

# Warfare Experience during Ontogeny Increases Egalitarian and Parochial Motivations

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**Many evolutionary approaches to understanding human cooperation emphasize the importance of inter-group conflict.<sup>1-4</sup> Recent models predict that if inter-group competition was an enduring selective force over human evolutionary history,<sup>5,6</sup> it would favour motivations that increase both (a) egalitarianism, to suppress within-group competition, and (b) parochialism, to favour in-group members. In two diverse populations, we test this hypothesis using simple economic decision experiments among children and adults who were differentially affected by war. From the Republic of Georgia, our experiments ( $n = 543$ ) show that older children who were more war-afflicted are more egalitarian towards in-group members, even six months post-conflict. In Sierra Leone, the same experiments ( $n = 586$ ) reveal that adults who were older children or adolescents during the war are also more egalitarian towards in-group partners, even a decade post-conflict. Meanwhile, those who were younger than age 7 reveal no short-term effects (Georgia) and those older than 20 reveal only much muted long-term effects (Sierra Leone). These results indicate that experiencing inter-group conflict during the window from middle childhood through adolescence increases parochial egalitarianism. Such motivational shifts have implications for understanding the relationship between warfare, polity building and post-conflict recovery.**

Inter-group conflicts have pervaded human evolutionary and modern history.<sup>7,8</sup> Yet, at the same time, humans are unusually cooperative and pro-social,<sup>9</sup> often willing to incur costs to benefit others.<sup>10</sup> Many have argued that this eusociality may have emerged from the cauldron of enduring intergroup conflict, when an individual's survival hinged on sustaining high-levels of within-group cooperation.<sup>1,2,11,12</sup> Violent conflicts among human groups create selective pressures that, via cultural, genetic or culture-gene coevolutionary processes, can favour psychological mechanisms that simultaneously promote egalitarian motivations that cement group cohesion, enhancing within-group cooperation, and sharpen an individual's sense of group identity (parochialism)—creating fertile ground for out-group hostility.<sup>4,5,13</sup> Under culture-gene coevolution, if inter-group competition during cultural evolution did favour the spread of self-reinforcing social norms for such motivations, then sanctioning mechanisms based on reputation, signaling and punishment could favor psychological mechanisms—based purely on within-group genetic selection—for increasing parochial-egalitarian or norm-adhering motivations in response to inter-group conflict, or merely the threat of it.<sup>13,14</sup>

Much empirical work is consistent with this view. Researchers have long observed that inter-group conflict seems to intensify the punishment of norm-violators and the celebration of heroes.<sup>15</sup> In the laboratory, psychologists have shown that inter-group competition intensifies group-based altruism,<sup>11,16</sup> which may be underpinned by the production of the neuropeptide oxytocin,<sup>17</sup> and that inducing thoughts of death induces participants to cling more firmly to their in-group's normative values.<sup>18</sup> Economists have produced some evidence that violent war experiences may actually increase participation in voting,<sup>19</sup> local collective action<sup>20</sup>, and altruism towards neighbours<sup>21</sup>. Historically, wars have promoted state formation and nation building in Europe,<sup>22</sup> Africa, and North America.<sup>23</sup>

However, a direct link between conflict experience and parochial-egalitarian motivations has not been empirically established, due to the paucity of experimental measures of social behavior from post-conflict societies. To test this hypothesis across dissimilar populations and ages, we ran the same set of binary-choice decision experiments in two very different post-conflict societies, the Republic of Georgia in the Caucasus and Sierra Leone in West Africa. In Georgia, six months after the war with Russia over South Ossetia, we tested children (ages 3 to 11) from 17 primary schools and kindergartens scattered across the afflicted region (Figure S1). We focus on this age range since prior work suggests that other-regarding motivations develop substantially during middle childhood.<sup>24-26</sup> While brief, this war devastated areas of South Ossetia and its bordering districts, causing more than 100,000 civilians to flee their homes.<sup>27,28</sup> Because most of the fighting involved aerial, artillery and tank fire strikes<sup>27</sup>, it was unlikely to have selectively affected certain types of families. The lack of any pre-emptive exodus indicates that civilians did not anticipate the conflict, which mitigates concerns about a migratory-bias on who was affected.<sup>27,28</sup>

Within our sample, we distinguished three levels of war exposure, based on individual-level surveys. “Non-affected” children, 32% of participants, reported not hearing or seeing fighting, not having an injured relative, and not seeing a 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”), and 44% were affected but not internally displaced (“affected & non-IDP”).

In North-Western Sierra Leone (Figure S2), we recruited adult participants ( $n = 586$ ) across a diverse age range (18 to 84) from 21 villages where existing evidence indicated substantial variation in war exposure<sup>20</sup>. 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 rapes and amputations<sup>20</sup>, though neither ethnicity nor religion were important in targeting civilian populations<sup>20,29</sup>.

As for 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.

At each site, we ran four mini-dictator games where participants chose between two alternative allocations of tokens between themselves and an anonymous partner. Here we focus on two costly games (Sharing and Envy) which are particularly interesting because they unambiguously distinguish between other-regarding behaviour and purely selfish behaviour. The two costless games provide convergent findings (see Supplementary Information), though since they were designed to tap the social preferences of even entirely selfish actors<sup>9</sup>, the costly experiments provide more decisive insights. 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.

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 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. 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) or (1,1) indicates motivations to reduce disadvantageous inequality.

Participants were randomly assigned to either the in-group or out-group treatments. In Sierra Leone, the anonymous in-group partner came from the same village as the decision-maker while the outgroup partner was from an unspecified distant village. In Georgia, the in-group partner came from the same class as the decision-maker while the outgroup partner came from a different Georgian school, unknown to the participant. These treatments allow us to assess the extent of parochialism—preferential treatment to one’s own group members measured as the ingroup-outgroup gap in choices.

The evolutionary hypotheses sketched above suggest that exposure to inter-group conflict may heighten both egalitarian and parochial motivations. In particular, war-exposure should reduce selfish behaviour in the in-group treatment. Greater in-group egalitarianism will suppress within-group competition and enhance group-level cooperation, when facing out-group threats. Because the experimental out-group members were not enemies, we did not expect to observe more spiteful actions, but possibly more selfish behaviour towards them. Our design permits testing of whether egalitarian motivations in the in-group treatment (egalitarianism) and in-group-out-group gap (parochialism) are simultaneously increased by conflict.

Our results show that exposure to warfare is associated with more egalitarian motives towards the in-group, and greater parochialism (in-group vs. out-group gap) among both Georgian children (age 7-11) and Sierra Leonean adults who were children or adolescents during the war (age 7 to 20). The Sharing Game results, shown in Figures 1A 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 choices increase for the in-group, but either decline or stay the same for the out-group. The frequency of egalitarian choices goes from 49% to 68% in Georgia, and from 32% to 57% in Sierra Leone. Similarly, the gap between in-group and out-group increases from near zero at both sites to 36% in Georgia and 16% in Sierra Leone. Regression analyses (probits) using these subsamples arrive at the same conclusion, see Tables S4 and S5.

For the Envy Game, Figures 1C and 1D show 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. The fraction of egalitarian choices increases from 25% to 58% in Georgia and from 16 to 43% in Sierra Leone. Similarly, the gap between in-group and out-group increases from -18% to 26% in Georgia and from -20% to 25% in Sierra Leone. Table S4 and S5 show that regression analyses arrive at the same conclusion.

By combining the in-group data from these two games we can distinguish four behavioural types. Selfish types are characterized by maximizing their own payoffs by picking (2,0) in the Sharing Game in Georgia (or (15,5) in Sierra Leone) and (2,3) in the Envy Game (or (13,16) in Sierra Leone). Figure 2 shows that the frequency of Selfish types diminishes with war exposure, dropping from 35% to 8% among Georgian children and from 57% to 24% among Sierra Leoneans. By contrast, the frequency of Egalitarians, who are characterized by minimizing differences in payoffs between themselves and their partners, rises from 9% to 34% in Georgia and from 5% to 24% in Sierra Leone. The frequency of Spiteful types, those who aim to minimize the payoffs of other in-group members, also increases with conflict exposure, though to a lesser degree than Egalitarian or Selfish types. Tables S6 and S7 provide regression analyses linking conflict experience and type, and supplemental analyses also show how incorporating our other two costless games supports this picture (see Figures S10 and S11).

While both short- and long-term impacts on social motivations can be observed in 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 (Figure S12) and only much muted effects for Sierra Leoneans who were over age 20 during the conflict (Figure S13, Table S8). As noted, previous experimental evidence shows pro-social behaviour increases with age during childhood and doesn't plateau until the mid-twenties,<sup>24-26</sup> probably because children and adolescents are gradually acquiring and internalizing the normative rules of their society.<sup>26</sup> Consistent with this, sharing behaviour in our Georgian children increases with age (Table S4).

Of course, warfare experience is not a completely random event allowing for clear causal inference. For instance, some of the regions covered in our samples were more affected than others and, it can be argued, social norms governing pro-social behaviour could vary across

regions independently from warfare. To address this, in Tables S11 and S13 we controlled for location differences using dummy variables for each region (Georgia) or village (Sierra Leone), thus absorbing away any variation in warfare experience across the regions so that the remaining variation distinguishes people within the same region. The results tell the same story, supporting the link between war experience and parochial-egalitarian motives. We discuss further tests of the underlying causal mechanism in Supplementary Information.

Based on our very simple decision tasks, converging results using children and adults from the Caucasus and West Africa suggest that exposure to violent conflict between the ages of 7 and 20 shifts people's motivation to greater parochial egalitarianism. Affected participants were more willing to sacrifice both their own payoffs and those of the group in order to maintain equality. 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, and internalization of, egalitarian social norms, or simply more parochial-egalitarian motivations (independent of local norms). By revealing a relationship between war and increased parochial-egalitarian motivations, 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.<sup>5,10,30</sup> If, on the other hand, the observed effects of war were due to psychological trauma (e.g., psychological malfunctions), behavioural changes would not be in the predicted directions and should also be observed in both the younger and older cohorts.

Empirically establishing the enduring effects of war on human sociality and delimiting them to a particular developmental window may illuminate a range phenomena, including the (1) rapid recoveries observed in numerous post-conflict societies<sup>8</sup> (2) historical importance of war in building new nations and larger political structures<sup>22</sup>, and (3) persistent parochialism of cyclical conflicts. It also reminds us that potentially positive effects on cooperation created by conflict may come at the expense of regard for those outside of one's own social group.

