War's Enduring Effects on the Development of Egalitarian Motivations and In-group Biases

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Keywords: cooperation, inter-group competition, war, egalitarianism, parochialism, economic experiment

Abstract

In suggesting that new nations often coalesce in the decades following war, historians have posed an important economic and psychological question: does the experience of war generate an enduring elevation in people's egalitarian motivations toward their in-group? To explore this, we administered a battery of social choice tasks and survey instruments to over a thousand children and adults who were differentially affected by war in both the Republic of Georgia and Sierra Leone. We find that greater exposure to war creates a lasting increase in egalitarian motivations towards one's in-group, but not toward out-groups, during a developmental window between the ages of 7 and 20. Outside this window, war has no measurable impacts on social motivations in children younger than 7, and only muted effects on those older than 20. These "war effects" are consistent with predictions from evolutionary approaches that emphasize the importance of group or coalitional cooperation against external threats.

Violent conflict among human groups is an enduring part of the human experience, which likely reaches deep into our evolutionary past (Blattman & Miguel, 2010; Bowles, 2009; Keeley, 1997). While understanding how inter-group conflict affects people has long been an important interest in social sciences (Campbell, 1965; Sherif, 1988), little research has studied post-conflict societies to assess how the experience of war shapes our cooperative tendencies and social development across the life course. To address this, we combined survey data with a battery of simple social choice experiments done with both children and adults (ages 3 to 84) in two post-conflict societies, the Republic of Georgia in the Caucasus and Sierra Leone in West Africa.

Our work is motivated by evolutionary approaches to human prosociality that have long emphasized the important role that inter-group competition and other external threats (e.g. floods) have likely played in shaping our social psychology (Alexander, 1987; Choi & Bowles, 2007; Darwin, 1873). As an ultra-social species, our survival and reproduction as individuals is often linked to the fate of our groups, especially when inter-group competition is intense. Via a variety of different evolutionary avenues, these approaches all suggest that our species should be sensitive either to cues of external threats or to key experiences (e.g., war) during ontogeny in order to calibrate our psychological mechanisms, including our social motivations. More specifically, these approaches propose that cues to, or experiences of, inter-group conflicts should increase within-group cooperation, which may increase motivations related to in-group altruism, leveling or in-group equality, and both norm adherence and the punishment of norm-violators. This may also sharpen individuals' sense of group identity (parochialism), which generates fertile ground for out-group hostility (Bornstein, 2003; Bowles, 2006; Choi & Bowles, 2007; Chudek & Henrich, 2010; Darwin, 1873; Gneezy & Fessler, 2011; Hamilton, 1975; Henrich, 2004).

The existing empirical work broadly supports the effect of inter-group competition on social behavior. In the laboratory, economic experiments have shown that inter-group competition intensifies

group-based prosociality (Bornstein, 2003; Bornstein & Ben-Yossef, 1994). Studies using priming techniques indicate that cuing uncertainty in a number of domains, including mortality and inter-group threat, makes people more likely to favor in-group members and punish norm-violators (Heine, Proulx, & Vohs, 2006; Hohman, 2011; Kollack, 1994; Navarrete, Kurzban, Fessler, & Kirkpatrick, 2004). In the field, survey evidence shows that violent war experiences may actually increase participation in voting (Blattman, 2009) and local collective action (Bellows & Miguel, 2009).

Despite such diverse evidence, a direct link between the real-life experience of inter-group violence and the development of enduring in-group prosocial motivations has not been empirically established, one reason being the rarity of experimental measures from post-conflict societies. Here, we test the specific prediction that the experience of inter-group conflict shifts individual psychological motivations to favor in-group egalitarianism. We administered a battery of social choice tasks, designed to isolate in-group egalitarian motivations from selfish or generalized egalitarian and altruistic motivations, to over a thousand children and adults who were differentially affected by war in both the Republic of Georgia and Sierra Leone. Below, we discuss how our findings dovetail with two other recent studies from biology and economics that link war and sociality.

We focus on the ontogeny of social motivations for both theoretical and empirical reasons. Theoretically, much work on evolutionary processes suggests adaptive trade-offs between (1) maintaining a capacity to facultatively (on the fly) adapt to novel circumstances throughout adulthood, (2) investing in, calibrating, and partially fixing certain abilities or motivations in response to local conditions encountered during a developmental window (when brains, for example, are relatively more plastic), and (3) genetically hardwiring a developmental process (Kaplan, Hill, Lancaster, & Hurtado, 2000). Which of these is favoured by natural selection for any particular phenotype will depend on a wide range of factors that include the costs of maintaining flexibility over the life course, the variability in environments, and the fitness costs of failing to adapt. In a cultural species like humans, such

processes are particularly relevant because individuals find themselves in an extraordinarily diverse range of social environments, with different norms and fitness consequences, and because our species maintains a long juvenile period of greater neural plasticity that extends at least through the second decade of life (Giedd et al., 1999; Henrich, 2008; Kaplan et al., 2000). Influenced by these trade-offs, social motivations may—like other aspects of human psychology and physiology—be disproportionately calibrated and set during middle childhood and adolescence (Henrich, 2008).

Empirically, existing research has demonstrated that prosocial motivations develop substantially during childhood and adolescence, suggesting the potential existence of a sensitive period in their development (Eisenberg, Fabes, & Spinrad, 2006). In anonymous settings that aim to rule out prosocial behaviour driven by selfish motives (as used in this paper), Western children become more prosocial between 3-8 years of age (Fehr, Bernhard, & Rockenbach, 2008; Harbaugh & Krause, 2000), with more sophisticated notions of fairness and stronger fairness motivations developing during Western adolescence (Almås, Cappelen, Sørensen, & Tungodden, 2010; Fehr, Rützler, & Sutter, 2011). Cross-culturally, measures of egalitarian motivations vary substantially across diverse societies, from barely detectable to quite strong (Henrich et al., 2006; Rochat et al., 2009). Taken together, the evidence suggests that humans, at least in some societies, acquire and internalize much of their social behaviour during childhood and adolescence. Based on this, it's plausible that the experience of warfare during this period of development may have potent and enduring effects.

Method

Sample. We chose to explore the link between inter-group violence and group prosocial motivations in the Republic of Georgia and in Sierra Leone both because of the timing and nature of their recent wars. In terms of timing, we wanted to test for both the short and long term effects of war. We started in the Republic of Georgia, where we had the opportunity to collect data only six months

after the war with Russia (short-term impacts) and we chose to study children aged 3-12 years, i.e. during the age range that we hypothesized might contain the sensitive period in formation of prosocial motivations. As a next step, we turned to Sierra Leone, where the civil war had ended a decade before this research began, to study war's long-term impacts. There, we sampled adults to explore whether the effects are more enduring if experienced during ontogeny compared to adulthood.

In terms of the nature of the conflict, we looked for situations in which the effects of war on populations could—at least arguably—be seen as independent of underlying differing social motivations. Studying, for example, a self-selected population of refugees or a group of army volunteers would make the predicted effects harder to confidently distinguish because possessing certain social motivations (before the war) could make one more likely to experience the war. Essentially, we were looking for natural experiments that might provide quasi-random assignment to treatment groups, with war as the treatment. In Georgia, six months after the war with Russia over South Ossetia, we tested children from 17 primary schools and kindergartens scattered across the afflicted region. While brief, this war devastated areas of South Ossetia and its bordering districts, causing more than 100,000 civilians to flee their homes (EU, 2009; Human Rights Watch, 2009). Because most of the fighting involved aerial, artillery and tank fire strikes (Human Rights Watch, 2009), it was unlikely to have selectively affected certain types of families. Moreover, the lack of any pre-emptive exodus indicates that civilians did not anticipate the conflict, which mitigates statistical concerns about biases in who was affected by the war (EU, 2009; Human Rights Watch, 2009).

In North-Western Sierra Leone, we recruited adults ($n = 586$) across a diverse age range (18 to 84) from 21 villages where existing evidence indicated substantial variation in war exposure (Bellows & Miguel, 2009). Many adults ($n = 162$) were children or adolescents during the brutal civil war that lasted from 1991 to 2002. The conflict killed more than 50,000 civilians and temporarily displaced half of the population. Thousands of survivors were victims of rape or amputations. Notably, several studies

conclude that neither ethnicity nor religions were important in targeting civilian populations (Bellows &

Miguel, 2009; Humphreys & Weinstein, 2006), which mitigates concerns about selection bias into

victimization based on observable characteristics.

