns and evolutionary origins. *Nature* **425**, 785–91 (2003).

Fehr, E. & Gachter, S. Altruistic punishment in humans. *Nature* **415**, 137-140 (2002).

Fehr, E. & Schmidt, K.M. A theory of fairness, competition, and cooperation. *Quarterly journal of Economics* **114**, 817–868 (1999).

Fehr, E., Bernhard, H. & Rockenbach, B. Egalitarianism in young children. *Nature* **454**, 1079–1083 (2008).

Fischbacher, U., Gächter, S. & Fehr, E. Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters* **71**, 397–404 (2001).

Fowler, J.H., Johnson, T. & Smirnov, O. Egalitarian motive and altruistic punishment. *Nature* **433**, (2005).

Gintis, H., Bowles, S., Boyd, R.T. & Fehr, E. *Moral sentiments and material interests: The foundations of cooperation in economic life*. (The MIT Press: 2005).

Henrich, J. et al. "Economic man" in cross-cultural perspective: Behavioral experiments in 15 small-scale societies. *Behavioral and Brain Sciences* **28**, 795–815 (2005).

Human Rights Watch Up in Flames: Humanitarian Law Violations and Civilian Victims in the Conflict over South Ossetia. at <http://www.hrw.org/en/reports/2009/01/22/flames-0>

Keeley, L.H. *War before civilization*. (Oxford University Press, USA: 1997).

Pruitt, D.G. & Rubin, J.Z. *Social conflict*. (McGraw-Hill New York: 1986).
Tilly, C. & Ardant, G. *The formation of national states in Western Europe*. (Princeton Univ Pr: 1975).
Wellman, H.M., Cross, D. & Watson, J. Meta-analysis of theory-of-mind development: The truth about false belief. *Child development* 655–684 (2001).

SUPPLEMENTARY INFORMATION GUIDE

Subjects:

This section contains a map with information about geographical pre-war distribution of the subjects within Georgia, a brief description of the war between Georgia and Russia over South Ossetia, and general socioeconomic characteristics of the regions we study.

Supplementary experimental and survey methods:

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

Supplementary information:

This section contains the classification of behavioral types based on behavior across games and the definition of the variables used in the statistical analysis.

Supplementary results:

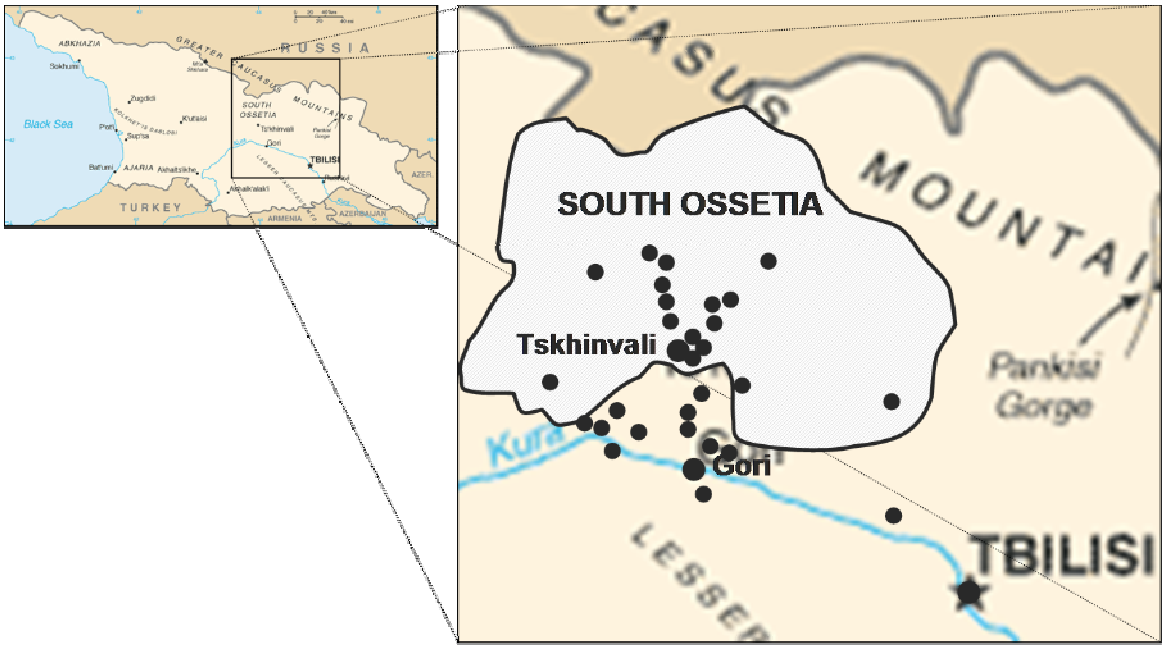
This section contains all the results and statistical tests referenced in the paper. In addition, it includes further results and discussion about the causal mechanism behind the observed relation between warfare and other-regarding preferences.