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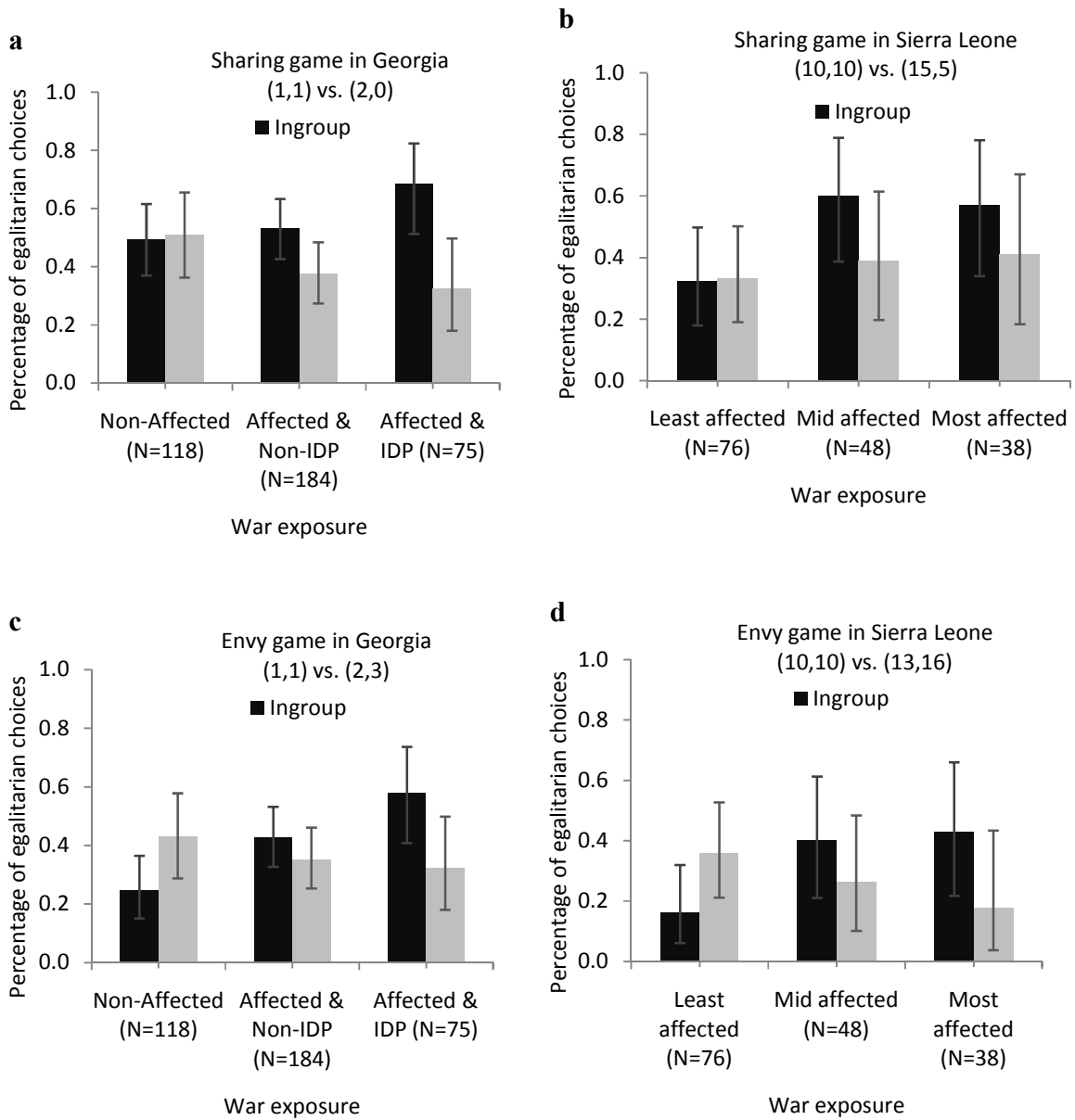


Figure 1. Warfare exposure and relative frequency of egalitarian choices in Sharing and Envy

**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 7-11. 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.

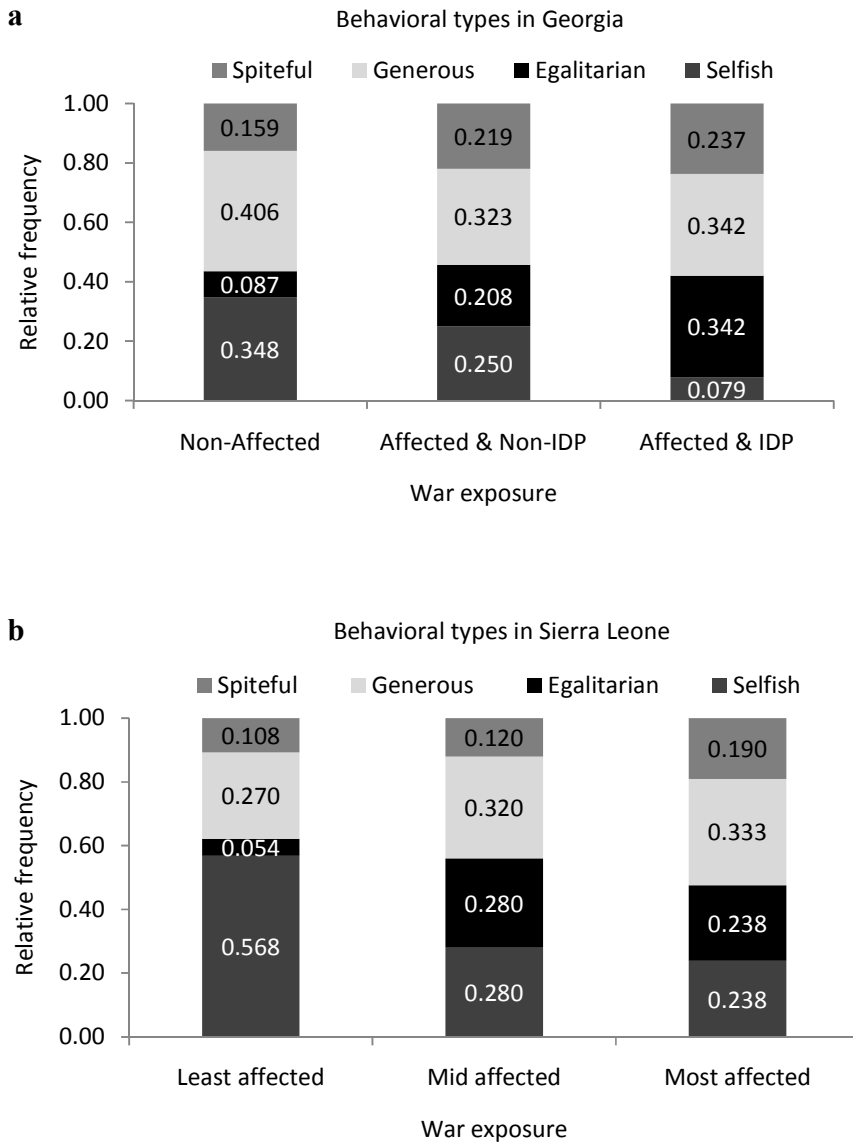


Figure 2. **Behavioural types in the ingroup condition and warfare.** Selfish types maximize their payoff in both games (choosing (2,0) and (2,3) in Georgia and (15,5) and (13,16) in Sierra Leone). Egalitarians choose the even splits in both games. Generous types maximize payoff of their partners in 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.

# **Warfare Experience during Ontogeny Increases Egalitarian and Parochial Motivations**

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## **Supplementary Information Guide**

### **Supplementary Methods:**

This file contains a description of the Republic of Georgia sample, the Sierra Leone sample and a brief description of the wars our study focuses on. It also contains a report on the experimental procedure, the choice situation, the rewards and the survey instruments.

### **Supplementary Tables:**

This file contains the definitions of all the variables used in the analysis, the results and the statistical tests referenced in the paper.

### **Supplementary Discussion:**

This file contains further discussion and results about the causal mechanism behind the observed link between being affected by war and parochial-egalitarian motivations.

### **Supplementary Experimental Instructions:**

This file contains the English version of experimental instructions.

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## **Supplementary Methods**

This file contains a description of the Republic of Georgia sample, the Sierra Leone sample and a brief description of the wars our study focuses on. It also contains a report on the experimental procedure, the choice situation, the rewards and the survey instruments.

## Samples

### Republic of Georgia (site #1)

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. Prior to the 2008 war, approximately half of the population of South Ossetia (or also called Tskhinvali region) were ethnic Georgians and half were ethnic Ossetians.

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<sup>31</sup>, its timing was unexpected and not preceded by migration of civilians away from the affected areas<sup>27,31</sup>. 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<sup>27,28</sup>. 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 by Russian fighters on different locations in Tbilisi (the capital city). More than 100 thousands of ethnic Georgians (virtually all ethnic Georgian population in South Ossetia) were forced to leave their homes and resettled outside of South Ossetia, typically in the bordering regions<sup>27,28</sup>. Most of these families were still internally displaced (IDPs) 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.

The pattern and speed of bombing make it a reasonable case for treating individual exposure to warfare as random (especially after controlling for average location differences). We attribute exposure or no exposure based on the replies the subjects give to the survey questions. In the manuscript, we consider exposure to warfare as a “natural experiment” and compare the affected children with those in a control group (individuals with no exposure to warfare). Nevertheless, we provide several robustness checks to investigate concerns about endogeneity of exposure to warfare in the Supplementary Discussion.

A total of 543 children aged 3 through 11 years participated in the experiment during January-February 2009 -- 6 months after the war with Russia. The children come from different regions within South Ossetia, Gori region, villages between Gori and Tbilisi, and different parts of Tbilisi (see Figure S1 below). Children were accessed via 17 primary schools and kindergartens located across all these regions except South Ossetia which had, and still has, closed borders. Our sample also includes children from South Ossetia because ethnic Georgians from South Ossetia were internally displaced in bordering regions and their children attended local schools. In each school, we randomly selected classes and all children who were present participated in the experiment.



**Figure S1: Distribution of subjects across locations in the Republic of Georgia.** The blue dots denote villages or towns where our subjects lived prior to the 2008 war. The yellow-red fire symbols denote locations with documented aerial fire strikes<sup>27</sup>.

Table S1 provides the summary statistics for the variables in the regression analysis discussed below. Besides the choices in the experiments, the main variable of interest is five questions on the child's experience during the war in August 2008: whether she heard fighting, saw fighting, saw a soldier, saw an injured person or had an injured relative. We denote children as being affected by warfare if they answered positively to any of those five questions. The differences between affected and non-affected children are significant for each type of war experience. In addition to being exposed to warfare, 24% children were internally displaced at the time of the experiment.

**Table S1: Summary statistics (Georgia)**

	All		7-11 years old		3-6 years old	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
<i>Panel A: Warfare exposure</i>						
Non-affected	0.319	(0.466)	0.313	(0.464)	0.33	(0.471)
Affected & Non-IDP	0.442	(0.497)	0.488	(0.501)	0.351	(0.479)
Affected & IDP	0.239	(0.427)	0.199	(0.400)	0.319	(0.467)
<i>Panel B: Child's characteristics</i>						
Female	0.484	(0.500)	0.493	(0.501)	0.465	(0.500)
Age (years)	7.724	(2.068)	8.912	(1.345)	5.34	(0.834)
Has a sibling	0.862	(0.345)	0.87	(0.337)	0.847	(0.361)
Has a brother	0.558	(0.497)	0.585	(0.493)	0.5	(0.501)
Has a sister	0.541	(0.499)	0.531	(0.500)	0.563	(0.497)
Height (cm)	130.3	(13.24)	137.1	(9.42)	116.7	(8.41)
Lived in urban area before war	0.554	(0.498)	0.546	(0.499)	0.571	(0.496)
Lived in South Ossetia before war	0.22	(0.415)	0.199	(0.400)	0.262	(0.441)
<i>Panel C: Choices in the experimental games</i>						
Sharing game	0.446	(0.498)	0.48	(0.500)	0.378	(0.486)
Envy game	0.382	(0.486)	0.382	(0.487)	0.382	(0.487)
Costless sharing game	0.727	(0.446)	0.75	(0.434)	0.681	(0.467)
Costless envy game	0.679	(0.467)	0.689	(0.464)	0.66	(0.475)
N	565		377		188	

**Sierra Leone (site #2)**

The Republic of Sierra Leone is a West African country sharing a border with Guinea (North and East) and Liberia (Southeast). It is a small country with an estimated population of around 5.3 million. Despite the country is rich in mineral resources (e.g. diamonds, titanium ore, bauxite, iron ore, gold, chromite) and in agricultural resources (abundant rainfall and fertile soils) there has always been tremendous inequalities and extremely low living standards. Governmental corruption brought economic deterioration and eventually lead to one of the most brutal and horrific civil conflict (1991-2002) in the history of Africa<sup>32</sup>. 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<sup>33</sup> many of whom became refugees in Guinea and Liberia.