Victimization indices. Within each sample, we distinguished three levels of war exposure, based

on the replies obtained from the surveys conducted with participants. In Georgia, "Non-affected"

children, 32% of the participants, reported not having heard or seen any fighting, not having had a

relative injured during the conflict, and not having seen any soldier or injured person. Of the remaining

68%: 24% were both "affected" and "internally displaced persons" (IDP) at the time of the experiment

(labelled as "affected & IDP") while 44% were affected but not internally displaced ("affected & non-

IDP"). We find no correlation between age and child reports of war exposure, attenuating concerns

about systematic biases in the ability of children to accurately report their level of exposure, especially

for the youngest children.

To identify exposure to conflict in Sierra Leone, we use the same questions as the recent

nationally representative survey (Bellows & Miguel, 2009). Specifically, we asked: "Were any members

of your household killed during the conflict?"; "Were any members injured or maimed during the

conflict?" As in Georgia, we distinguish three levels of war exposure. "Least-affected" individuals

(45%) reported not having anyone from their household killed or injured during the civil war; "mid-

affected" individuals (33%) reported having somebody either killed or injured, while the "most-

affected" (22%) reported both types of violent outcomes. Additional details about both field sites can be

found in the Supplemental Material available online (SOM).

Experimental Protocol. At each site, building on earlier protocols (Ernst Fehr et al., 2008; Silk

et al., 2005), we ran four mini-dictator games in which participants chose between two alternative

allocations of tokens between themselves and an anonymous partner. Here we focus on the two costly

games (the Sharing and Envy Games) that are particularly interesting because they unambiguously distinguish between purely selfish motivations, egalitarian motivations, and altruistic motivations. The two costless games provide convergent findings (results upon request), though since they were designed to tap the social preferences of even entirely selfish actors (Silk et al., 2005), the costly experiments yield more decisive insights.

In the Sharing Game, participants in Sierra Leone chose between the equal allocation (10,10)—ten tokens for the participant and ten for their partner—or the unequal allocation (15,5)—15 tokens for oneself and five for their partner. This choice pits self-interest against equality, and thus measures motivations to reduce advantageous inequality. Because choosing the egalitarian option (10,10) benefits an anonymous partner at a cost to the participant, selfish subjects should never make this choice (except as an error). We measure the same motives in Georgia by letting children choose between numbers of prizes (2,0) vs. (1,1).

In the Envy Game, the decision-maker chooses between (10,10) vs. (13,16) in Sierra Leone and between (1,1) vs. (2,3) in Georgia. Here, the unequal choice leads to higher rewards for both players, but it also creates disadvantageous inequality for the decision-maker. Thus, the egalitarian choice (10,10) in Sierra Leone or (1,1) in Georgia indicates motivations to reduce disadvantageous inequality.

Treatments. Participants were randomly assigned to either the in-group or the out-group treatments. In Sierra Leone, the anonymous in-group partner came from the same village as the decision-maker while the out-group partner was from an unspecified distant village. In Georgia, the in-group partner came from the same classroom as the decision-maker while the out-group partner came from a different Georgian school, unknown to the participant. These treatments allow us to assess the extent of preferential treatment to one's own group members. Note that because the experimental out-

group members were not enemies (e.g., Russians), these theories do not predict more spiteful actions, though more self-regarding behaviour should be favoured.

 After the experiments, tokens were exchanged for cash in Sierra Leone; in Georgia, each token allowed children to "buy" one item from a variety of sweets, pencils, and small toys.

Results

The Sharing Game results, shown in Figure 1 (Panels A and B), reveal that among the least war-affected people in both sites there is no difference between the in-group and out-group treatments. Moving to those who were more affected, rates of egalitarian sharing choices increase for the in-group, but either decline or do not change for the out-group. In Georgia, the gap between the in-group and out-group increases from near zero to 36% (Fisher's Exact Test (FET): P = 1.00 for the non-affected group, $n = 118$; P = .003 for the affected & IDP group, $n = 75$). This is because the frequency of egalitarian sharing choices in the in-group treatment goes up from 49% to 68% (FET: P = .07 for the in-group treatment, $n = 107$), while the frequency diminishes from 51% to 32% in the out-group treatment (FET: P = .12 for the out-group treatment, $n = 86$). In Panel A of Table S2 (columns 1-6) in the SOM we use a regression framework to show that the same patterns emerge when controlling for gender, age and sibling composition. This approach also reveals a positive interaction effect on sharing between being in the affected & IDP group and in-group condition (probit regression, in-group dummy*affected & IDP, P = .03, $n = 341$), indicating that the difference in sharing between the in-group and out-group increases with warfare experience. In Sierra Leone, the frequency of egalitarian sharing in the in-group treatment increases from 32% among the least-affected group to 57% among the most-affected group (FET: P = .097, $n = 58$), while we don't find any statistically discernible effect on sharing in the out-group treatment. Panel A of Table S2 (columns 7-12) in the SOM shows these patterns hold in a regression framework after controlling for gender, age, siblings' composition, education, religion and ethnicity.

For the Envy Game, Figure 1 (Panels C and D) shows that those participants who were more affected by the war make more egalitarian choices for their in-group, and show a larger in-group-out-group gap. In the in-group treatment, the fraction of egalitarian choices increases from 25% to 58% in Georgia (FET: P = .001, n = 107) and from 16% to 43% in Sierra Leone (FET: P = .03, n = 58). Similarly, the gap between in-group and out-group increases from -18% to 26% in Georgia (FET: P = .05 for the non-affected group, n =118; P = .04 for the affected & IDP group, n = 75) and from -20% to 25% in Sierra Leone (FET: P = .07 for the least-affected group, n = 76; P = .16 for the most-affected group, n = 38). Also, regression analyses in Panel A of Table S2 in the SOM show that the difference in the in-group-out-group gap changes with war exposure at both sites, as indicated by a positive and highly significant interaction between war exposure and in-group treatment on egalitarian choices in the Envy game (probit regression; Georgian sample, in-group dummy*affected & IDP, P<.001, n = 341; Sierra Leone sample, in-group dummy*most-affected, P = .01, n = 158).

Another approach to analysing our findings is to combine the in-group data from these two games in order to distinguish four behavioural types: (1) Selfish, (2) Egalitarian, (3) Spiteful and (4) Generous. Selfish types are characterized by maximizing their own payoffs by picking (2,0) and (2,3) in the Sharing and Envy Games in Georgia, respectively, or by similarly picking (15,5) and (13,16) in Sierra Leone. Figure 2 shows that the frequency of Selfish types diminishes with war exposure, dropping from 35% to 8% (Panel A) among Georgian children (FET: P = .002, n = 107) and from 57% to 24% (Panel B) among Sierra Leoneans (FET: P = .03, n = 58). By contrast, the frequency of Egalitarians, who are characterized by minimizing differences in payoffs between themselves and their partners (always picking the even splits in all games), rises from 9% to 34% in Georgia (FET:P = .002, n = 107) and from 5% to 24% in Sierra Leone (FET: P = .09, n = 58). The frequency of Spiteful types, those who aim to minimize the payoffs of other in-group members by selecting (2,0) in the Sharing Game in Georgia (or (15,5) in Sierra Leone) and (1,1) in the Envy Game (or (10,10) in Sierra Leone),

also increases with conflict exposure in Georgia, though to a lesser degree than Egalitarians or Selfish types. Not significant are the results of war exposure on prevalence of purely Generous types, those who pick (1,1) in the Sharing Game in Georgia (or (10,10) in Sierra Leone) and (2,3) in the Envy Game (or (13,16) in Sierra Leone), which slightly declines in Georgia while slightly increasing in Sierra Leone. Table S3 in the SOM provides regression analyses linking conflict experience and type, and supplemental analyses that incorporate our other two costless games further supports this picture (Figures S2 and S3).