Subjects

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 conflict of August 2008 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, its timing was unexpected and not preceded by migration of civilians off the affected areas. 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 (HRW 2009, EU 2009) and the fighting affected most heavily regions 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 (HRW 2009, EU 2009). 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.

A total of 564 children aged 3 to 11 years old participated in the experiment during January-February 2009 ---only 6 months after the war with Russia. The children in our sample come from different regions within South Ossetia, Gori region, villages between Gori and Tbilisi, and different parts of Tbilisi (see Map below). The fighting took place mostly in South Ossetia, Gori and surrounding areas, but the Russian forces stopped only 30km from Tbilisi. Children were accessed via 15 primary schools and kindergartens located across these regions except of South Ossetia which has closed borders. South Ossetia subjects are still present in our sample since a majority of Georgian families from South Ossetia were internally displaced in the other regions we study and the children attended local schools.



Map S1: Distribution of subjects across locations in the Republic of Georgia. Before the war in August 2008, our subjects lived in various locations of South Ossetia, Gori region, villages between Gori and Tbilisi, and different parts of Tbilisi, as illustrated by the dots on the right-hand-side map which denote villages or towns where at least three of our subjects lived before the conflict.

Supplementary experimental methods

Experimental procedures

The instructions are based on the written experimental protocols developed by Fehr et al. (2008) for the specific purpose of conducting experiments among children. We are very grateful to the authors for allowing us to base our experiments on their fundamental work. Relative to their work, we added a fourth game, the costly envy game [(1,1) vs. (2,3)], because we were primarily interested in other-regarding choices that reduce individual fitness and 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 variety of tastes.

Each child played all four games against anonymous partner either from their class (ingroup condition) or from some unknown class (outgroup condition). In each game, the subjects chose between two mutually exclusive options, represented with two cardboards (see Supplementary Fig. 1). On each cardboard there were two circles, each 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 will 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 on the 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 decision-maker and partner was illustrated by circles with arrows and a photo displayed on a laptop screen.

The choices were made in privacy and only the experimenter could observe the subject's choices (it is very difficult to enforce a double blind protocol with children). The experimenters explained to each child that nobody including their parents and teachers will be informed about their choices. Three trained experimenters conducted the experiment and two other research assistants helped with filling questionnaires and distributing rewards in the experimental shop. Two experimenters were graduate economics students and one was an employee of the Georgian Ministry of Education; the results are robust to controlling for experimenter effects. All our game scripts were administered in Georgian language by native speakers and we used the method of back translation to ensure consistency. English version of experimental protocols is a part of the Supplementary Information.

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 the questions on payoff consequences of the two options.

The children were very motivated to truthfully reveal their preferences. After the experiments were completed, they could exchange the experimental currency for various items in the experimental shop ranging from different kinds of sweets, pencils, erasers, stickers to other small toys. For simplicity, the exchange rate was 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 exchanged it for a reward before the actual experiments. After each child exchanged all her tokens at the end, we placed the rewards into a paper bag and requested the child not to open it before the end of 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."

Measuring conflict exposure

The experiments were complemented with a short questionnaire 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 is internally displaced. The complete questionnaires are available in the Supplementary Information.

Supplementary information

	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

Table S1: Classification of types based on behavior across games. Classification of types is based on behavior across games. Aheadness averse types choose the egalitarian option in the costly sharing game and the costless sharing game, that is in 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 allocation that maximize payoff of their partner. Spiteful subjects choose the allocations that minimize payoff of their partner. Selfish subjects 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 War exposure 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+Displaced" is 0-1 variable, which is equal to 1 if the subject was exposed to warfare (as defined above) and at the same time 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 "Number of times the decision-making time was>3 seconds" is 0-4 variable, which counts the occasions when a subject needed more than three seconds to decide.
- 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.