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<sup>34</sup>. 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<sup>34</sup>, have also committed a large part of the atrocities. According to the available statistical evidence<sup>29,35,36</sup> neither individual ethnic nor religious affiliation played a major role in targeting the civilian population by the rebels. Instead, “villages [not individuals] were a major target.”<sup>29</sup> As a response, many communities formed local fighting groups (known as Civil Defense Forces) to provide protection against the attacks.

Our field work was based mostly in the Bombali district, which is located in the centre-north of Sierra Leone (Figure S2). Most of the attacks on civilians in this district took place in the period 1994-1999<sup>37</sup>. Makeni, the principal town of the district, has the biggest military base in the northern region of Sierra Leone and was fiercely fought for during the war. Matotoka, a gold mining community, was strategic during the war as a buffer zone between the rebel held East and the government controlled North.



**Figure S2: Map of Sierra Leone.** The dark brown dots denote villages where the experimental sessions were conducted.

Our Sierra Leone experiment was carried out throughout 42 sessions in 21 different villages, resulting in a sample of 586 adult subjects (see Table S2 for summary statistics). The

sessions were conducted during the month of July 2010. We pre-selected the villages where existing evidence indicated substantial variation in war exposure. We would like to thank authors of Bellows and Miguel (2009)<sup>35</sup> for sharing this data with us. Our subjects are parents or guardians of children from randomly selected classes in local schools. Many of these adults (N=162) were children or adolescents during the civil war. Since we are interested in whether a psychological response to the civil-war violence has more enduring effects during ontogeny, we divide the sample on subjects who were young during the war (7-20 years in 1999) and those who were adults (more than 20 years). We use 1999 as cut-out year since the Lome Peace Accord between the Government of Sierra Leone (GOSL) and the Revolutionary United Front was signed on July 7, 1999 and most of the fighting in the area under study ended during this year. The war formally ended in January 2002.

**Table S2: Summary statistics (Sierra Leone)**

	All		Adults who were 7-20 yr-old during the war		Adults during war	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
<i>Panel A: Warfare exposure</i>						
Least affected	0.449	(0.498)	0.469	(0.501)	0.442	(0.497)
Mid-affected	0.335	(0.472)	0.296	(0.458)	0.350	(0.477)
Most affected	0.215	(0.411)	0.235	(0.425)	0.208	(0.406)
<i>Panel B: Adult's characteristics</i>						
Female	0.706	(0.456)	0.816	(0.388)	0.665	(0.473)
Age (years)	40.757	(13.661)	26.235	(3.728)	46.319	(11.875)
Attended school	0.259	(0.439)	0.352	(0.479)	0.224	(0.417)
Number of siblings	7.471	(4.787)	7.494	(4.617)	7.462	(4.856)
Religion - Christian	0.362	(0.481)	0.379	(0.487)	0.356	(0.479)
Religion - Muslim	0.631	(0.483)	0.621	(0.487)	0.634	(0.482)
Religion - other	0.007	(0.082)	0.000	(0.000)	0.009	(0.097)
Ethnicity - Temne	0.635	(0.482)	0.636	(0.483)	0.634	(0.482)
Ethnicity - Limba	0.287	(0.453)	0.296	(0.458)	0.283	(0.451)
Ethnicity - other	0.078	(0.269)	0.068	(0.252)	0.083	(0.276)
<i>Panel C: Frequency of (10,10) choice in the experimental games</i>						
Sharing game	0.417	(0.493)	0.42	(0.495)	0.415	(0.493)
Envy game	0.280	(0.449)	0.296	(0.458)	0.274	(0.446)
Costless sharing game	0.720	(0.450)	0.735	(0.443)	0.714	(0.453)
Costless envy game	0.421	(0.494)	0.426	(0.496)	0.419	(0.494)
N	586		162		424	

The individual-level survey instruments contained a series of questions on conflict experiences and a variety of socio-economic characteristics, including ethnicity, religion, age, education and wealth. In the analysis we focus on war experiences at the household level. To identify exposure to conflict, we use the same questions as the recent nationally representative survey<sup>35</sup> and we find broadly comparable levels of exposure. In particular we focus on two such questions: “Were any members of your household killed during the conflict?”; “Were any members injured or maimed during the conflict?” 41.5% of the subjects reported to have a household member killed. 35% had a member of the household injured, the same number as in the representative survey. When creating the exposure to conflict index, we use a similar logic as in Bellows and Miguel (2009)<sup>35</sup>: we denote the subjects to be “least affected” if they answered negatively to both questions (45%), “mid-affected” if they answered positively to one of them (34%), and “most affected” if they answered positively to both (22%).

## **Experimental procedures**

### **Republic of Georgia (site #1)**

Investigating prosocial behaviour of children and its developmental patterns has a rich tradition in psychology<sup>26,38-41</sup> and more recently economists also started to contribute to this field<sup>24,25,42,43</sup>. Experimental protocols differ along several potentially important dimensions: types of reward, age of recipients, anonymity of recipients and relationship towards recipients. The instructions used in Georgia are based on the experimental protocol developed by Fehr, Bernhard and Rockenbach (2008)<sup>24</sup> for the specific purpose of conducting experiments among children. This protocol has been inspired by previous experimental work with chimpanzees<sup>9</sup> and continues to be a popular tool for studying prosocial motivations of children<sup>44,45</sup>. We are very grateful to authors of Fehr, Bernhard and Rockenbach (2008)<sup>24</sup> for allowing us to base our protocol on their work.

The experiments consist of a series of binary choice dictator games in which the subject has to select between two alternative allocations of tokens between self and a partner. These games are one-shot, without repeated interactions, with a partner who is always anonymous, even after the experiment is concluded, although we vary the identity of the partner, as discussed below. Thus, this experimental design rules out potential for future reciprocal behaviour and isolates prosocial behaviour due to other-regarding motives from selfish motives and strategic considerations.

In the sharing game, the subject chooses between the allocation (1,1) ---one token for herself and one for partner--- and the allocation (2,0) ---both tokens for self. This game measures preference to reduce advantageous inequality. Because choosing the egalitarian option (1,1) provides a benefit to an anonymous partner at a cost to oneself, selfish subjects should never make the egalitarian choice. In the costless sharing game, the subjects can choose between (1,1) and (1,0). Choosing the (1,1) option indicates a basic prosociality, because it is costless to increase partner’s payoff. In the costless envy game, the decision-maker can choose between (1,1) and (1,2). Choosing the (1,1) option indicates aversion to disadvantageous inequality. Relative to Fehr, Bernhard and Rockenbach (2008)<sup>24</sup>, we added a fourth game, the envy game

[(1,1) vs. (2,3)], because we are primarily interested in other-regarding choices that reduce individual payoff: the envy game is a natural complement to costless envy game [(1,1) vs. (1,2)], similarly as the sharing game [(1,1) vs. (2,0)] complements costless sharing game [(1,1) vs. (1,0)]. In the main body of the paper we focus on the costly games – [(1,1) vs. (2,0)] and [(1,1) vs. (2,3)] – because they unambiguously distinguish between other-regarding behaviour and purely selfish behaviour and thus provide more decisive insights. In the Supplementary Tables we discuss results of all four games.

Another departure from the original protocol of Fehr, Bernhard and Rockenbach (2008)<sup>24</sup> has been the use of tokens instead of sweets as experimental currency, to avoid satiation effects and satisfy a wide variety of tastes.

Each child played all four games with an anonymous partner either from her class (ingroup condition) or from another unknown class (outgroup condition). In each game, the subjects chose between two mutually exclusive options, represented on two cardboards (see Figure S3). On each cardboard there were two circles, each one with one arrow directed either to the decision-maker or to an anonymous partner displayed on a laptop screen. We placed the tokens inside the circles. One arrow was directed towards the decision-maker to illustrate that (s)he will be the recipient of the tokens placed inside that circle, whereas the tokens in the other circle, with the other arrow towards the laptop picture, illustrated how much the partner would get. Ingroup and outgroup conditions were randomly assigned to the subjects. If the ingroup condition was applied, the photo on the laptop showed a photo of children from the same class whereas, for the outgroup condition, the photo showed an unknown class of children. The decision-maker was told that the tokens in the circle with the arrow pointing to the picture would be given to one of the children in that picture. A bag with the appropriate number of tokens was set aside and later anonymously delivered.

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



**Figure S3: Choice situation.** The children made choices between two mutually exclusive options represented by cardboards. The allocation of rewards to the decision-maker and the partner was illustrated by circles with arrows and a photo displayed on a laptop screen.

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



**Figure S4: Making choices.** Experimenters explained the games individually to each subject. In each game, the subjects made their choices only after they answered correctly to the questions on the payoff consequences of the two options.

The children were very motivated to reveal their preferences. After the experiments were completed, the children were taken to the experimental shop where they could exchange the gained experimental tokens for various items ranging from different kinds of sweets, pencils, erasers, stickers to other small toys. For simplicity, the price was always one token for one item. To stress the link between tokens and rewards in the shop and to increase the salience of rewards, the children received one token as a show-up fee and were allowed to exchange it for a reward before the actual experiment. At the end, after each child exchanged all her tokens, we placed all her rewards into a paper bag and requested the child not to open it before the end of the school-day, so that other children could not observe its content when the subject returned to her classroom.



**Figure S5: Experimental shop.** After the experiments were completed, the children exchanged the tokens earned during the experiment for a range of items (pencils, erasers, candies and small toys) in the “experimental shop”.

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

Because our subject pool are children who could not sign an informed consent to participating in our experiment, the experiments were explained in detail and officially approved by the Georgian Ministry of Education, the principals and teachers of participating schools. The children were told that they could leave anytime during the session. The experiments were approved by the Institutional Review Board for the Protection of Human Subjects - University of San Francisco.

## Sierra Leone (site #2)

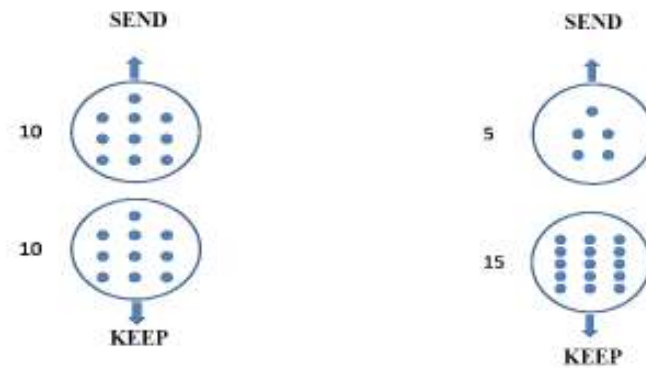
A set of behavioral experiments was designed to mirror the experiments conducted with children in Georgia (see Table S3) in order to capture the same other-regarding motivations. Particular parameters were chosen to maximize response variation in an adult population. Each subject faced a series of four binary choice dictator games in which one had to select between two alternative allocations of tokens between self and an anonymous partner. The egalitarian choice in all four games is (10, 10) – ten tokens for the decision-maker and ten tokens for the partner. The alternative choices in all four games were unequal allocations of rewards between the decision-maker and the partner. We denote the games for adults in the same way as the games for children -- 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)].

Table S3: 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
<i>Costly games</i>								
Sharing game	1	1	2	0	10	10	15	5
Envy game	1	1	2	3	10	10	13	16
<i>Costless games</i>								
Sharing game	1	1	1	0	10	10	10	5
Envy game	1	1	1	2	10	10	10	15

Each subject was randomly assigned either to an ingroup or an outgroup treatment condition. The partner was always anonymous. For the ingroup condition, the subjects were informed that their partner was a person from the same village where they lived, whereas for the outgroup condition the partner was from a distant village in Sierra Leone. The definition of the ingroup boundary on the village-level was motivated by the fact that the rebel forces did not target any ethnic or religious groups but their major targets were villages<sup>29,35,36</sup>.