While we observe both short- and long-term impacts on social motivations for those who experienced inter-group conflicts between the ages of 7 and 20, we do not find any conflict-related effects on sociality for children ages 3 to 6 in Georgia (Panel A of Table S4 in the SOM) and only muted effects for Sierra Leoneans who were over age 20 during the conflict (Panel B of Table S4 in the SOM). For children and adolescents in Sierra Leone, the war effects are 26 percentage points in the Sharing Game and 31 percentage points in the Envy Game, while for adults it is 17 and 4 percentage points, respectively. As noted, previous experimental evidence shows prosocial behaviour increases with age during childhood and does not plateau until the mid-twenties (Eisenberg & Fabes, 1998; Harbaugh & Krause, 2000), probably because children and adolescents are gradually acquiring and internalizing the normative rules of their society (Eisenberg & Fabes, 1998). Consistent with this, sharing behaviour in Georgian children increases with age – the likelihood of sharing increases by 4 percentage points with each additional year during the age 3-12 years.

Of course, our selection of natural experiments creating quasi-random assignment to war treatments may not have been entirely effective. For instance, some of the regions covered in our samples were more affected than others and, it could be argued, social norms governing prosocial behavior could vary across regions independently from warfare. To address this, in Panel B of Table S2 in the SOM we controlled for location differences using dummy variables for each region (Georgia) or

village (Sierra Leone). This approach absorbs away any variation in warfare experience across the regions so that the remaining variation distinguishes only people within the same regions. The results tell the same story, supporting the link between war experience and in-group-oriented egalitarian motivations.

Discussion

Using simple decision tasks run with children and adults from the Caucasus and West Africa, we find results showing that exposure to conflict-related violence between the ages of 7 and 20 shifts people's motivations to greater equality for in-group members. Affected participants were more willing to sacrifice both their own payoffs and those of the group in order to reduce both advantageous and disadvantageous inequality within their in-group. This work supports evolutionary approaches that emphasize how inter-group competition intensifies selective pressures for reducing within-group fitness differences to solidify internal cohesion and galvanize in-group cooperation (Bowles, 2006; Fehr & Fischbacher, 2003). Combined with other lines of evidence, our results suggest that psychological reactions triggered by war during a particular developmental window generates either greater attention to, or internalization of, egalitarian social norms, or simply more in-group oriented egalitarian motivations (independent of local norms). These are separate evolutionary hypotheses, which we cannot distinguish here.[1]

If, on the other hand, the observed effects of war were due to psychological trauma (a psychological malfunction rather than the predicted adaptive response), behavioural changes would not be in the predicted directions and might also be observed in both the younger and older cohorts.

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[1] Our findings, which indicate that conflict exposure favors increased leveling over efficiency, highlight an ambiguity in current theorizing and point to a need for evolutionary models that explicitly examine the trade-off between fitness-leveling and total group payoffs.

These findings converge with two other recent studies linking war and social motivations using behavioral games (Gneezy & Fessler, 2011; Voors et al., 2012). Ultimatum Games conducted before, during, and after the Israel-Hezbollah conflict show that living in a society under an active and ongoing external threat temporarily increases the willingness of senior citizens to punish non-cooperators or reward cooperation (Gneezy & Fessler, 2011). In Burundi, Voors et. al. (2012) reveal that the experience of war-related violence increases sharing with neighbors.

We advance beyond these findings in four ways. First, by using simple games suitable to both children and unschooled adults, we are able to isolate a developmental window in which the experience of warfare leaves an enduring psychological mark on social motivations. This contrasts with the time-limited effects revealed by Gneezy and Fessler (2011) among senior Israeli citizens, though our findings are consistent with theirs in that we observe only weak enduring effects in those exposed during adulthood. Second, our experimental tasks more directly identify the social motivations instilled by inter-group conflicts using multiple interlocking games with an in-group vs. out-group treatment. This is crucial, since the theoretical prediction is specifically for an increase in in-group egalitarian motivation—and not merely for generalized prosociality or equality. Third, because we assessed the nature of individuals' conflict experiences, we were able to examine how more and less direct exposure to the violence differentially impacts social motivation: more direct exposure to conflict yields greater in-group egalitarian motivations. Fourth, we ran our experiments across more than one thousand participants, ranging from age 3 to 84 years old, drawn from multiple communities in both the Georgian Caucasus and in Sierra Leone. Establishing the broad generalizability of experimental findings is crucial to testing theories of human behavior (Henrich, Heine, & Norenzayan, 2010).

We developed our hypotheses based on the idea that inter-group conflict may have specifically impacted both genetic and cultural evolution in domain-specific ways. However, it is plausible that inter-group conflict instead represents but one type of personal insecurity, a broader domain that

includes other events or threats such as those created by floods, pathogens, earthquakes, and famines, as well as war. Here, the idea is that people have evolved to respond to insecurity by shifting their investment from building a broader sphere of positive sum interactions to managing risk by investing more heavily in their kin, personal relationships, and a tighter in-group. Only future research can sort this out.

Establishing the enduring effects of war on human sociality and delimiting them to a particular developmental window may illuminate a range of phenomena, including (a) the rapid recoveries observed in numerous post-conflict societies (Blattman & Miguel, 2010), (b) the historical importance of war in building new nations and larger political structures (Tilly & Ardant, 1975), (c) the persistent parochialism of cyclical conflicts, and (d) the existence of generational differences in sociality and patriotism between those who experienced war during the 7-20 age window and those who did not. This last point may contribute to explaining generational differences, such as those between America's "Greatest Generation" (who experienced WWII in the window) and subsequent generations. Such findings also remind us that the potentially positive effects on cooperation created by conflict may come at the expense of regard for those outside of one's own social group.

Acknowledgments

Declaration of Conflicting Interests

Funding

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Figure 1. Warfare exposure and relative frequency of egalitarian choices in Sharing and Envy Games.
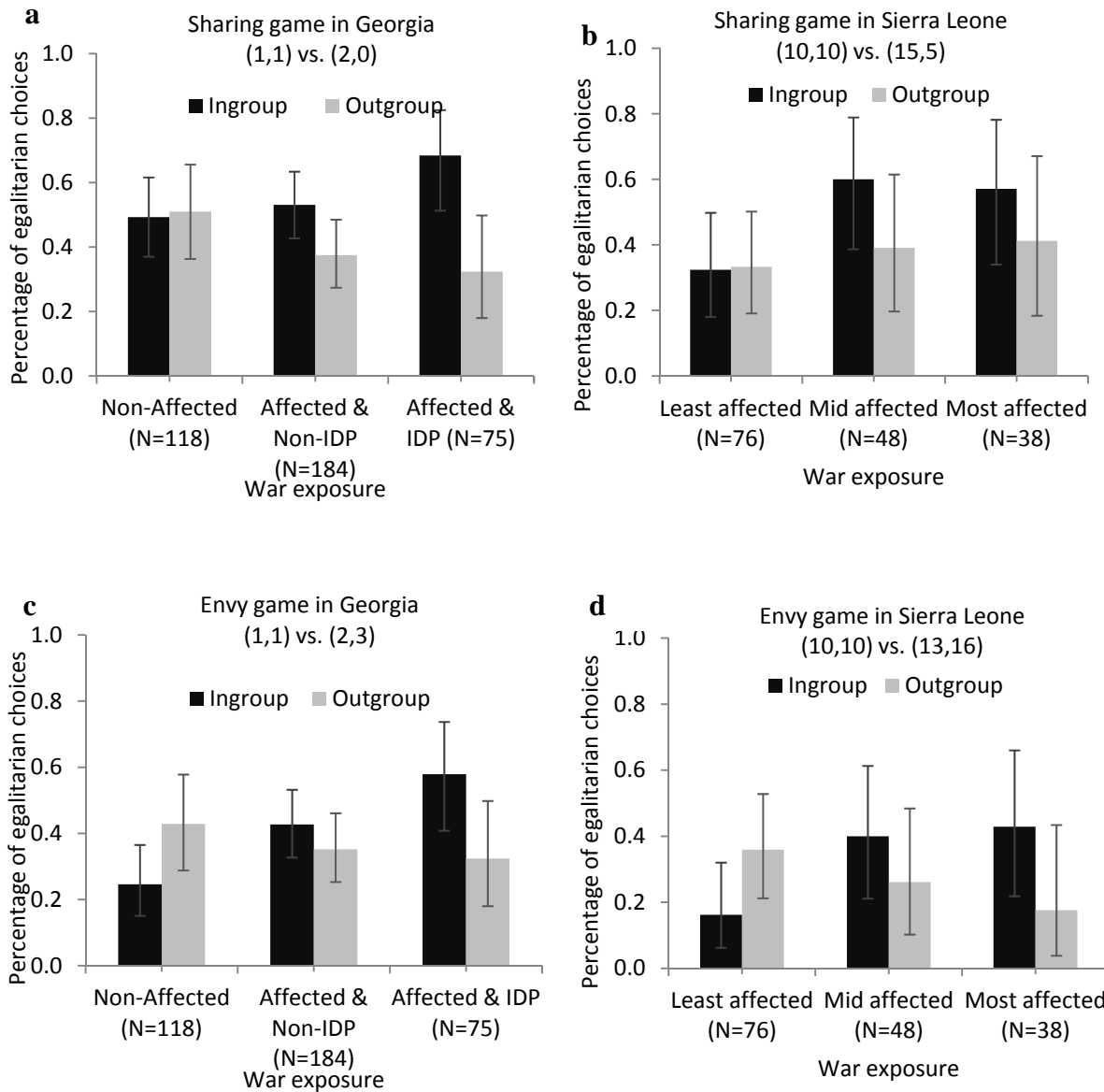
Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals. (a) Sharing Game in the