Supplementary results

Estimator	Probit				
Sample	Ingroup treatment (1)	Outgroup treatment (2)	Affected by war (3)	Non-affected by war (4)	All (5)
Panel A: Dep. variable	**Costly envy game (1,1) vs. (2,3): Egalitarian choice=1**				
Ingroup (1=yes)			0.142	-0.197	-0.209
			(0.022)**	(0.027)**	(0.025)**
War experience (1=yes)	0.253	-0.081			-0.082
	(0.001)***	(0.325)			(0.324)
War exp. * Ingroup					0.349
					(0.002)***
Age	-0.046	-0.055	-0.053	-0.043	-0.050
	(0.082)*	(0.051)*	(0.023)**	(0.206)	(0.009)***
Observations	203	174	259	118	377
Panel B: Dep. variable	**Costly sharing game (1,1) vs. (2,0): Egalitarian choice=1**				
Ingroup (1=yes)			0.206	0.013	0.002
			(0.001)***	(0.894)	(0.984)
War experience (1=yes)	0.035	-0.155			-0.159
	(0.650)	(0.065)*			(0.061)*
War exp. * Ingroup					0.203
					(0.073)*
Age	0.071	0.038	0.044	0.088	0.057
	(0.009)***	(0.176)	(0.062)*	(0.018)**	(0.004)***
Observations	203	174	259	118	377
Panel C: Dep. variable	**Costless envy game (1,1) vs. (1,2): Egalitarian choice=1**				
Ingroup (1=yes)			0.059	-0.141	-0.154
			(0.305)	(0.113)	(0.079)*
War experience (1=yes)	0.090	-0.108			-0.111
	(0.210)	(0.166)			(0.159)
War exp. * Ingroup					0.200
					(0.047)**
Age	0.035	0.008	0.004	0.069	0.022
	(0.162)	(0.774)	(0.867)	(0.046)**	(0.224)
Observations	203	173	259	117	376
Panel D: Dep. variable	**Costless prosociality game (1,1) vs. (1,0): Egal. choice=1**				
Ingroup (1=yes)			0.082	0.050	0.047
			(0.128)	(0.547)	(0.567)
War experience (1=yes)	0.005	-0.028			-0.026
	(0.939)	(0.719)			(0.713)
War exp. * Ingroup					0.035
					(0.721)
Age	0.027	0.020	0.020	0.032	0.024
	(0.223)	(0.429)	(0.304)	(0.302)	(0.155)
Observations	203	173	259	117	376

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table S2: Warfare exposure and egalitarian choices in all four games among 7-11-yrs-old children. The dependent variable in Panel A is the egalitarian choice in the costly envy game, in Panel B the dep. var. is the egalitarian option in the costly sharing game, in Panel C it is the egalitarian option in the costless envy game and in Panel D it is the egalitarian option in the costless sharing game. Definitions of behavioral types, based on choices across the games, are provided in Table S1. In column (1) the sample is restricted to children who played the game with their ingroup partner (ingroup condition), in column (2) the sample is restricted to children in the outgroup condition, in column (3) the sample is restricted to children exposed to warfare, in column (4) the sample is restricted children not exposed to warfare and in column (5) we study the whole sample. Probit regressions are conducted and we report marginal effects with p-values in parentheses.