The tasks were illustrated in a similar fashion as to the children. Each game was displayed on two sheets of paper. On each sheet there were two circles with arrows on each circle – one arrow with the word “keep” directed towards the decision-maker and the second one with the word “send” directed away from the decision-maker. The circles with arrows illustrated how much tokens the decision-maker and the partner would get in each of the two possible choices.



**Figure S6: Choice situation.** The subjects made choices between two mutually exclusive options. The allocation of rewards to the decision-maker and the partner was illustrated by circles with arrows.

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.



**Figure S7: Making choices.** All our game scripts were administered in Temne, Krio and Limba languages by trained native speakers and we used the method of back translation to ensure consistency.

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 ingroup treatment,



the payment was paid to another participant of the experiment in the same village while for the outgroup 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. The English version of the experimental protocol is a part of this document.

Prior to participation the subjects signed an informed consent and were told that they could leave anytime during the session. The experiments were approved by the Institutional Review Board for the Protection of Human Subjects - University of San Francisco.

# **Warfare Experience during Ontogeny Increases Egalitarian and Parochial Motivations**

Michal Bauer, Alessandra Cassar, Julie Chytilová & Joseph Henrich

## **Supplementary Tables**

This file contains the definitions of all variables used in the analysis, the results and the statistical tests referenced in the paper.

In this file we (a) describe notations and variables used in the analysis, (b) present a series of regressions that demonstrate the link between warfare exposure during ontogeny and behaviour in the sharing and envy games in both post-conflict countries, (c) provide more detailed results about the effects of war exposure on prevalence of behavioural types, and (d) show that warfare has no systematic effect on prosociality of very small children (3-6yrs) in the Republic of Georgia and that it has only a moderate effect on prosociality among subjects who experienced the civil war during adulthood in Sierra Leone.

### **Notations and definitions of variables**

The egalitarian choices in different games and the prevalence of different other-regarding types are examined using a binary response model which employs a probit link function (estimated using standard maximum likelihood procedure), also known as probit regression. Probit regressions are conducted with robust standard errors. We report marginal effects, i.e. the change in probability for a small change in each independent variable ( $dF/dX$ ), p-values are in parentheses, \*\*\* denotes significance at 1% level, \*\* at 5% level and \* at 10% level. We control for observable characteristics that are unlikely to change due to warfare.

- 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 “Egalitarian choice in the sharing game: (1,1) vs. (2,0)” is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in the sharing game, and 0 otherwise.
- The variable “Egalitarian choice in the envy game: (1,1) vs. (2,3)” is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in the envy game, and 0 otherwise.
- The variable “Egalitarian (2 games)” is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in both the sharing and the envy games, and 0 otherwise.
- The variable “Selfish” is 0-1 variable, which is equal to 1 if the subject chooses the (2,0) option in the sharing game and the (2,3) option in the envy game, and 0 otherwise.
- The variable “Spiteful (2 games)” is 0-1 variable, which is equal to 1 if the subject chooses the (2,0) option in the sharing game and the egalitarian option in the envy game, and 0 otherwise.
- The variable “Generous (2 games)” is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in the sharing game and the (2,3) option in the envy game, and 0 otherwise.
- The variable “Egalitarian (4 games)” 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 (4 games)” 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 (4 games)” 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 “Behindness-averse” is 0-1 variable, which is equal to 1 if the subject chooses the egalitarian option in the 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 the sharing game and costless sharing game, and 0 otherwise.
- The variable Female is 0-1 variable, which is equal to 1 if the subject is female, and 0 if he is male.
- The variable “Affected” is 0-1 variable, which is equal to 1 if the subject in Georgia answered positively to any of the five questions on war-related experiences: whether (s)he saw fighting, heard fighting, saw a soldier, saw an injured person, had an injured relative; and it is equal to 0 otherwise.
- The variable “Affected & IDP” is 0-1 variable, which is equal to 1 if the subject in Georgia was affected by war (as defined above) and at the same time internally displaced in January 2009, and 0 otherwise.
- The variable “Affected & Non-IDP” is 0-1 variable, which is equal to 1 if the subject in Georgia was affected by war (as defined above) and at the same time was not internally displaced in January 2009, and 0 otherwise.
- The variable “Height” is an integer variable, which carries the number of centimeters the child in Georgia was high.
- The variable “Has a brother” is 0-1 variable, which is equal to 1 if the subject in Georgia has at least one brother, and 0 otherwise.
- The variable “Has a sister” is 0-1 variable, which is equal to 1 if the subject in Georgia has at least one sister, and 0 otherwise.
- The variable “Lived in urban area before war” is 0-1 variable, which is equal to 1 if the subject in Georgia lived in urban area before war, and 0 if she lived in rural area.
- The variable “Lived in South Ossetia before war” is 0-1 variable, which is equal to 1 if the subject in Georgia lived in South Ossetia before war, and 0 otherwise.
- The variable “Least-affected” is 0-1 variable, which is equal to 1 if the subject in Sierra Leone comes from a household where nobody was killed or injured during the civil war, and 0 otherwise.
- The variable “Mid-affected” is 0-1 variable, which is equal to 1 if the subject in Sierra Leone comes from a household where somebody was either killed or injured during the civil war, and 0 otherwise.
- The variable “Most-affected” is 0-1 variable, which is equal to 1 if the subject in Sierra Leone comes from a household where somebody was killed and somebody was injured during the civil war, and 0 otherwise.
- The variable “Attended school” is 0-1 variable, which is equal to 1 if the subject in Sierra Leone has attended a primary school during her childhood, and 0 otherwise.
- The variable “Number of brothers” is an integer variable, which carries the number of brothers of a subject in Sierra Leone.
- The variable “Number of sisters” is an integer variable, which carries the number of sisters of a subject in Sierra Leone.

- The variable “Muslim religion” is 0-1 variable, which is equal to 1 if the subject in Sierra Leone is a Muslim, and 0 otherwise.
- The variable “Temne ethnicity” is 0-1 variable, which is equal to 1 if the subject in Sierra Leone belongs to the Temne ethnic group, and 0 otherwise.

### **Warfare exposure and behaviour in Sharing and Envy games**

We start with studying choices of children 7-11yrs in Georgia. We control for their observable characteristics such as age, gender and having a brother and a sister. In Table S4, columns 1-3, the dependent variable is choosing the egalitarian option in the Sharing game [(1,1) vs. (2,0)]. It shows that warfare intensifies ingroup bias in sharing behaviour. This is because sharing with the ingroup increased with war exposure (column 2) and decreased for the outgroup (column 3), although these effects are not statistically significant. In column 1 (whole sample), we see significant interaction effect on sharing between being Affected & IDP and having an ingroup partner. The interaction term measures how the difference in egalitarian choices between the ingroup and outgroup changes with warfare experience.

Table S4, columns 4-6, shows the results for the Envy game [(1,1) vs. (2,3)]. Choosing the egalitarian option in this game is costly for the group and the decision-maker, but it can facilitate creation of social norms that can help sustaining group cohesion and harmony in the long-term. The frequency of egalitarian choices significantly increases with exposure to warfare in the ingroup condition (column 2 – the sample restricted to subjects in the ingroup condition). In the outgroup condition (column 3) the coefficients are negative, but insignificant statistically. In column 1 (whole sample) we find a large positive and highly significant interaction effect of having ingroup partner and being affected by war on prevalence of egalitarian choices. The positive coefficients for both interaction terms (“Ingroup\*Affected & IDP” and Ingroup\*Affected & Non-IDP”) mean that the (ingroup-outgroup) difference is greater for both these groups, relative to non-affected children.

**Table S4: Sharing game and envy game in Georgia**

Dependent variable Sample	Egalitarian choice in the sharing game: (1,1) vs. (2,0)			Egalitarian choice in the envy game: (1,1) vs. (2,3)		
	7-11 year-old children in Georgia					
	All (1)	Ingroup (2)	Outgroup (3)	All (4)	Ingroup (5)	Outgroup (6)
Affected&Non-IDP	-0.183* (0.055)	-0.048 (0.583)	-0.186** (0.048)	-0.082 (0.362)	0.198** (0.023)	-0.086 (0.334)
Affected&IDP	-0.190* (0.091)	0.130 (0.206)	-0.197* (0.069)	-0.126 (0.242)	0.382*** (0.000)	-0.133 (0.208)
Ingroup	0.0005 (0.996)			-0.179* (0.063)		
Affected&Non-IDP*Ingroup	0.148 (0.244)			0.288** (0.023)		
Affected&IDP*Ingroup	0.317** (0.032)			0.499*** (0.0009)		
Age	0.055*** (0.009)	0.069** (0.016)	0.041 (0.192)	-0.041** (0.042)	-0.030 (0.280)	-0.055* (0.057)
Female	-0.042 (0.459)	-0.030 (0.693)	-0.056 (0.493)	-0.046 (0.391)	-0.010 (0.889)	-0.091 (0.247)
Has a brother	0.011 (0.860)	-0.050 (0.544)	0.071 (0.400)	-0.090 (0.118)	-0.099 (0.224)	-0.085 (0.292)
Has a sister	-0.034 (0.557)	-0.046 (0.567)	-0.028 (0.739)	-0.115** (0.039)	-0.124 (0.121)	-0.102 (0.195)
Observations	341	184	157	341	184	157

Overall development of choices within this age range (7-11 yrs) is also noteworthy. In the sharing game [(1,1) vs. (2,0)], older children are more likely to share, as indicated by positive correlation between age and choosing the egalitarian option (Table S4, column 1). In the envy game [(1,1) vs. (2,3)], the group payoff (choosing (2,3)) becomes more important for older children, as indicated by negative correlation between age and choosing the egalitarian option (Table S4, column 4).

Next, we study similar motives on the sample of adults who were children or adolescents (between 7-20 yrs in 1999) during the civil war in Sierra Leone. The results are very similar to Georgia. Prevalence of egalitarian choices increases in the ingroup treatment, whereas there is a negative or no effect in the outgroup treatment. In Table S5, columns 1-3, the dependent variable is the egalitarian choice in the Sharing game [(10,10) vs. (15,5)]. Again, the frequency of egalitarian choices increases with exposure to warfare in the ingroup treatment, in which an anonymous partner is from the same village. We observe no effects in the outgroup treatment, in which the partner is from a distant village. In columns 4-6 of Table S5, we study the results for the Envy game [(10,10) vs. (13,16)]. In column 4, we observe a large and highly significant interaction effect of the ingroup treatment and exposure to warfare on egalitarian choices.

**Table S5: Sharing and envy game 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	Ingroup	Outgroup	All	Ingroup	Outgroup
Sample	Adults who were 7-20 yr-old during the civil war In Sierra Leone					
	(1)	(2)	(3)	(4)	(5)	(6)
Mid affected	0.059 (0.670)	0.284** (0.032)	0.150 (0.265)	-0.088 (0.462)	0.261** (0.041)	-0.096 (0.423)
Most affected	0.049 (0.744)	0.269* (0.057)	0.099 (0.508)	-0.193 (0.134)	0.294** (0.033)	-0.189 (0.138)
Ingroup	0.023 (0.85)			-0.214* (0.062)		
Mid affected*Ingroup	0.198 (0.302)			0.359* (0.060)		
Most affected*Ingroup	0.218 (0.291)			0.520** (0.012)		
Age	-0.012 (0.281)	-0.023 (0.141)	0.003 (0.857)	-0.0006 (0.949)	0.010 (0.481)	-0.012 (0.399)
Female	-0.005 (0.963)	-0.082 (0.556)	0.129 (0.425)	-0.115 (0.245)	-0.150 (0.245)	-0.132 (0.415)
Number of brothers	-0.016 (0.302)	0.024 (0.319)	-0.059** (0.029)	-0.009 (0.536)	-0.006 (0.787)	-0.011 (0.579)
Number of sisters	-0.012 (0.286)	-0.044* (0.083)	-0.019 (0.565)	-0.0008 (0.963)	-0.003 (0.894)	0.0007 (0.980)
Observations	158	82	76	158	82	76

Combining the choices in the Sharing and Envy game we can distinguish four behavioural types —Selfish, Egalitarian, Generous, and Spiteful—and then examine how conflict exposure influences prevalence of these types. We denote subjects to be *Selfish* if they maximized their payoff in the Sharing and Envy games (choosing (2,0) and (2,3) in Georgia, and choosing (15,5) and (13,16) in Sierra Leone). *Egalitarian* types minimize differences in their own and a partner’s payoff by choosing (1,1) in both games in Georgia and by choosing (10,10) in Sierra Leone. *Generous* types maximize the payoffs of the partner (choosing (1,1) and (2,3) in Georgia, and choosing (10,10) and (13,16) in Sierra Leone). *Spiteful* types minimize payoff of their partners (choosing (2,0) and (1,1) in Georgia, and choosing (15,5) and (10,10) in Sierra Leone).