Republic of Georgia with children ages 7-12. We distinguish three groups of children: non-affected children, children who were exposed to warfare but not displaced six month later (Affected & Non-IDP), and children who were IDP in addition to being exposed to warfare (Affected & IDP). (b) Sharing Game in Sierra Leone (adults now who were 20 years or younger during the civil war). We again distinguish three groups: least-affected, mid-affected (individuals from households were somebody was either killed or injured), most-affected (somebody was killed and somebody was injured). (c) Envy Game in the Republic of Georgia. (d) Envy game in Sierra Leone.

Figure 2. Behavioural types in the in-group condition and warfare.

a   Behavioral types in Georgia

b   Behavioral types in Sierra Leone
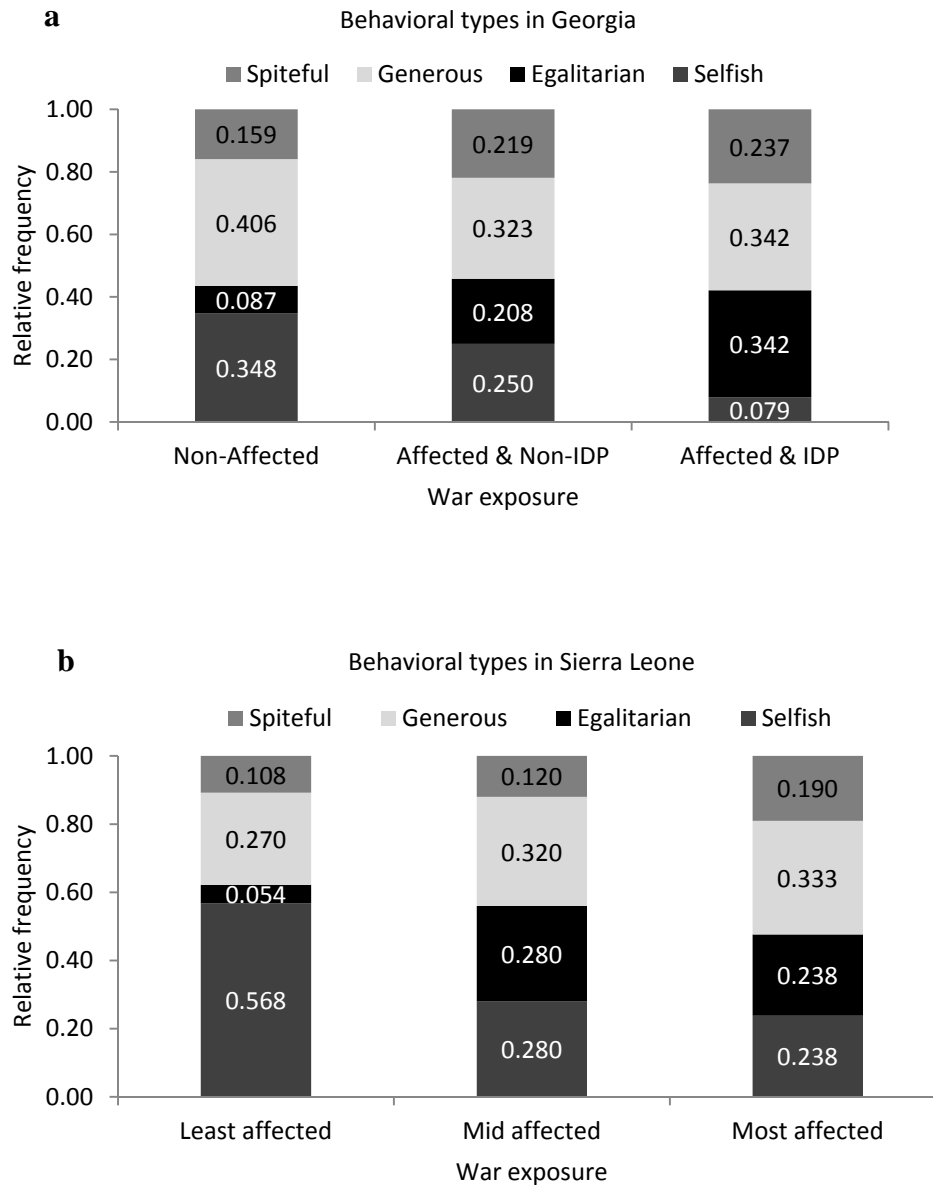
Selfish types maximize their payoff in both games (choosing (2,0) and (2,3) in Georgia and (15,5) and (13,16) in Sierra Leone). Egalitarians choose the even splits in both games. Generous types maximize payoff of their partners in both games, whereas Spiteful types minimize payoff of their partners. (a) Republic of Georgia. (b) Sierra Leone. The fraction of

Egalitarians increases steeply with warfare exposure, whereas the fraction of Selfish types

decreases by a similar magnitude.

Supplemental Online Material

For: War's Enduring Effects on the Development of Egalitarian Motivations and In-group Biases

Michal Bauer, Alessandra Cassar, Julie Chytilová & Joseph Henrich

Samples and Experimental Procedures

Republic of Georgia. Since independence after the collapse of communism in the USSR, 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 militia comprised by ethnic Ossetians. Although provocations took place for extended periods before the inception of the war (Asmus, 2010), its timing was unexpected and not preceded by migration of civilians away from the affected areas (Asmus, 2010; Human Rights Watch, 2009). The war lasted one week and intensive fighting, indiscriminate to civilians, resulted in substantial human losses and devastation of livelihoods. Most of the fighting was based on aerial, artillery and tank fire strikes.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). Several bombs were dropped on different locations in Tbilisi (the capital city). Essentially all ethnic Georgians who lived within South Ossetia (more than 100,000) were forced to leave their homes and were resettled outside of South Ossetia (EU, 2009; Human Rights

Watch, 2009). Most of these families were still internally displaced (IDPs) at the time of our data collection.

The pattern and speed of the Russian bombing makes it a reasonable to treat individual exposure to warfare as random,especially after controlling for average location differences. In the main text, we consider exposure to warfare as a quasi-natural experiment and compare the affected children with those in a control group (individuals with no exposure to warfare). Nevertheless, we provide several robustness checks to investigate concerns about the endogeneity of exposure to warfare (see below).

A total of 543 children aged 3-12 participated in the experiment six months after the August 2008 war. Children were accessed via 17 primary schools and kindergartens in Gori region, villages between Gori and Tbilisi, and Tbilisi. Although South Ossetia had closed borders, our sample includes children from South Ossetia because ethnic Georgians were internally displaced in bordering regions, Gori region in particular, and their children attended local schools.

The experiments consist of four binary choice games which are one-shot, without repeated interactions, with an anonymous partner who remains anonymous after the experiment. In each game, the subjects chose between two mutually exclusive options, each represented on a cardboard with two circles directed to the decision-maker and to a partner displayed on a laptop screen (see Figure S1). Tokens placed inside indicated who would receive how many tokens. In the randomly assigned in-group condition, the photo on the laptop showed children from the same class, whereas for the out-group condition it showed an unknown class of children. The tokens for the partner were set aside and anonymously delivered later. The four games were the Sharing Game (choice of (1,1) vs. (2,0), i.e. one token for the decision maker and one token for the partner, or two tokens for the decision-maker and nothing for the partner), the Envy Game [(1,1) vs. (2,3)], the Costless Sharing Game [(1,1) vs. (1,0)] and the Costless Envy game [(1,1) vs. (1,2)]. 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 were randomly determined before the experiment and the results are robust to controlling for all of these. The choices were made privately and only the experimenter could observe the subject's choices. Prior to making choices, children had to correctly answer a set of comprehension questions. After the experiments, tokens were exchanged for sweets, pencils, erasers, stickers and small toys, the price being one token for one item. The children received one token as a show-up fee and exchanged it for a reward before the experiment, to ensure understanding of the link between tokens and rewards.