Estimator	Probit				
Sample	Ingroup treatment (1)	Outgroup treatment (2)	Affected by war (3)	Non-affected by war (4)	All (5)
Panel A: Dep. variable	**Behindness averse**				
Ingroup (1=yes)			0.152**	-0.134	-0.149*
			(0.0114)	(0.105)	(0.0997)
War experience (1=yes)	0.236***	-0.0416			-0.0438
	(0.000995)	(0.591)			(0.583)
War exp. * Ingroup					0.303***
					(0.00613)
Age	-0.0344	-0.0528**	-0.0469**	-0.0337	-0.0431**
	(0.174)	(0.0447)	(0.0355)	(0.280)	(0.0184)
Observations	203	174	259	118	377
Panel B: Dep. variable	**Aheadness averse**				
Ingroup (1=yes)			0.171***	0.0854	0.0783
			(0.00518)	(0.355)	(0.396)
War experience (1=yes)	0.0341	-0.0446			-0.0491
	(0.657)	(0.572)			(0.563)
War exp. * Ingroup					0.0929
					(0.409)
Age	0.0680**	0.0282	0.0421*	0.0696*	0.0500**
	(0.0121)	(0.296)	(0.0683)	(0.0540)	(0.0101)
Observations	203	174	259	118	377
Panel C: Dep. variable	**Inequality averse**				
Ingroup (1=yes)			0.0848*	-0.0558	-0.0874
			(0.0550)	(0.241)	(0.216)
War experience (1=yes)	0.143***	0.00244			0.00233
	(0.00581)	(0.962)			(0.966)
War exp. * Ingroup					0.181**
					(0.0466)
Age	-0.000806	-0.00653	-0.00869	0.00807	-0.00334
	(0.962)	(0.712)	(0.587)	(0.642)	(0.783)
Observations	203	174	259	118	377
Panel D: Dep. variable	**Generous**				
Ingroup (1=yes)			0.00182	0.106*	0.108*
			(0.961)	(0.0939)	(0.0724)
War experience (1=yes)	-0.0864	0.0319			0.0366
	(0.105)	(0.504)			(0.515)
War exp. * Ingroup					-0.0955
					(0.150)
Age	0.0188	0.00201	0.0195	-0.0117	0.0106
	(0.307)	(0.902)	(0.176)	(0.628)	(0.390)
Observations	203	172	259	116	375
Panel D: Dep. variable	**Spiteful**				
Ingroup (1=yes)			-0.00768	-0.0474	-0.0560
			(0.785)	(0.190)	(0.198)
War experience (1=yes)	0.0280	-0.00769			-0.00828
	(0.340)	(0.844)			(0.805)
War exp. * Ingroup					0.0531
					(0.335)
Age	-0.0108	-0.0299**	-0.0160	-0.0253*	-0.0191**
	(0.298)	(0.0341)	(0.133)	(0.0673)	(0.0237)
Observations	203	174	259	118	377

p values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table S3: Warfare exposure and prevalence of other-regarding types among 7-11-yrs-old children. The dependent variable in Panel A is being aheadness averse, in Panel B the dep. var. is being behindness averse, in Panel C the dep. var. is being inequality averse, in Panel D it is being generous and in Panel E it is being spiteful. In column (1) the sample is restricted to children who played the game with their ingroup partner (ingroup condition), in column (2) the sample is restricted to the children in the outgroup condition, in column (3) the

sample is restricted to children exposed to warfare, in column (4) the sample is restricted to children not exposed to warfare and in column (5) we study the whole sample. Probit regressions are conducted and we report marginal effects with p-values in parentheses.

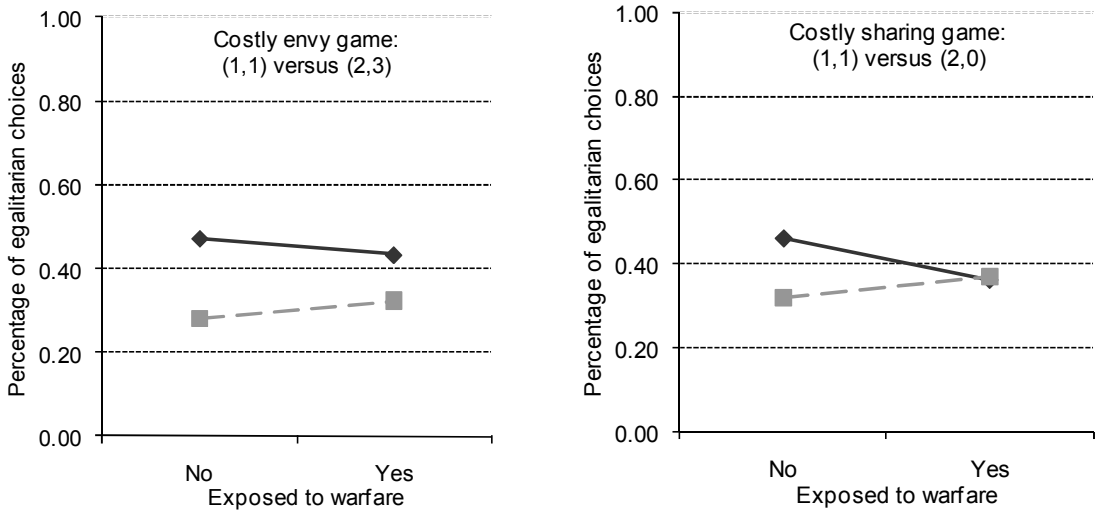


Figure S4: Warfare exposure and relative frequency of other-regarding choices among 3-6yr-old children. Grey dashed line represent when the partner was an outgroup member, whereas the black solid line represent when the partner was an ingroup member. Being exposed to warfare denotes children who either heard fighting, saw fighting, a soldier, an injured person. In both games there are no statistically significant differences in likelihood of egalitarian choices and ingroup-outgroup gap across warfare exposure.