Figure 2A in the paper and Table S6 show that warfare exposure reduces prevalence of selfish types (column 1) and increases prevalence of egalitarian types (column 2) in the ingroup treatment in Georgia. Similar effects are observed in Sierra Leone (Figure 2B and Table S7).

**Table S6: Prevalence of behavioural types in the ingroup condition in Georgia**

Dependent variable	<b>Selfish</b>	<b>Egalitarian</b>	<b>Generous</b>	<b>Spiteful</b>
Sample	7-11 year-old children in Georgia			
	(1)	(2)	(3)	(4)
Affected&Non-IDP	-0.0356 (0.609)	0.118 (0.106)	-0.144* (0.082)	0.092 (0.181)
Affected&IDP	-0.223*** (0.006)	0.298*** (0.002)	-0.133 (0.162)	0.121 (0.185)
Age	-0.034 (0.136)	0.006 (0.798)	0.064** (0.021)	-0.034 (0.124)
Female	0.015 (0.813)	-0.022 (0.707)	-0.003 (0.970)	0.016 (0.787)
Has a brother	0.063 (0.347)	-0.085 (0.148)	0.036 (0.654)	-0.011 (0.863)
Has a sister	0.085 (0.202)	-0.084 (0.146)	0.035 (0.653)	-0.040 (0.535)
Observations	184	184	184	184

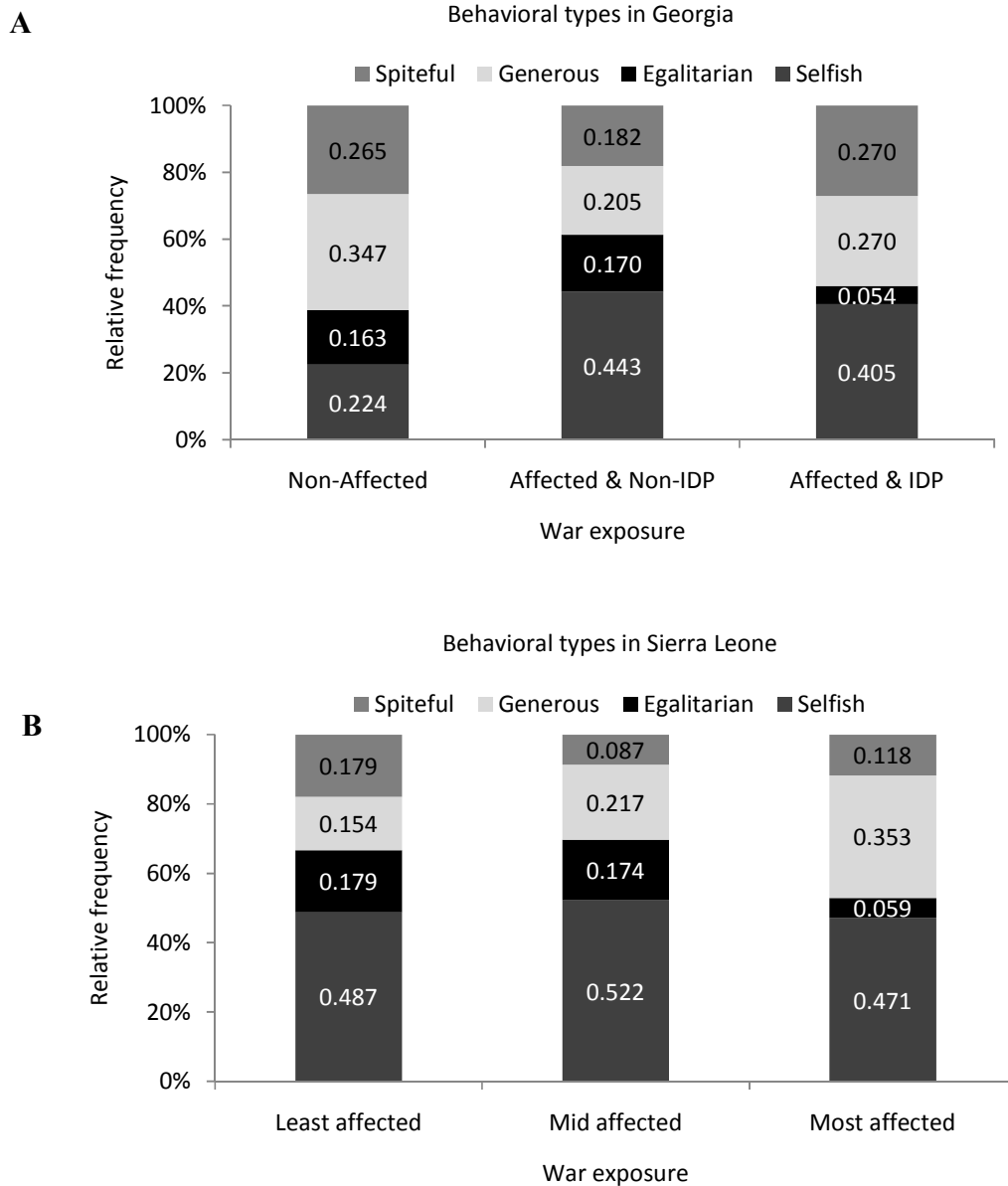
**Tables S7: Prevalence of behavioural types in the ingroup condition in Sierra Leone**

Dependent variable	<b>Selfish</b>	<b>Egalitarian</b>	<b>Generous</b>	<b>Spiteful</b>
Sample	Adults who were 7-20 yr-old during the civil war In Sierra Leone			
	(1)	(2)	(3)	(4)
Mid affected	-0.251** (0.043)	0.325*** (0.002)	0.017 (0.887)	-0.006 (0.943)
Most affected	-0.322*** (0.009)	0.267** (0.022)	0.080 (0.554)	0.066 (0.469)
Age	0.0341** (0.027)	0.0151 (0.191)	-0.039*** (0.009)	-0.008 (0.343)
Female	0.0402 (0.768)	-0.191* (0.074)	0.107 (0.395)	0.050 (0.488)
Number of brothers	0.0057 (0.814)	0.0202 (0.150)	0.0023 (0.914)	-0.027* (0.076)
Number of sisters	0.027 (0.281)	-0.018 (0.248)	-0.020 (0.406)	0.0160 (0.400)
Observations	82	82	82	82

We find different effects in the outgroup condition. Figure S8A demonstrates that warfare exposure is associated with much greater selfishness and somewhat less generosity and

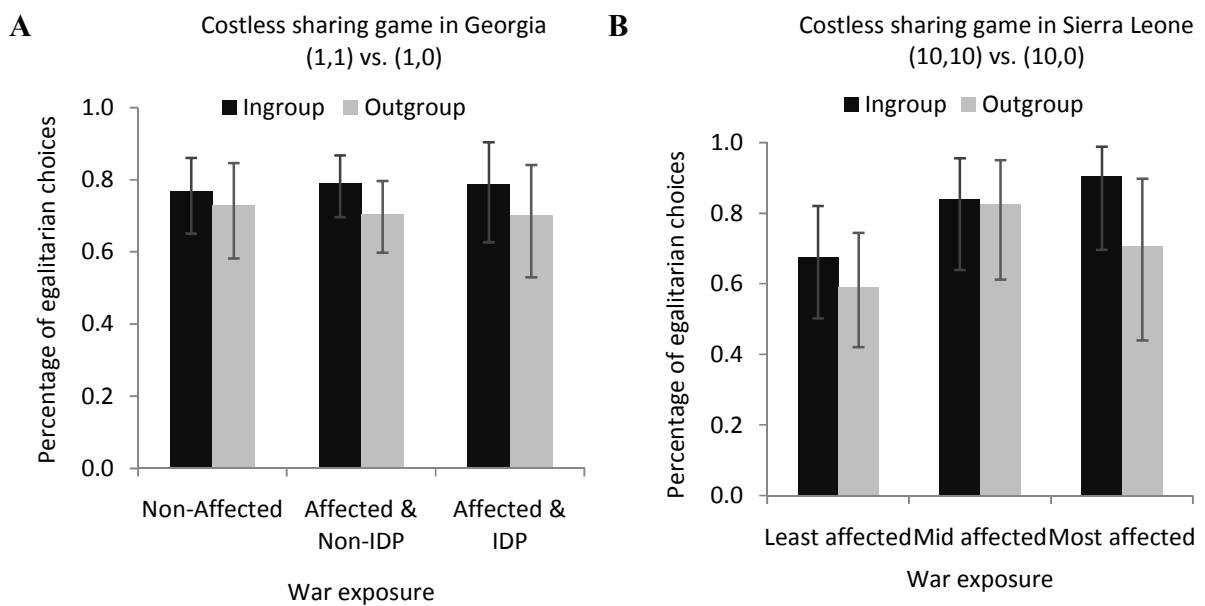


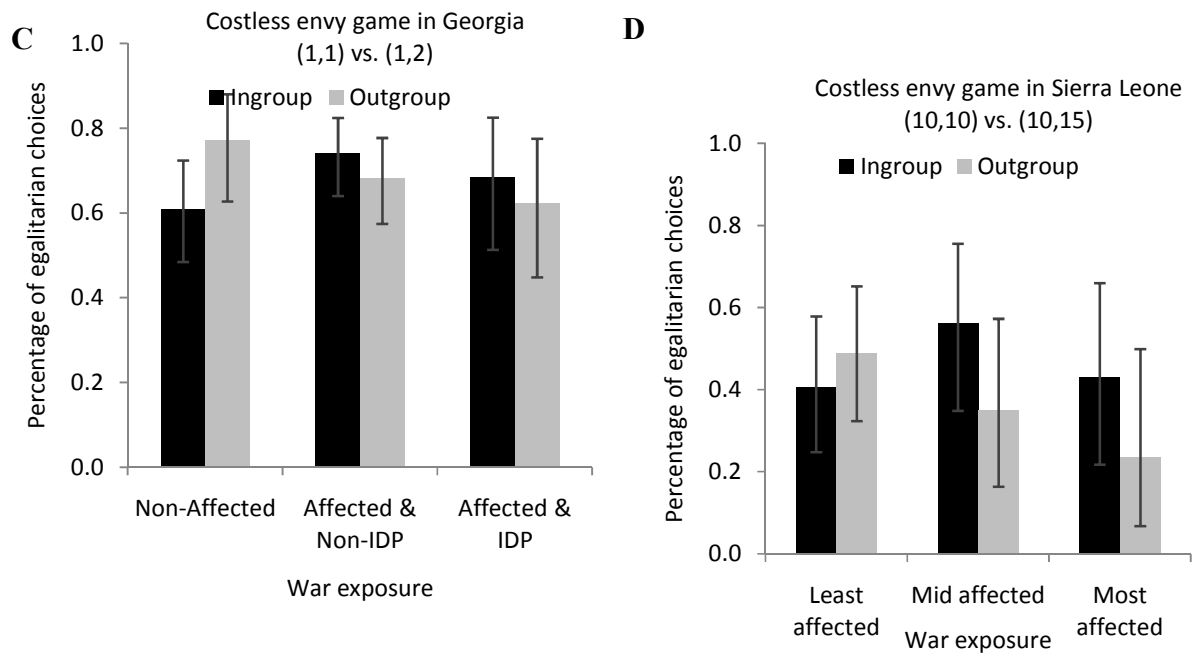
egalitarianism in Georgia. In Figure S8B we find no effect on prevalence of selfishness and positive effects on prevalence of generosity in Sierra Leone.