Sierra Leone. The country experienced one of the most brutal and horrific civil conflicts (1991-2002) in the history of Africa (Truth and Reconciliation Commission, 2004). The civilian population became the victim of brutal attacks, including public executions, rape, amputations and abduction of children to serve in the rebel army. It has been estimated that more than 50,000 people died during the conflict while more than 2 million (about one-third of the population) were displaced (Human Rights Watch, 1999). The triggers for the civil war are a series of interrelated internal factors -- bad governance, extreme corruption, access to alluvial diamonds, youth unemployment and high level of poverty --as well as the international factors, in particular the support of the rebels by Liberia and Libya (Keen, 2005). Most of the violence has been committed by the Revolutionary United Front (RUF). Various other groups, including the Sierra Leone Army (SLA) which often collaborated with rebels to avoid direct battles and to divide access to alluvial diamonds (Keen, 2005), have also committed a large fraction of the atrocities. According to the available statistical evidence (Bellows & Miguel, 2009; Conibere et al., 2004; Humphreys & Weinstein, 2006) neither individual ethnic nor religious affiliation played a major role in the targeting the civilian population by the rebels. Instead, "villages [not individuals] were a major target" (Humphreys & Weinstein, 2006).

Our field work was based mostly in the Bombali district, which is located in the centre-north of Sierra Leone. Most of the attacks on civilians in this district took place in the period 1994-1999 (Smith, Gambette, & Longley, 2004). The experiment was carried out in 2010 in 21 villages, resulting in a sample of 586 adult subjects. We pre-selected the villages where existing evidence indicated substantial variation in war exposure (Bellows & Miguel, 2009). Our subjects are parents or guardians of children from randomly selected classes in local schools.

The experiment was designed to mirror the experiment in Georgia and its parameters were chosen to maximize response variation in an adult population (see Table S1). The games were the Sharing Game [(10,10) vs. (15,5)], the Envy Game [(10,10) vs. (13,16)], the Costless Sharing Game [(10,10) vs. (10,5)] and the Costless Envy game [(10,10) vs. (10,15)]. For the randomly assigned in-group condition, the partner was an anonymous person from the same village, while in the out-group condition she was from a distant village. The tasks were illustrated in a similar fashion as in Georgia. The choices were made privately -- each subject had a large cardboard box in which her working place was hidden from anybody else's sight. The subjects were asked to put the decision sheet with their choice in an envelope. The envelopes were identified only by the subject ID number and only the experimenters could observe the subjects' choices. According to these identification numbers the experimental measures were matched with the survey data and the experimental rewards were then disbursed to the subjects. At the beginning of the session subjects were informed that they would be paid according to only one of the games randomly selected at the end of the session. For the in-group treatment, the payment was paid to another participant of the experiment in the same village while for the out-group treatment it was paid to a participant from another village. Each experimental token represented 500 Sierra Leone Leones. The experimental rewards were at least SLL 5,000 (USD 1.25, approximately daily per capita income; at the time of our study the exchange rate was 3,970 SLL/USD). In addition, each participant received SLL 10,000 as a show-up fee. All subjects were paid in private.

All our game scripts were administered in Temne, Krio and Limba languages by native speakers. English translation of experimental protocols is available here (hyperlink).

Discussion of further results

Results in all four games. In the manuscript we simplified the analysis by focusing on behavior in the two costly games which unambiguously distinguish between selfish and other-regarding motives. As noted, subjects made choices in two more costless games, which capture similar motives but in which changing partner's payoff is costless for the decision-maker. To cross-check whether we obtain similar patterns, we classify behavioural types based on choices across all four games. *Egalitarian* types choose the egalitarian option in all four games. *Generous* subjects always maximize the payoff of their partner, while *Spiteful* subjects always minimize it. *Aheadness-averse* types choose the egalitarian option in the Sharing game and the costless Sharing game -- where they can reduce advantageous inequality. *Behindness-averse* types choose the egalitarian option in the Envy game and the costless Envy game -- where they can reduce disadvantageous inequality. *Selfish* subjects choose allocations that maximize their own payoff.

Figure S2 shows the prevalence of the types for different levels of war exposure in Georgia and Figure S3 in Sierra Leone. Overall, the results are in line with our previous analysis: egalitarian motives increase in the in-group treatment in both countries. In the out-group treatment Selfish motives increase in Georgia, whereas the effects are less conclusive in Sierra Leone.

Results for smaller children in Georgia and older adults in Sierra Leone. While long-term impacts on social motivations are observed in those who experienced inter-group conflicts between the ages of 7

and 20, we find no systematic effect of warfare exposure on choices of 3-6 year-olds in Georgia (Panel A of Table S4) and weaker (and statistically insignificant) effects for Sierra Leoneans who were over age 20 during the conflict (Panel B of Table S4). To test whether these moderate effects in SierraLeone are driven by subjects who are just above the threshold of twenty years, perhaps because development of prosociality does not plateaux until mid-twenties, we vary the age threshold from 20 years to 25 years (Panel C of Table S4) and 30 years (Panel D of Table S4). Interestingly, we find no "war effects" on those exposed during their twenties.

Concerns about causal mechanism. 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 motivations are driven by causal effect of warfare, and robustness checks which support the interpretation and indicate that the alternative explanations are unlikely to drive our results.

Panel A of Table S5 studies which individual characteristics predict exposure to warfare among 7-12yr old children in Georgia. Children who lived in South Ossetia prior to the war are more likely to be Affected & IDP, as expected given the history of the war. The main concern is that certain towns or villages were affected more than others and social norms governing prosocial behaviour could vary across locations, independently of warfare. In particular, regions where people are more egalitarian and have bigger in-group bias could be, coincidentally, those regions that were more heavily affected. In columns 1-6 of Panel B of Table S2 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. In order to minimize the loss of degrees of freedom, we

do not control for gender, and for having a brother and having a sister. The results are similar to our previous estimates, supporting the direct link between warfare and egalitarian motives.

The problem of selective targeting by fighters based on some observable characteristic of victims is a priori more severe in Sierra Leone because the civil war lasted for several years and it has not been carried out mainly by impersonal bombing, making the individual exposure potentially less random. In particular, the fighters could have targeted households of community leaders, which may in turn affect post-war social preferences (by overestimating the prosociality of the victims). In this context it is noteworthy that the observed effects are stronger for the sub-sample of younger subjects who are less likely to be subject of targeted violence than the sub-sample of adults. Individuals who were teenagers during the civil war could not have been community leaders prior to the war. This indicates that the impacts we observe are due to violence rather than due to selection. In Panel B of Table S5 we find that few characteristics predict individual warfare exposure. We interpret our results in the broader context of Bellows and Miguel (2009) which concludes against the hypothesis of selection into victimization using a large national representative sample.

In all our regression estimates for Sierra Leone sample we controlled for a set of individual observable characteristics that are unlikely to change due to the warfare: gender, age, religion, ethnicity, number of brothers and sisters, and information whether an individual attended school. Further, in columns 7-12 of Panel B of Table S2 we control for 21 dummies, one for each village, which should eliminate the role of village-level fixed characteristics. This is a very ambitious test given the high number of explanatory variables relative to the number of observations in the analysed sub-samples. In order to minimize loss of degrees of freedom, we do not control for observable characteristics other than age. The results are qualitatively similar, but less significant statistically.

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Figure S1: Choice situation.