Estimator			Probit		
Sample	Ingroup treatment (1)	Outgroup treatment (2)	Affected by war (3)	Non-affected by war (4)	All (5)
Panel A: Dep. variable	**Costly envy game (1,1) vs. (2,3): Egalitarian choice=1**				
Ingroup (1=yes)			0.112	0.197	0.193
			(0.199)	(0.122)	(0.130)
War experience (1=yes)	-0.032	0.053			0.047
	(0.759)	(0.622)			(0.692)
War exp. * Ingroup					-0.083
					(0.588)
Age	0.065	-0.073	0.013	-0.034	-0.000
	(0.283)	(0.221)	(0.793)	(0.668)	(0.993)
Observations	96	90	125	61	186
Panel B: Dep. variable	**Costly sharing game (1,1) vs. (2,0): Egalitarian choice=1**				
Ingroup (1=yes)			0.082	0.053	0.056
			(0.339)	(0.666)	(0.651)
War experience (1=yes)	-0.000	-0.026			-0.033
	(0.999)	(0.819)			(0.762)
War exp. * Ingroup					0.027
					(0.858)
Age	0.089	0.009	0.048	0.068	0.054
	(0.099)*	(0.883)	(0.330)	(0.365)	(0.190)
Observations	98	90	126	62	188
Panel C: Dep. variable	**Costless envy game (1,1) vs. (1,2): Egalitarian choice=1**				
Ingroup (1=yes)			-0.012	0.139	0.141
			(0.885)	(0.276)	(0.263)
War experience (1=yes)	-0.098	0.055			0.053
	(0.339)	(0.622)			(0.646)
War exp. * Ingroup					-0.148
					(0.320)
Age	0.005	-0.047	-0.030	0.007	-0.019
	(0.928)	(0.442)	(0.555)	(0.935)	(0.651)
Observations	98	90	126	62	188
Panel D: Dep. variable	**Costless prosociality game (1,1) vs. (1,0): Egal. choice=1**				
Ingroup (1=yes)			0.204	0.196	0.188
			(0.016)**	(0.104)	(0.122)
War experience (1=yes)	-0.014	-0.031			-0.028
	(0.876)	(0.791)			(0.793)
War exp. * Ingroup					0.012
					(0.936)
Age	-0.002	0.001	0.017	-0.047	-0.001
	(0.973)	(0.991)	(0.731)	(0.550)	(0.987)
Observations	98	90	126	62	188

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table S4: Warfare exposure and egalitarian choices in all four games among 3-6-yrs-old children. The dependent variable in Panel A is the egalitarian choice in the costly envy game, in Panel B the dep. var. is the egalitarian option in the costly sharing game, in Panel C it is the egalitarian option in the costless envy game and in Panel D it is the egalitarian option in the costless sharing game. In column (1) the sample is restricted to children who played the game with their ingroup partner (ingroup condition), in column (2) the sample is restricted to children in the outgroup condition, in column (3) the sample is restricted to children exposed to warfare, in column (4) the sample is restricted to children not exposed to warfare and in column (5) we study the whole sample. Probit regressions are conducted and we report marginal effects with p-values in parentheses.

Estimator	Ordered probit				
Dependent variable	**Number of times when decision-making time > 3 seconds**				
Sample	Ingroup treatment (1)	Outgroup treatment (2)	Affected by war (3)	Non-affected by war (4)	All (5)
Ingroup (1=yes)			0.258	-0.248	-0.237
			(0.084)*	(0.263)	(0.283)
War experience (1=yes)	0.171	-0.262			-0.257
	(0.355)	(0.179)			(0.187)
War exp. * Ingroup					0.502
					(0.060)*
Age	0.046	-0.192	-0.043	-0.100	-0.059
	(0.464)	(0.005)***	(0.436)	(0.231)	(0.193)
Observations	155	141	204	92	296

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table S5: Decision-making time across ingroup-outgroup conditions and war exposure among 7-11-yr-old children. In each of the four games we recorded whether a child needed more than three seconds to make a decision. The dependent variable is the sum of the cases (out of four games) with decision-making time higher than 3 seconds. In column (1) the sample is restricted to children who played the game with their ingroup partner (ingroup condition), in column (2) the sample is restricted to children in the outgroup condition, in column (3) the sample is restricted to children exposed to warfare, in column (4) the sample is restricted children not exposed to warfare and in column (5) we study the whole sample. Ordered probit regressions are conducted and we report p-values in parentheses.