**Figure S8. Behavioural types in the outgroup condition and warfare. A.** Republic of Georgia. **B.** Sierra Leone.

In the main paper (and above) we simplified the analysis by focusing on behavior in the two costly games which unambiguously distinguish between selfish motives and other-regarding motives. As noted, subjects made choices in two more games, costless sharing game: [(1,1) vs. (1,0)] in Georgia and [(10,10) vs. (10,5)] in Sierra Leone, and costless envy game: [(1,1) vs. (1,2)] in Georgia and [(10,10) vs. (10,15)] in Sierra Leone, which capture similar motives but in which changing partner's payoff is costless for the decision-maker. In Figure S9 we report the results for these games. Overall, we observe the same direction of effects but they are much weaker in magnitude and statistical significance, in particular for the costless sharing game in Georgia. This is likely to be due to ceiling effects – this game measures basic prosociality and about 80% of children in the non-affected group opted for the (1,1) option, not leaving much scope for increase in prosociality with warfare exposure.

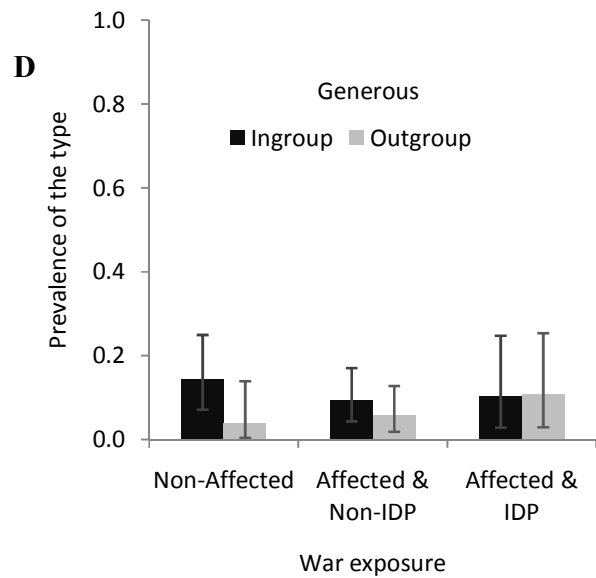
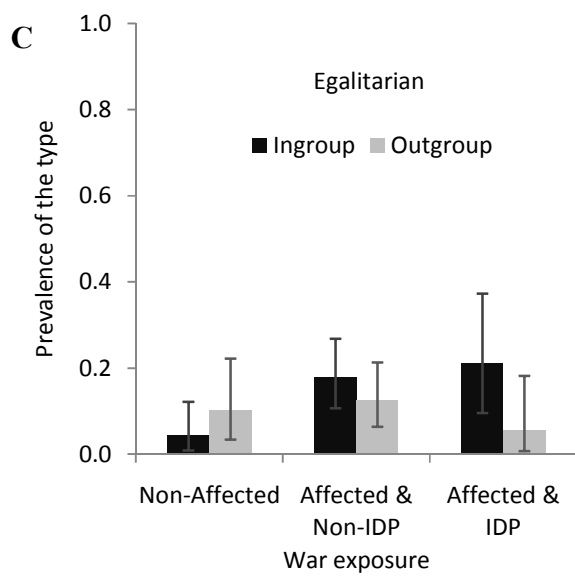
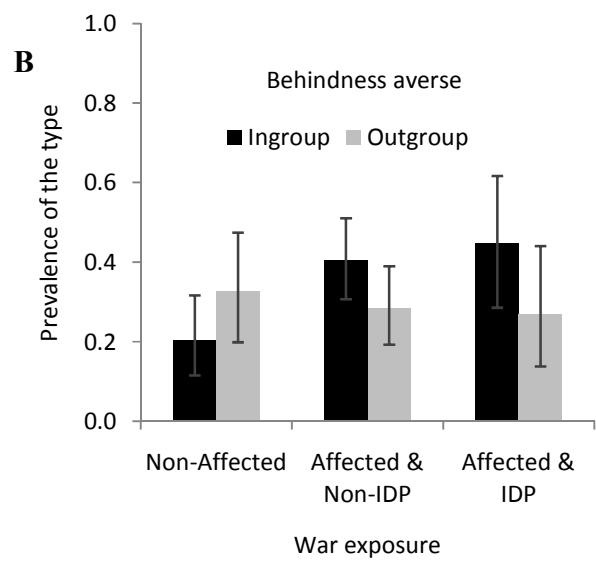
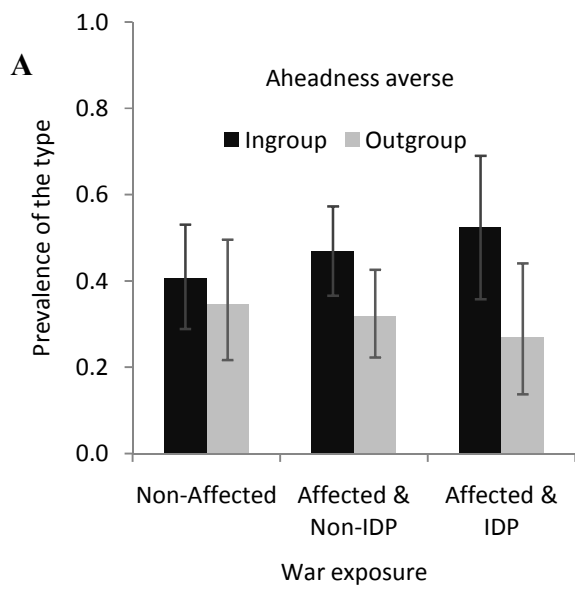


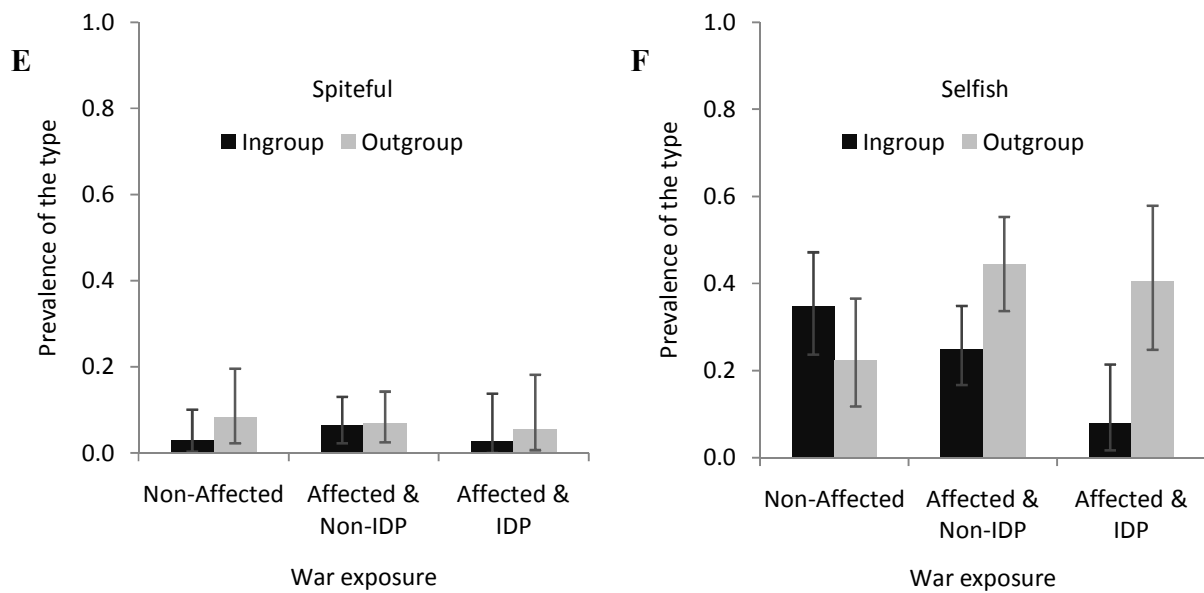


**Figure S9: Warfare and relative frequency of egalitarian choices in Costless Sharing and Costless Envy games.** Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals. **A.** Costless sharing game in the Republic of Georgia (children aged 7-11). **B.** Costless sharing Game in Sierra Leone (adults who were less than 21yrs during the civil war). **C.** Costless envy game in the Republic of Georgia. **D.** Costless envy game in Sierra Leone.

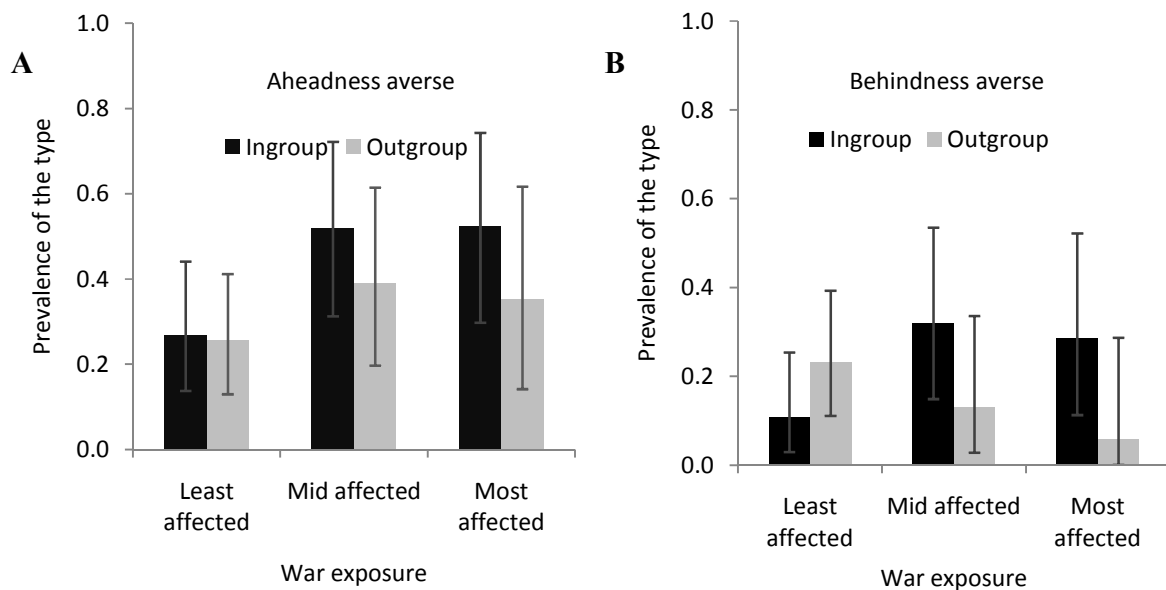
To cross-check whether we obtain similar patterns as in the analysis above, we classify behavioural types, based on choices across all four games. *Egalitarian types* choose the egalitarian option in all four games. *Generous* subjects always choose the allocations that maximize the payoff of their partner. *Spiteful* subjects choose the allocations that minimize the payoff of their partner. *Aheadness-averse* types choose the egalitarian option in the sharing game and the costless sharing game -- that is in the two games in which they can reduce advantageous inequality. *Behindness-averse* types choose the egalitarian option in the envy game and the costless envy game -- that is in games in which they can reduce disadvantageous inequality. *Selfish* subjects choose allocations that maximize their own payoff.