Figure S2. Behavioural types and warfare in Georgia.
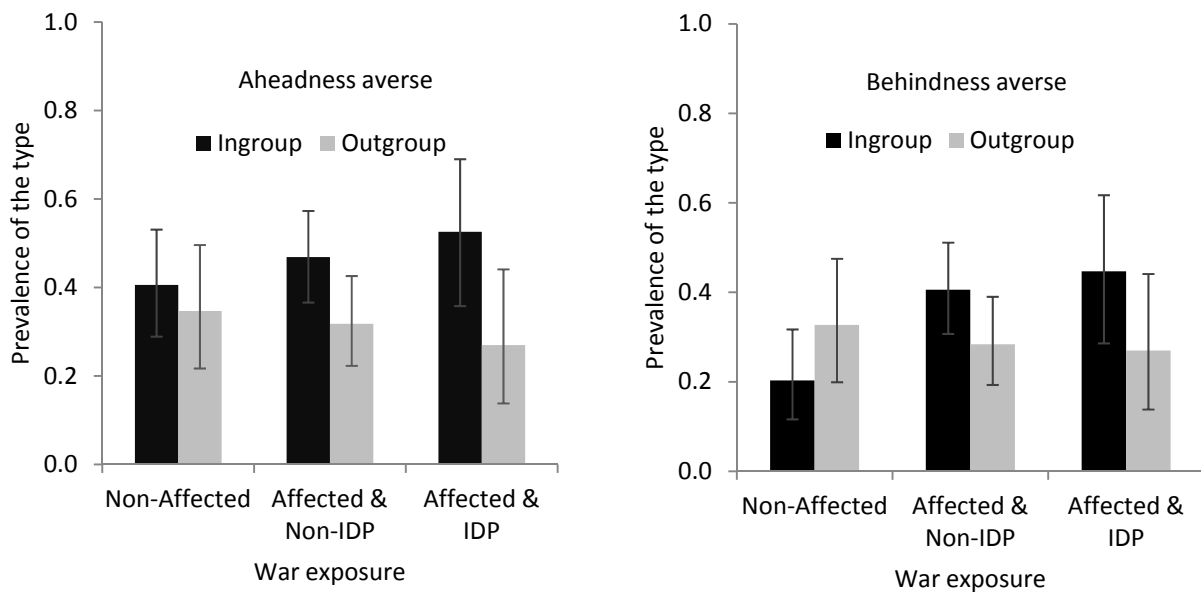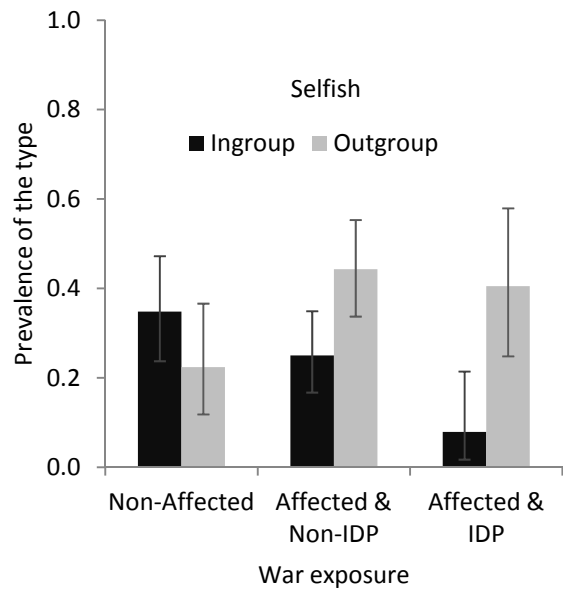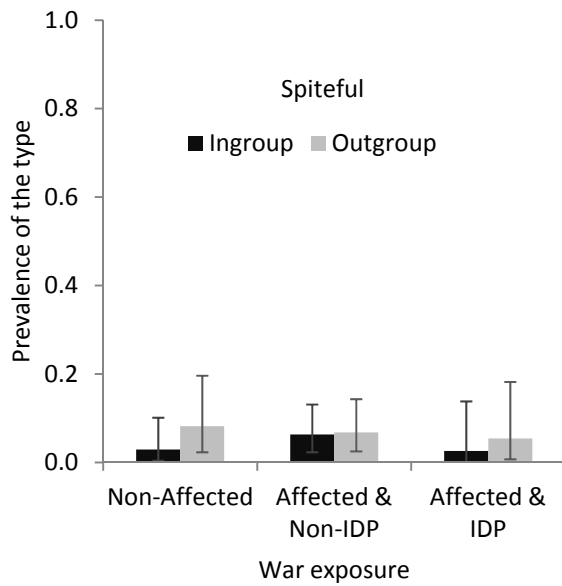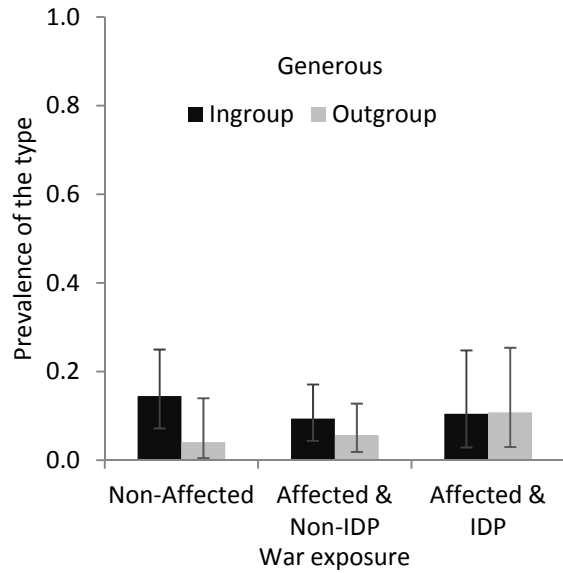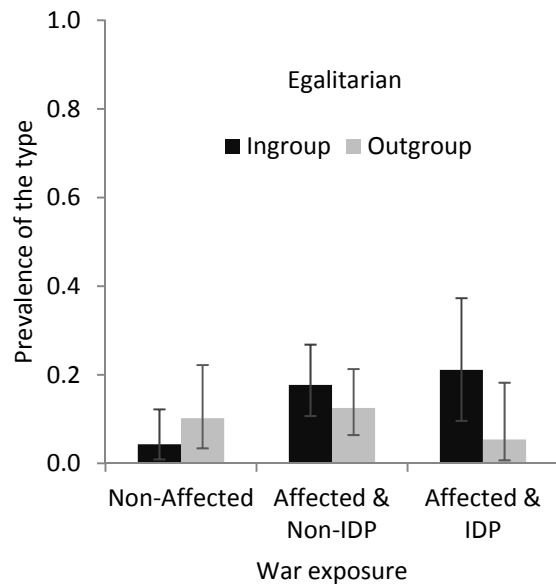
Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals.