Estimator	Probit					
Panel A: Dep. variable	**Costly envy game (1,1) vs. (2,3): Egalitarian choice=1**					
Sample	Ingroup treatment (1)	Outgroup treatment (2)	Non-affected by war (3)	Only war exposure (4)	War+Displacement (5)	All (6)
Ingroup			-0.197	0.087	0.251	-0.209
			(0.024)**	(0.226)	(0.033)**	(0.023)**
War	0.220	-0.067				-0.068
	(0.007)***	(0.429)				(0.420)
War+Displaced	0.354	-0.099				-0.098
	(0.001)***	(0.325)				(0.334)
War*ingroup						0.300
						(0.011)**
(War+Displaced)*ingroup						0.446
						(0.002)***
Age	-0.035	-0.050	-0.034	-0.047	-0.042	-0.042
	(0.169)	(0.045)**	(0.277)	(0.060)*	(0.301)	(0.017)**
Observations	205	182	121	189	77	387
Panel A: Dep. variable	**Costly sharing game (1,1) vs. (2,0): Egalitarian choice=1**					
Ingroup			0.034	0.144	0.337	0.022
			(0.719)	(0.048)**	(0.005)***	(0.814)
War	-0.013	-0.107				-0.113
	(0.873)	(0.208)				(0.197)
War+Displaced	0.162	-0.161				-0.168
	(0.106)	(0.115)				(0.122)
War*ingroup						0.111
						(0.346)
(War+Displaced)*ingroup						0.324
						(0.022)**
Age	0.061	0.030	0.087	0.001	0.115	0.046
	(0.020)**	(0.227)	(0.013)**	(0.971)	(0.009)***	(0.013)**
Observations	205	182	121	189	77	387

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table S6: Relative frequency of egalitarian choices among 7-11yr-old children who were non-affected, exposed to warfare, and displaced. We distinguish three groups of children: non-affected children, children who were exposed to warfare are further divided on those not displaced six month later, and children who were internally displaced in addition to being exposed to warfare. The dependent variable in Panel A is the egalitarian choice in the costly envy game, in Panel B the dep. var. is the egalitarian option in the costly sharing game. In column (1) the sample is restricted to children who played the game with their ingroup partner (ingroup condition), in column (2) the sample is restricted to children in the outgroup condition, in column (3) the sample is restricted to children who were not exposed to warfare, in column (4) the sample is restricted children were exposed but not internally displaced, in column (5) the sample is restricted to children who were exposed to warfare as well as internally displaced. Probit regressions are conducted and we report marginal effects with p-values in parentheses.

Further discussion about causation

Exposure to warfare is not a purely random event that allows unambiguous 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.

Some regions within Georgia were affected more than others and, potentially, social norms governing pro-social behavior could vary across regions, independently of warfare. 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. This absorbs any variation in warfare exposure across the regions so that the remaining variation essentially distinguishes children within the same region (Supplementary Table 11). 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 behavior of their children. We test the importance of this issue in two ways. First, we use information about children's characteristics. In Table S9 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 rather quick, intensive and without repeated attacks it might be possible that the separatist fighters new personally civilians in South Ossetia and, potentially, could target more cooperative households or households of local leaders. In contrast, there has been much less pre-war personal interactions between separatist groups and civilians in the Gori area (undisputed area), and thus in this location the selective targeting is very unlikely. In Table S10 we 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 and costless envy game.