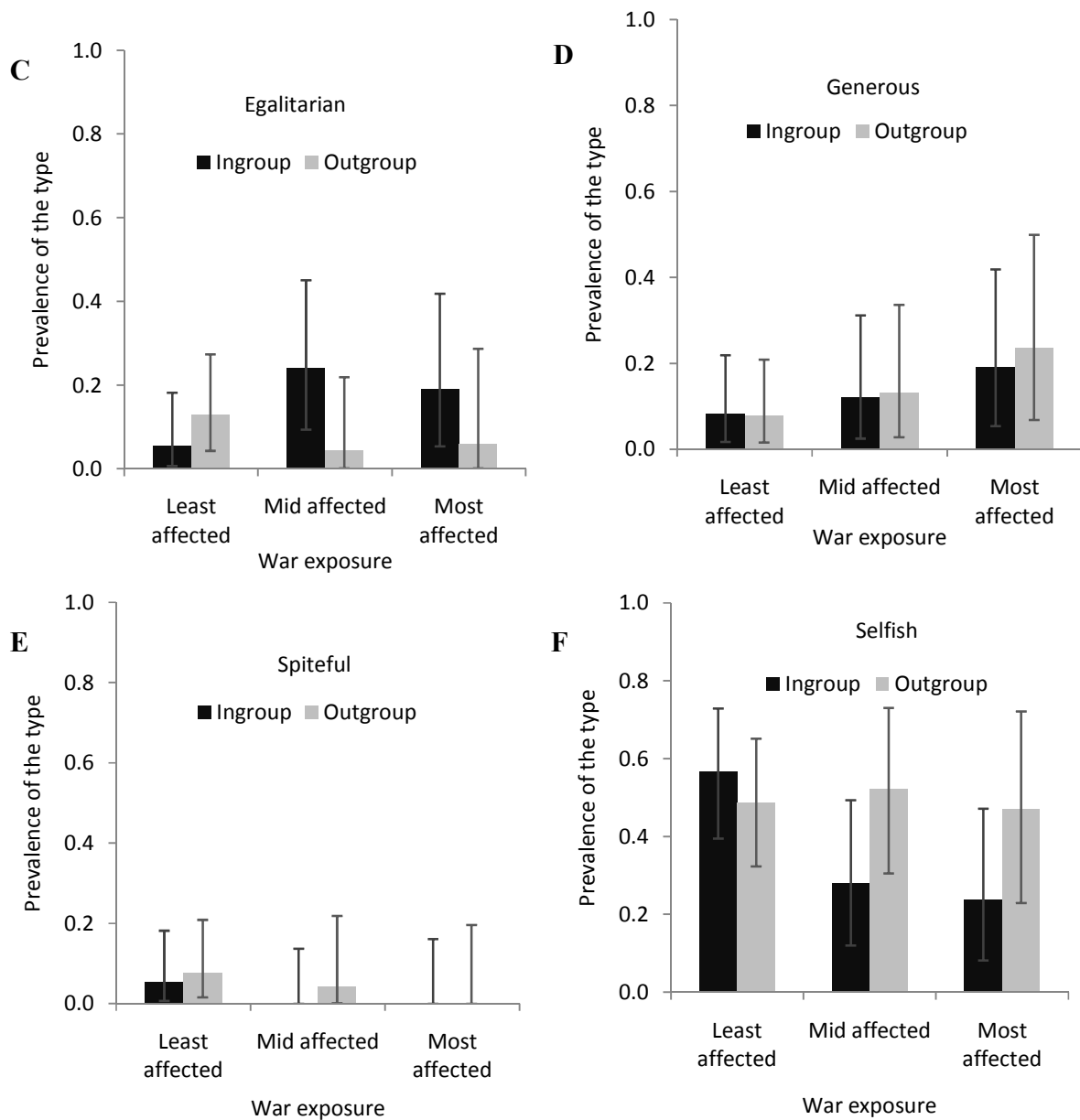
Overall, the results in Figures S10 and S11 are in line with our previous analysis: egalitarian motives increase in the ingroup treatment in both countries. In the outgroup treatment Selfish motives increase in Georgia, whereas the effects are less conclusive in Sierra Leone.





**Figure S10. 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. We classify types based on behaviour in all four games. Egalitarians always choose the even splits. Generous types maximize payoff of their partners, whereas Spiteful types minimize the payoff of their partners. Selfish types maximize their payoff in costly sharing and costly envy game. Aheadness-averse types choose the egalitarian option in the sharing game and the costless sharing game. Behindness-averse types choose the egalitarian option in the envy game and the costless envy game. **A.** Prevalence of aheadness-averse types. **B.** Prevalence of behindness-averse types. **C.** Prevalence of egalitarian types. **D.** Prevalence of generous types. **E.** Prevalence of spiteful types. **F.** Prevalence of selfish types.

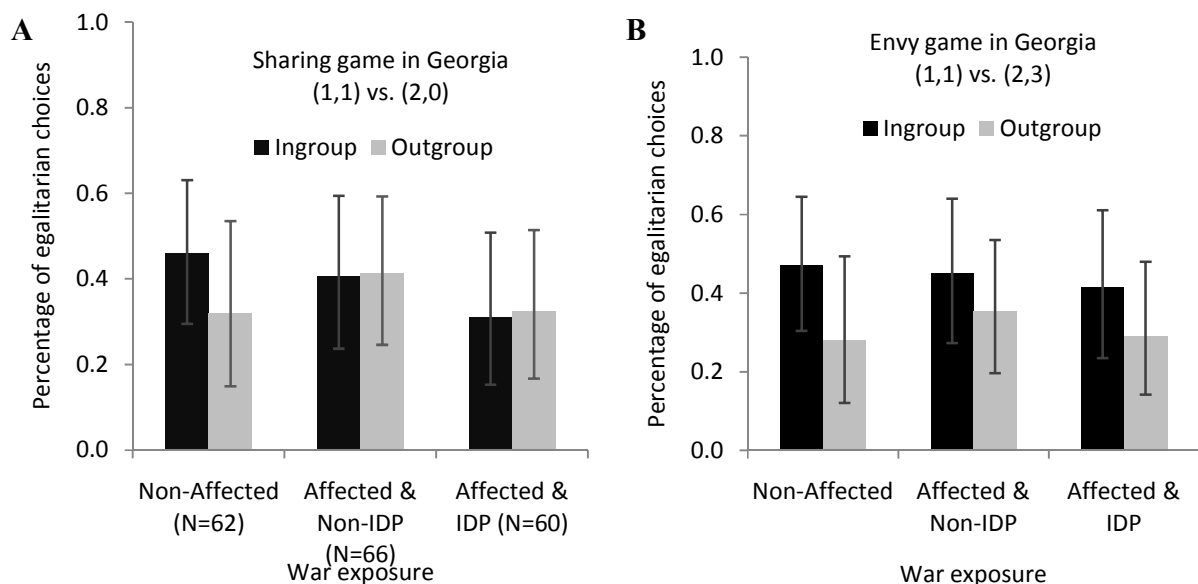




**Figure S11. Behavioural types and warfare in Sierra Leone.** Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals. We classify types in the same way as in Figure S10. **A.** Prevalence of aheadness-averse types. **B.** Prevalence of behindness-averse types. **C.** Prevalence of egalitarian types. **D.** Prevalence of generous types. **E.** Prevalence of spiteful types. **F.** Prevalence of selfish types.

### Warfare and sociality of 3-6 yr-old children (Georgia)

We find no systematic effect of warfare exposure on choices of 3-6-yr-old in the sharing and envy game (Figure S12), in contrast with the 7-11-yr group. This result is interesting in light of the experimental evidence<sup>24-26,39,40</sup> that shows other-regarding behaviour to develop strongly with age, probably because children gradually acquire and partially internalize normative rules of the society surrounding them<sup>38</sup>. The results suggest that psychological reaction triggered by warfare generate greater adherence to social norms or to purely (late-developing) parochial-egalitarian motivations. If, on the other hand, the observed effects of war were due to psychological trauma from the experience similar behavioural change should be observed in the younger cohort as well.

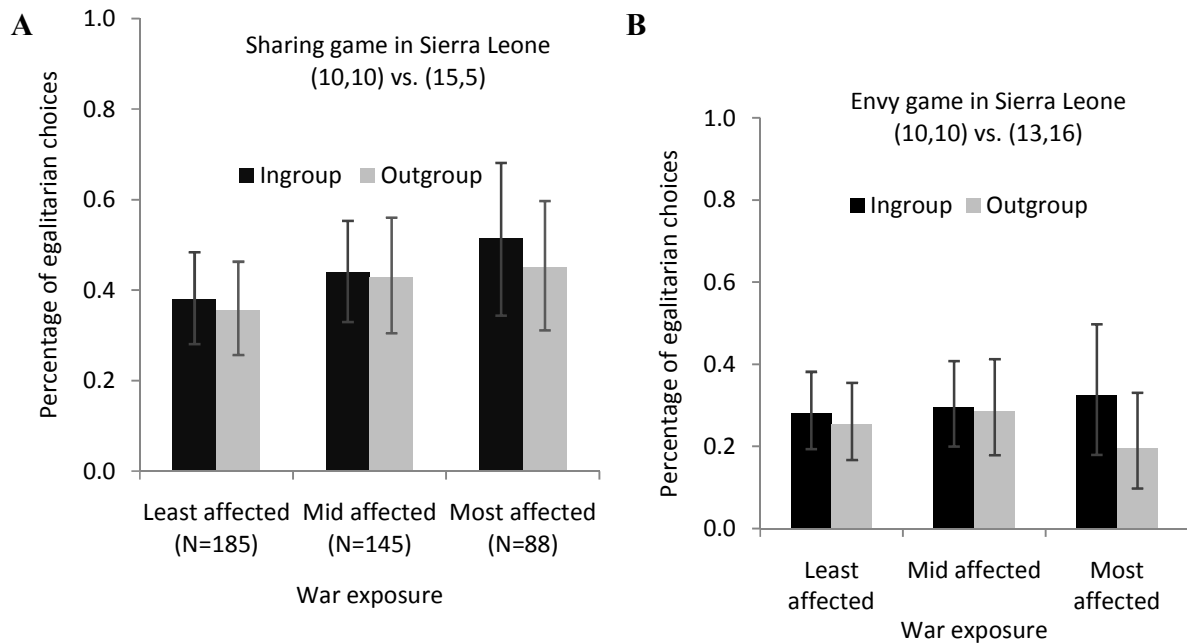


**Figures S12: Warfare and relative frequency of egalitarian choices in the sharing and envy games among very young children (3-6 yr-old).** Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals. **A.** Sharing in the Republic of Georgia. **B.** Envy Game in Georgia.

### Warfare and sociality of subjects who were adults during the civil war (Sierra Leone)

While both short- and long-term impacts on social motivations can be observed in those who experienced inter-group conflicts between the ages of 7 and 20, we find much weaker effects for Sierra Leoneans who were over age 20 during the conflict (in 1999). The prevalence of egalitarian choices in the Envy game is independent on war exposure in both ingroup and

outgroup treatments (Figure S13B). The prevalence of sharing in the Sharing game moderately increases in both treatment conditions (Figure S13A). To test whether these moderate effects are driven by subjects who are just above the threshold of twenty years, perhaps because development of prosociality does not plateau until mid-twenties, we vary the age threshold from 20 years in 1999 (Panel A of Table S8), to 25 years (Panel B) and 30 years (Panel C). We observe similar effects.



**Figure S13: Warfare and relative frequency of egalitarian choices in the sharing and envy games among subjects who were >20 years during the civil war in Sierra Leone.** Black and grey bars represent the frequencies of in- and out-group partners, respectively. Error bars provide 95% exact confidence intervals. **A.** Sharing Game. **B.** Envy Game.