Figure S3. Behavioural types and warfare in Sierra Leone.
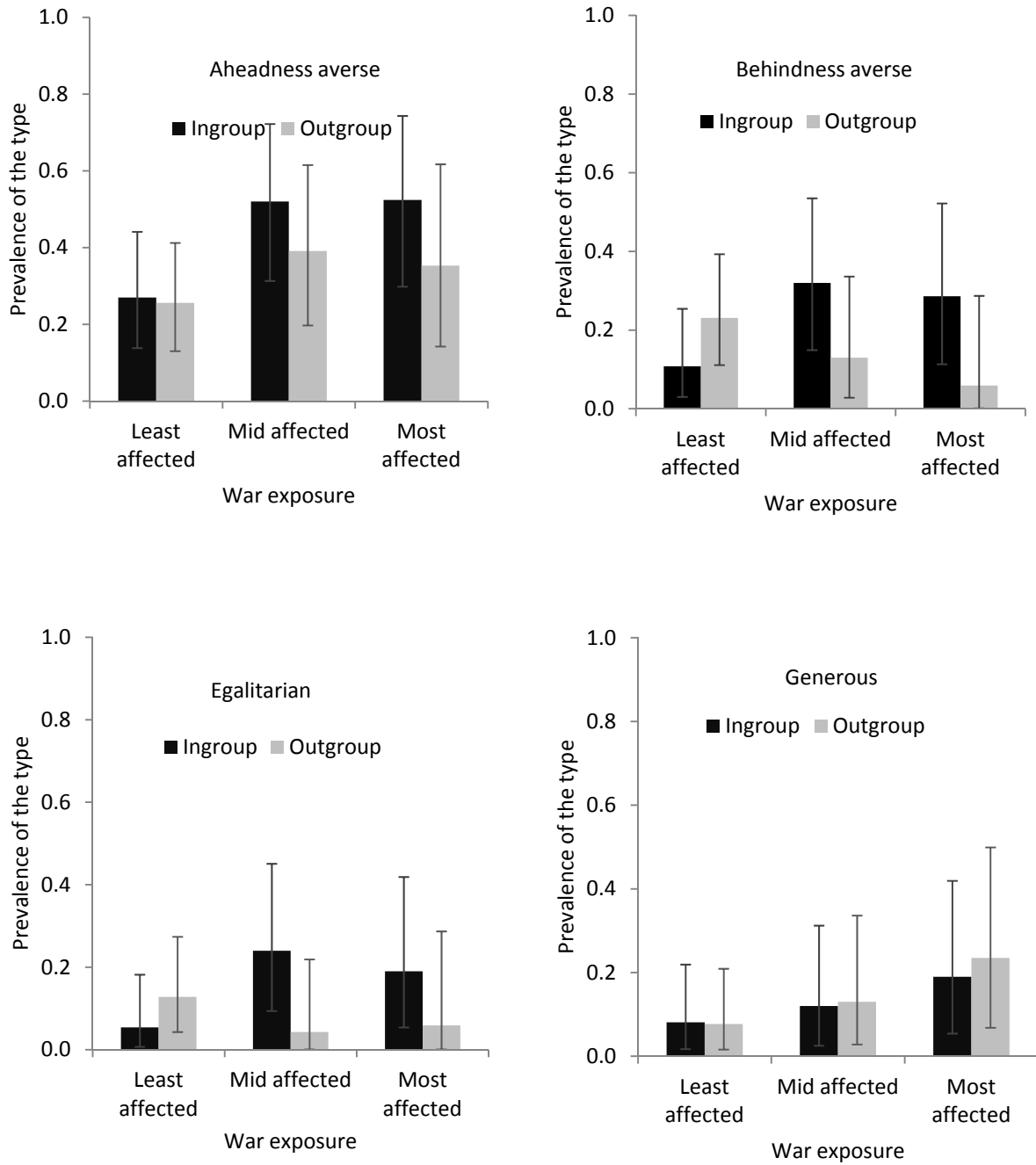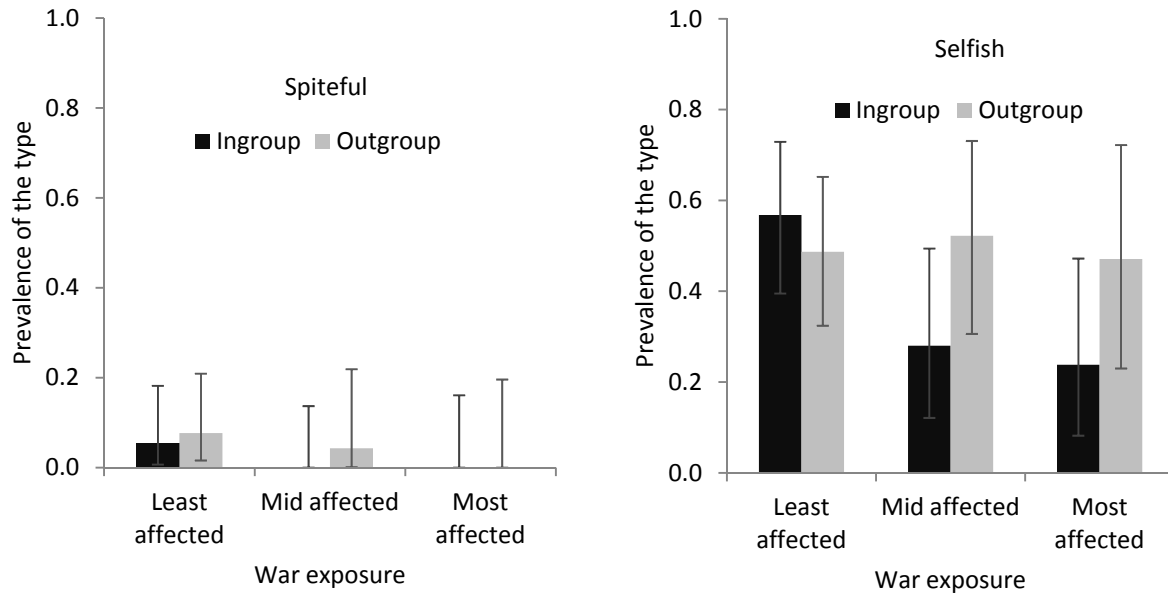
Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals.

Table S1: Comparison of experiments across sites.

	Children in Georgia				Adults in Sierra Leone			
	Option A		Option B		Option A		Option B	
	Own payoff	Partner's payoff	Own payoff	Partner's payoff	Own payoff	Partner's payoff	Own payoff	Partner's payoff
Costly games								
Sharing game	1	1	2	0	10	10	15	5
Envy game	1	1	2	3	10	10	13	16
Costless games								
Sharing game	1	1	1	0	10	10	10	5
Envy game	1	1	1	2	10	10	10	15

Table S2: Sharing game and envy game.

Sample	7-12 year-old children in Georgia						Adults who were 7-20 yr-old during the civil war In Sierra Leone					
Dependent variable	Egalitarian choice in the sharing game: (1,1) vs. (2,0)			Egalitarian choice in the envy game: (1,1) vs. (2,3)			Egalitarian choice in the sharing game: (10,10) vs. (15,5)			Egalitarian choice in the envy game: (10,10) vs. (13,16)		
	All	In-group	Out-group	All	In-group	Out-group	All	In-group	Out-group	All	In-group	Out-group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A												
Affected&IDP/Most affected	-0.190*	0.130	-0.197*	-0.126	0.382***	-0.133	0.0454	0.264*	0.102	-0.203	0.313**	-0.227**
	(0.0910)	(0.206)	(0.0690)	(0.242)	(0.000325)	(0.208)	(0.764)	(0.0692)	(0.511)	(0.109)	(0.0257)	(0.0495)
Affected&Non-IDP/Mid affected	-0.183*	-0.0479	-0.186**	-0.0816	0.198**	-0.0865	0.0486	0.286**	0.103	-0.0783	0.253**	-0.144
	(0.0550)	(0.583)	(0.0485)	(0.362)	(0.0231)	(0.334)	(0.732)	(0.0317)	(0.479)	(0.529)	(0.0447)	(0.267)
In-group	0.000482			-0.179*			0.00545			-0.210*		
	(0.996)			(0.0627)			(0.965)			(0.0706)		
Affected&IDP/Most affected*In-group	0.317**			0.499***			0.205			0.520**		
	(0.0315)			(0.000908)			(0.322)			(0.0121)		
Affected&Non-IDP/Mid affected*In-group	0.148			0.288**			0.205			0.358*		
	(0.244)			(0.0234)			(0.293)			(0.0645)		
Observations	341	184	157	341	184	157	157	82	75	157	82	75
Panel B						Controlling for village fixed effects						
Affected&IDP/Most affected	-0.148	0.145	-0.0991	-0.117	0.461***	-0.198	0.0483	0.205	0.0754	-0.189	0.229	-0.270**
	(0.286)	(0.328)	(0.531)	(0.385)	(0.00300)	(0.207)	(0.783)	(0.259)	(0.701)	(0.103)	(0.184)	(0.0147)
Affected&Non-IDP/Mid affected	-0.136	-0.0202	-0.131	-0.115	0.195**	-0.140	-0.0699	0.296*	-0.0141	-0.0612	0.220	-0.0480
	(0.142)	(0.818)	(0.168)	(0.203)	(0.0246)	(0.147)	(0.656)	(0.0878)	(0.930)	(0.596)	(0.110)	(0.698)
In-group	0.0326			-0.213**			-0.0910			-0.199*		
	(0.730)			(0.0265)			(0.490)			(0.0585)		
Affected&IDP/Most affected*In-group	0.339**			0.493***			0.166			0.541**		
	(0.0218)			(0.00127)			(0.485)			(0.0174)		
Affected&Non-IDP/Mid affected*In-group	0.119			0.316**			0.340			0.328*		
	(0.329)			(0.0104)			(0.108)			(0.0889)		
Observations	377	197	172	373	202	171	153	69	72	156	72	60

Probit regressions with robust standard errors, marginal effects reported, *** denotes significance at 1% level, ** 5% level,* 10% level. In Panel A we control for age, gender, having a brother and having a sister in the Georgian sample and for age, gender, siblings, school attendance, religion and ethnicity in the Sierra Leone sample. In Panel B we control for location differences – in the Georgian sample we include 15 dummy variables for regions which the children come from; in the Sierra Leone sample we include 21 village dummies.