Estimator	Probit				
Sample	Ingroup treatment	Outgroup treatment	Affected by war	Non-affected by war	All
Controlling for region fixed effects	**yes**	**yes**	**yes**	**yes**	**yes**
	(1)	(2)	(3)	(4)	(5)
Panel A: Dep. variable	**Costly envy game (1,1) vs. (2,3): Egalitarian choice=1**				
Ingroup			0.163	-0.199	-0.208
			(0.012)**	(0.036)**	(0.028)**
War experience (1=yes)	0.228	-0.151			-0.135
	(0.005)***	(0.112)			(0.129)
War exp. * Ingroup					0.367
					(0.001)***
Age	-0.060	-0.098	-0.087	-0.045	-0.073
	(0.046)**	(0.004)***	(0.002)***	(0.232)	(0.001)***
Observations	202	167	256	111	373
Panel B: Dep. variable	**Costly sharing game (1,1) vs. (2,0): Egalitarian choice=1**				
Ingroup			0.207	0.073	0.028
			(0.001)***	(0.485)	(0.773)
War experience (1=yes)	0.006	-0.141			-0.157
	(0.945)	(0.140)			(0.086)*
War exp. * Ingroup					0.183
					(0.114)
Age	0.081	0.059	0.049	0.115	0.071
	(0.008)***	(0.080)*	(0.075)*	(0.006)***	(0.002)***
Observations	197	172	259	109	377
Panel C: Dep. variable	**Costless envy game (1,1) vs. (1,2): Egalitarian choice=1**				
Ingroup			0.032	-0.108	-0.136
			(0.597)	(0.270)	(0.128)
War experience (1=yes)	0.078	-0.066			-0.076
	(0.325)	(0.466)			(0.367)
War exp. * Ingroup					0.160
					(0.122)
Age	0.037	0.012	0.002	0.078	0.028
	(0.198)	(0.690)	(0.935)	(0.046)**	(0.175)
Observations	198	167	254	110	374
Panel D: Dep. variable	**Costless prosociality game (1,1) vs. (1,0): Egal. choice=1**				
Ingroup			0.103	0.056	0.080
			(0.076)*	(0.546)	(0.343)
War experience (1=yes)	0.031	0.053			0.014
	(0.658)	(0.578)			(0.865)
War exp. * Ingroup					0.017
					(0.869)
Age	0.022	0.028	0.025	0.024	0.026
	(0.379)	(0.372)	(0.306)	(0.499)	(0.170)
Observations	193	157	244	104	362

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table S7: Within region differences in warfare exposure and egalitarian choices in all four games among 7-11-yrs-old children. In all regression we control for location fixed effects by including 16 dummy variables, one for each region. The dependent variable in Panel A is the egalitarian choice in the costly envy game, in Panel B the dep. var. is the egalitarian option in the costly sharing game, in Panel C it is the egalitarian option in the costless envy game and in Panel D it is the egalitarian option in the costless sharing game. In column (1) the sample is restricted to children who played the game with their ingroup partner (ingroup condition), in column (2) the sample is restricted to children in the outgroup condition, in column (3) the sample is restricted to children exposed to warfare, in column (4) the sample is restricted children not exposed to warfare and in column (5) we study the whole sample. Probit regressions are conducted and we report marginal effects with p-values in parentheses.

Estimator	Probit				
Sample	Ingroup treatment	Outgroup treatment	Affected by war	Non-affected by war	All
Controlling for # child's observable characteristics	**yes**	**yes**	**yes**	**yes**	**yes**
	(1)	(2)	(3)	(4)	(5)
Panel A: Dep. variable	**Costly envy game (1,1) vs. (2,3): Egalitarian choice=1**				
Ingroup (1=yes)			0.170**	-0.142	-0.148
			(0.0120)	(0.138)	(0.130)
War experience (1=yes)	0.233***	-0.0859			-0.0814
	(0.00458)	(0.326)			(0.355)
War exp. * Ingroup					0.323***
					(0.00725)
Age	0.00131	-0.0655	-0.0385	0.0271	-0.0245
	(0.975)	(0.177)	(0.292)	(0.657)	(0.429)
Observations	166	153	215	104	319
Panel B: Dep. variable	**Costly sharing game (1,1) vs. (2,0): Egalitarian choice=1**				
Ingroup (1=yes)			0.192***	-0.0151	-0.0103
			(0.00557)	(0.883)	(0.918)
War experience (1=yes)	0.0153	-0.173*			-0.175*
	(0.857)	(0.0606)			(0.0540)
War exp. * Ingroup					0.200*
					(0.0996)
Age	0.0842*	-0.0270	0.0324	0.0607	0.0404
	(0.0509)	(0.586)	(0.387)	(0.349)	(0.211)
Observations	166	153	215	104	319
Panel C: Dep. variable	**Costless envy game (1,1) vs. (1,2): Egalitarian choice=1**				
Ingroup (1=yes)			0.0808	-0.114	-0.132
			(0.209)	(0.245)	(0.161)
War experience (1=yes)	0.0967	-0.0771			-0.0980
	(0.217)	(0.377)			(0.246)
War exp. * Ingroup					0.203*
					(0.0617)
Age	0.0895**	-0.0480	-0.0207	0.149**	0.0222
	(0.0316)	(0.310)	(0.556)	(0.0178)	(0.460)
Observations	166	152	215	103	318
Panel D: Dep. variable	**Costless prosociality game (1,1) vs. (1,0): Egal. choice=1**				
Ingroup (1=yes)			0.0552	0.0757	0.0835
			(0.365)	(0.384)	(0.344)
War experience (1=yes)	-0.0312	0.0127			0.000430
	(0.654)	(0.881)			(0.996)
War exp. * Ingroup					-0.0279
					(0.796)
Age	0.00694	0.0534	0.0295	0.0305	0.0270
	(0.838)	(0.244)	(0.364)	(0.558)	(0.323)
Observations	166	152	215	103	318

p-values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table S8: Warfare exposure and egalitarian choices among 7-11-yrs-old children after controlling for children's observable characteristics. In all regressions we control for chidren's age, height, number of brothers and number of sisters, gender which may affect the likelihood of being exposed to warfare. The Table is organized in exactly the same way as Table S8. Probit regressions are conducted and we report marginal effects with p-values in parentheses.

Estimator			Probit		
Sample	Ingroup treatment	Outgroup treatment	Affected by war	Non-affected by war	All
	Children from South Ossetia not included				
	(1)	(2)	(3)	(4)	(5)
Panel A: Dep. variable	**Costly envy game (1,1) vs. (2,3): Egalitarian choice=1**				
Ingroup (1=yes)			0.123	-0.204	-0.212
			(0.081)*	(0.028)**	(0.029)**
War experience (1=yes)	0.249	-0.069			-0.070
	(0.002)***	(0.435)			(0.428)
War exp. * Ingroup					0.337
					(0.005)***
Age	-0.042	-0.056	-0.046	-0.052	-0.048
	(0.133)	(0.076)*	(0.075)*	(0.139)	(0.021)**
Observations	165	138	195	108	303
Panel B: Dep. variable	**Costly sharing game (1,1) vs. (2,0): Egalitarian choice=1**				
Ingroup (1=yes)			0.161	0.068	0.052
			(0.024)**	(0.495)	(0.598)
War experience (1=yes)	-0.030	-0.131			-0.135
	(0.714)	(0.148)			(0.141)
War exp. * Ingroup					0.110
					(0.368)
Age	0.057	0.038	0.028	0.093	0.049
	(0.051)*	(0.235)	(0.277)	(0.017)**	(0.024)**
Observations	165	138	195	108	303
Panel C: Dep. variable	**Costless envy game (1,1) vs. (1,2): Egalitarian choice=1**				
Ingroup (1=yes)			0.016	-0.137	-0.146
			(0.803)	(0.137)	(0.103)
War experience (1=yes)	0.079	-0.058			-0.069
	(0.302)	(0.472)			(0.416)
War exp. * Ingroup					0.156
					(0.145)
Age	0.042	-0.021	-0.005	0.052	0.013
	(0.123)	(0.457)	(0.834)	(0.144)	(0.512)
Observations	165	137	195	107	302
Panel D: Dep. variable	**Costless prosociality game (1,1) vs. (1,0): Egal. choice=1**				
Ingroup (1=yes)			0.073	0.055	0.056
			(0.240)	(0.516)	(0.515)
War experience (1=yes)	-0.001	-0.021			-0.019
	(0.987)	(0.797)			(0.800)
War exp. * Ingroup					0.017
					(0.869)
Age	0.012	0.018	0.015	0.015	0.015
	(0.606)	(0.536)	(0.517)	(0.637)	(0.423)
Observations	165	137	195	107	302

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table S9: Warfare exposure and egalitarian choices among 7-11-yrs-old children who do not come from South Ossetia. A potential for selective targeting based on individual characteristics was higher in South Ossetia relative to other affected regions. To test whether selective targeting played a role, in all regression we restrict the sample on children who do not come from South Ossetia. Otherwise, the Table is organized in exactly the same way as Table S8. Probit regressions are conducted and we report marginal effects with p-values in parentheses.