Table S3: Behavioral types, ingroup treatment.

Dependent variable	Selfish	Egalitarian	Generous	Spiteful
	(1)	(2)	(3)	(4)
Panel A:				
Sample	**7-12 year-old children in Georgia**			
Affected&IDP	-0.223***	0.298***	-0.133	0.121
	(0.00644)	(0.00205)	(0.162)	(0.185)
Affected&Non-IDP	-0.0356	0.118	-0.144*	0.0925
	(0.609)	(0.106)	(0.0823)	(0.181)
Age	-0.0337	0.00586	0.0637**	-0.0341
	(0.136)	(0.798)	(0.0206)	(0.124)
Female	0.0151	-0.0216	-0.00277	0.0156
	(0.813)	(0.707)	(0.970)	(0.787)
Has a brother	0.0633	-0.0851	0.0358	-0.0115
	(0.347)	(0.148)	(0.654)	(0.863)
Has a sister	0.0852	-0.0840	0.0349	-0.0398
	(0.202)	(0.146)	(0.653)	(0.535)
Observations	184	184	184	184
Panel B				
Sample	**Adults who were 7-20 yr-old during the civil war In Sierra Leone**			
Most affected	-0.337***	0.186*	0.0673	0.0686
	(0.00861)	(0.0789)	(0.619)	(0.391)
Mid affected	-0.261**	0.271***	0.00521	-0.0172
	(0.0362)	(0.00977)	(0.966)	(0.813)
Age	0.0381**	0.0174	-0.0423***	-0.00980
	(0.0124)	(0.117)	(0.00655)	(0.232)
Female	0.0626	-0.212*	0.130	0.00595
	(0.673)	(0.0919)	(0.351)	(0.941)
Number of brothers	0.00425	0.0201	0.00825	-0.0219
	(0.861)	(0.108)	(0.690)	(0.122)
Number of sisters	0.0290	-0.0132	-0.0258	0.0141
	(0.283)	(0.365)	(0.315)	(0.352)
Attended school	0.103	0.0838	-0.0734	-0.122**
	(0.428)	(0.187)	(0.548)	(0.0369)
Muslim religion	-0.0273	-0.192	0.191	0.0567
	(0.846)	(0.124)	(0.122)	(0.367)
Temne ethnicity	0.0847	0.185*	-0.189	-0.174**
	(0.524)	(0.0807)	(0.151)	(0.0334)
Observations	82	82	82	82

Probit regressions with robust standard errors, marginal effects reported, *** denotes significance at 1% level, ** 5% level, * 10% level.

Table S4: Sharing game and envy game in Georgia, 3-6 years old; and in Sierra Leone,

>20, >25, >30 years in 1999.

Panel A

Sample	3-6 year-old children in Georgia					
	Egalitarian choice in the sharing game: (1,1) vs. (2,0)			**Egalitarian choice in the envy game: (1,1) vs. (2,3)**		
Dependent variable	All	In-group	Out-group	All	In-group	Out-group
	(1)	(2)	(3)	(4)	(5)	(6)
Affected&Non-IDP	0.120	-0.0571	0.139	0.0988	-0.0353	0.0987
	(0.358)	(0.630)	(0.294)	(0.467)	(0.776)	(0.441)
Affected&IDP	0.0256	-0.177	0.0413	0.0295	-0.0592	0.0241
	(0.849)	(0.139)	(0.761)	(0.832)	(0.647)	(0.852)
In-group	0.164			0.216*		
	(0.194)			(0.0968)		
Affected&Non-IDP*In-group	-0.177			-0.129		
	(0.278)			(0.453)		
Affected&IDP*In-group	-0.200			-0.0841		
	(0.225)			(0.641)		
Observations	187	97	90	185	95	90

Panel B

Sample	>20 years old in 1999 in Sierra Leone					
	Egalitarian choice in the sharing game: (10,10) vs. (15,5)			**Egalitarian choice in the envy game: (10,10) vs. (13,16)**		
Dependent variable	All	In-group	Out-group	All	In-group	Out-group
Mid affected	0.0599	0.0616	0.0539	0.0558	0.00695	0.0615
	(0.471)	(0.432)	(0.516)	(0.460)	(0.921)	(0.402)
Most affected	0.103	0.174*	0.0960	-0.0572	0.0386	-0.0520
	(0.247)	(0.0787)	(0.283)	(0.467)	(0.673)	(0.491)
In-group	0.0273			0.0469		
	(0.716)			(0.476)		
Mid affected*In-group	-0.00766			-0.0524		
	(0.946)			(0.589)		
Most affected*In-group	0.0491			0.102		
	(0.707)			(0.417)		
Observations	414	210	204	415	210	205

Panel C

Sample	>25 years old in 1999 in Sierra Leone					
	Egalitarian choice in the sharing game: (10,10) vs. (15,5)			**Egalitarian choice in the envy game: (10,10) vs. (13,16)**		
Dependent variable	All	In-group	Out-group	All	In-group	Out-group
Mid affected	0.110	0.0925	0.109	0.123	0.0171	0.142
	(0.260)	(0.291)	(0.273)	(0.171)	(0.828)	(0.109)
Most affected	0.101	0.185*	0.0910	-0.0285	0.0186	-0.0105
	(0.328)	(0.0895)	(0.387)	(0.761)	(0.852)	(0.907)
In-group	0.0312			0.0830		

	(0.710)			(0.266)		
Mid affected*In-group	-0.0378			-0.104		
	(0.766)			(0.334)		
Most affected*In-group	0.0614			0.0476		
	(0.674)			(0.729)		
Observations	331	177	154	332	177	155

Panel D

Sample	>30 years old in 1999 in Sierra Leone					
Dependent variable	Egalitarian choice in the sharing game: (10,10) vs. (15,5)			Egalitarian choice in the envy game: (10,10) vs. (13,16)		
	All	In-group	Out-group	All	In-group	Out-group
Mid affected	0.119	0.0613	0.116	0.128	0.00787	0.129
	(0.322)	(0.561)	(0.360)	(0.260)	(0.935)	(0.279)
Most affected	0.0290	0.268**	0.00483	0.0105	0.109	0.0263
	(0.832)	(0.0460)	(0.972)	(0.934)	(0.394)	(0.837)
In-group	0.0308			0.0479		
	(0.765)			(0.617)		
Mid affected*In-group	-0.0657			-0.115		
	(0.669)			(0.393)		
Most affected*In-group	0.210			0.0763		
	(0.264)			(0.674)		
Observations	221	123	98	223	124	99

In all columns of Panel A we control for age and gender. We do not control for dummies for having a brother and having a sister because many children did not answer these questions. In all columns of panels B, C and D we control for age, gender, and dummies for ever having attended school, Muslim religion and Temne ethnicity.

Table S5: Determinants of war exposure.

Panel A

Sample	7-12 year-old children in Georgia	
	Affected& Non-	
Dependent variable	IDP	Affected& IDP
	(1)	(2)
Age	0.0325	0.0297
	(0.366)	(0.376)
Female	-0.0968	-9.61e-05
	(0.130)	(0.998)
Has a brother	0.0870	-0.0476
	(0.193)	(0.368)
Has a sister	0.136**	-0.0149
	(0.0354)	(0.750)
Height	0.00301	-0.00682
	(0.554)	(0.155)
Lived in urban area before war	0.0680	-0.137*
	(0.378)	(0.0540)
Lived in South Ossetia before war	-0.415***	0.594***
	(8.05e-07)	(0)
Observations	283	283

Panel B

Sample	Adults who were 7-20 yr-old during the civil war In Sierra Leone	
Dependent variable	Mid affected	Most affected
Female	0.0480	-0.0985
	(0.632)	(0.316)
Age	-0.00786	0.00712
	(0.432)	(0.454)
Number of brothers	-0.00268	0.00540
	(0.866)	(0.698)
Number of sisters	0.00591	0.00906
	(0.751)	(0.595)
Attended school	0.152*	0.0621
	(0.0777)	(0.440)
Muslim religion	-0.0125	0.100
	(0.894)	(0.275)
Temne ethnicity	-0.0990	0.0525
	(0.290)	(0.551)
Observations	157	157

Probit regressions with robust standard errors, marginal effects reported, *** denotes significance at 1% level, ** 5% level, * 10% level.