**Table S8: Warfare and prevalence of egalitarian choices among older cohorts 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 (1)	Ingroup (2)	Outgroup (3)	All (4)	Ingroup (5)	Outgroup (6)
<b>PANEL A: sub-sample of those who were &gt;20 years old in 1999</b>						
Mid affected	0.0789 (0.339)	0.057 (0.461)	0.077 (0.347)	0.042 (0.574)	0.005 (0.938)	0.045 (0.524)
Most affected	0.101 (0.257)	0.160 (0.104)	0.094 (0.288)	-0.059 (0.483)	0.040 (0.659)	-0.052 (0.495)
Ingroup	0.031 (0.677)			0.035 (0.598)		
Mid affected*Ingroup	-0.027 (0.808)			-0.038 (0.697)		
Most affected*Ingroup	0.0409 (0.753)			0.110 (0.386)		
Observations	414	210	204	415	210	205
<b>PANEL B: sub-sample of those who were &gt;25 years old in 1999</b>						
Mid affected	0.124 (0.197)	0.085 (0.324)	0.127 (0.188)	0.108 (0.217)	-0.0008 (0.991)	0.131 (0.124)
Most affected	0.097 (0.349)	0.172 (0.112)	0.091 (0.384)	-0.030 (0.755)	0.009 (0.926)	-0.013 (0.885)
Ingroup	0.033 (0.690)			0.079 (0.298)		
Mid affected*Ingroup	-0.058 (0.647)			-0.100 (0.347)		
Most affected*Ingroup	0.051 (0.725)			0.051 (0.713)		
Observations	331	177	154	332	177	155
<b>PANEL C: sub-sample of those who were &gt;30 years old in 1999</b>						
Mid affected	0.124 (0.297)	0.058 (0.572)	0.116 (0.338)	0.099 (0.364)	-0.020 (0.833)	0.112 (0.316)
Most affected	0.026 (0.843)	0.256* (0.055)	0.013 (0.921)	0.010 (0.935)	0.074 (0.554)	0.018 (0.889)
Ingroup	0.034 (0.740)			0.037 (0.694)		
Mid affected*Ingroup	-0.084 (0.582)			-0.110 (0.412)		
Most affected*Ingroup	0.185 (0.317)			0.060 (0.734)		
Observations	221	123	98	223	124	99

# **Warfare Experience during Ontogeny Increases Egalitarian and Parochial Motivations**

Michal Bauer, Alessandra Cassar, Julie Chytilová & Joseph Henrich

## **Supplementary Discussion**

This file contains further discussion and results about the causal mechanism behind the observed link between being affected by war and parochial-egalitarian motivations.

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. We start discussing these concerns in the context of Georgia and continue with Sierra Leone.

### Georgia (site #1)

Table S9 studies which individual characteristics predict exposure to warfare among 7-11yr old children in Georgia. Children who lived in South Ossetia prior to the war are more likely to be Affected & IDP children, as expected given the history of the war.

**Table S9: Determinants of war exposure (Georgia)**

Dependent variable Sample	<b>Affected&amp; Non-IDP</b> 7-11 year-old children in Georgia (1)	<b>Affected&amp; IDP</b> (2)
Age	0.032 (0.366)	0.030 (0.376)
Female	-0.097 (0.130)	-9.61e-05 (0.998)
Has a brother	0.087 (0.193)	-0.048 (0.368)
Has a sister	0.136** (0.035)	-0.015 (0.750)
Height	0.003 (0.554)	-0.007 (0.155)
Lived in urban area before war	0.068 (0.378)	-0.137* (0.054)
Lived in South Ossetia before war	-0.415*** (0.000)	0.594*** (0.000)
Constant		
Observations	283	283

The main concern is that certain towns or villages were affected more than others and social norms governing pro-social behaviour could vary across locations, independently of warfare. In particular, people in regions where people are more egalitarian and have bigger ingroup bias could be, coincidentally, those regions that were more heavily affected. Motivated by previous evidence showing a link between market integration and human prosociality<sup>46</sup>, we

divide our sample on two sub-samples: children who come from urban areas (Tbilisi, Gori, Tskhinvali) and children who come from villages. Since there are only few children in the Affected & IDP group who lived in urban setting, we pool the Affected & Non-IDP group and Affected & IDP group into one group. In Table S10 we find qualitatively similar effects of warfare on other-regarding motivations in both urban and rural areas (Panel A and Panel B, respectively).

**Table S10: Warfare and prevalence of egalitarian choices in Georgia (urban vs. rural areas)**

Dependent variable	Egalitarian choice in the sharing game: (1,1) vs. (2,0)			Egalitarian choice in the envy game: (1,1) vs. (2,3)		
	All	Ingroup	Outgroup	All	Ingroup	Outgroup
Sample	7-11 year-old children in Georgia					
	(1)	(2)	(3)	(4)	(5)	(6)
<b>PANEL A: Sub-sample of subjects who lived in urban areas before war</b>						
Affected	-0.121 (0.295)	-0.009 (0.938)	-0.116 (0.307)	-0.105 (0.349)	0.240** (0.027)	-0.104 (0.360)
Ingroup	0.074 (0.543)			-0.233* (0.059)		
Affected*Ingroup	0.115 (0.458)			0.363** (0.019)		
Age	0.087*** (0.005)	0.091** (0.029)	0.080* (0.072)	-0.078*** (0.009)	-0.073* (0.085)	-0.084** (0.044)
Observations	185	100	85	185	100	85
<b>PANEL B: Sub-sample of subjects who lived in rural areas before war</b>						
Affected	-0.307** (0.025)	0.0920 (0.458)	-0.310** (0.027)	-0.0630 (0.640)	0.308** (0.013)	-0.063 (0.637)
Ingroup	-0.155 (0.338)			-0.220 (0.168)		
Affected*Ingroup	0.398** (0.027)			0.385** (0.037)		
Age	0.0723** (0.028)	0.085** (0.048)	0.052 (0.282)	-0.043 (0.179)	-0.052 (0.240)	-0.032 (0.491)
Observations	154	82	72	154	82	72

In further multivariate analysis (Table S11) 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<sup>1</sup>. This absorbs any variation in warfare exposure across the regions so that the remaining variation essentially distinguishes children within the same region. The results are similar to our previous estimates, supporting the direct link between warfare and egalitarian motives.

**Table S11: Warfare and prevalence of egalitarian choices in Georgia (controlling for location differences)**

Dependent variable	Egalitarian choice in the sharing game: (1,1) vs. (2,0)			Egalitarian choice in the envy game: (1,1) vs. (2,3)		
	All	Ingroup	Outgroup	All	Ingroup	Outgroup
Sample	7-11 year-old children in Georgia					
	(1)	(2)	(3)	(4)	(5)	(6)
Affected&Non-IDP	-0.136 (0.142)	-0.0202 (0.818)	-0.131 (0.168)	-0.115 (0.203)	0.195** (0.025)	-0.140 (0.147)
Affected&IDP	-0.148 (0.286)	0.145 (0.328)	-0.099 (0.531)	-0.117 (0.385)	0.461*** (0.003)	-0.198 (0.207)
Ingroup	0.033 (0.730)			-0.213** (0.026)		
Affected&Non-IDP*Ingroup	0.119 (0.329)			0.316** (0.010)		
Affected&IDP*Ingroup	0.339** (0.022)			0.493*** (0.001)		
Age	0.075*** (0.001)	0.086*** (0.007)	0.063* (0.067)	-0.0726*** (0.001)	-0.052* (0.087)	-0.097*** (0.004)
Observations	377	197	172	373	202	171

### Sierra Leone (site #2)

The problem of selective targeting by fighters based on some observable characteristic of victims is a priori more severe in Sierra Leone than in the Georgian case 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 pro-sociality 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

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

leaders prior to the war. This indicates that the impacts we observe are due to violence rather than due to selection. In Table S12 we find that few characteristics predict individual warfare exposure. We interpret our results in the broader context of Bellows and Miguel (2009)<sup>35</sup> which concludes against the hypothesis of selection into victimization using a large national representative sample.

**Table S12: Determinants of war exposure in Sierra Leone**

Dependent variable	Mid affected	Most affected
Sample	Adults who were less than 21yrs during the civil war in Sierra Leone	
	(1)	(2)
Female	0.048 (0.632)	-0.098 (0.316)
Age	-0.008 (0.432)	0.007 (0.454)
Attended school	0.152* (0.078)	0.062 (0.440)
Number of brothers	-0.003 (0.866)	0.005 (0.698)
Number of sisters	0.006 (0.751)	0.009 (0.595)
Muslim religion	-0.0125 (0.894)	0.100 (0.275)
Temne ethnicity	-0.099 (0.290)	0.052 (0.551)
Observations	157	157

In all our regression estimates 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 Table S13 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 analyzed sub-samples. The results are qualitatively similar, but less significant statistically.

**Table S13: Warfare and prevalence of egalitarian choices in Sierra Leone (controlling for location differences)**

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	Ingroup	Outgroup	All	Ingroup	Outgroup
Sample	Adults who were less than 21yrs during the civil war in Sierra Leone					
	(1)	(2)	(3)	(4)	(5)	(6)
Mid affected	-0.070 (0.656)	0.296* (0.088)	-0.014 (0.930)	-0.061 (0.596)	0.220 (0.110)	-0.0480 (0.698)
Most affected	0.048 (0.783)	0.205 (0.259)	0.075 (0.701)	-0.189 (0.103)	0.229 (0.184)	-0.270** (0.0147)
Ingroup	-0.091 (0.490)			-0.199* (0.058)		
Mid affected*Ingroup	0.340 (0.108)			0.328* (0.089)		
Most affected*Ingroup	0.166 (0.485)			0.541** (0.017)		
Age	-0.020 (0.107)	-0.040** (0.045)	-0.005 (0.790)	-0.003 (0.781)	0.0015 (0.928)	-0.017 (0.235)
Observations	153	69	72	156	72	60

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# **Warfare Experience during Ontogeny Increases Egalitarian and Parochial Motivations**

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## **Supplementary Experimental Instructions**

This file contains the English version of experimental instruction.

## Georgia (site #1)

### Greeting and introductory instructions for the group

Hello everybody! My name is Irakli. And this is Maka and Roman.

First of all, thanks a lot for letting us come to your kindergarten/school today. It's really nice to be here. Today we're going to play some games with each one of you. During the games you can earn tokens. You can then use these tokens to buy some items such as pencils, erasers, stickers, sweets and small toys which you can keep. The items are from the University of San Francisco.

Here we have a bag with cards from the "memory" game. Each card has a number and an animal or fruit on it. Maka is going to come by and you can pick a card. One after the other, you can come into the room next door and play the game with us. Roman will call out an animal [*and number if children already know them*] and when you hear the name of the animal which is on your memory card it's your turn to play. Roman will take you to play the games. When you're done playing, you can go back into the class and continue drawing [*or whatever the children are doing at that moment*]. It's really important to us that you don't talk about the game until all the kids have played. We really want you to follow this rule!

*The assistant calls out the next animal/number. The child gets a paperbag from the experimenter and they write the child's name on it. At the end of each game the child puts the tokens which have been acquired into this paperbag. This ensures that the other children who have not yet played the games do not know what is in the paperbag when the child goes back into the class. At the end, each child goes to the "shop" and puts the prizes in her/his paperbag.*

### Individual game script for children - costless sharing game

#### 1. Short introduction

Hi! I'm Maka / Irakli / Maka.

What's your name? Please write it on this paperbag (*write it instead of the child in the case of small children who cannot write*).

Do you like kindergarten/school?

*(Measure the height of the child and report it in the answer-sheet.)*

Before we start with the games, you will get one token - the same as you will earn during the games. (*Give the child one token.*) Now we will go to our "shop" and I will show you what is there that you can buy with the tokens you will have gained during the games. (*Go to the shop.*) For each token you can buy one item from the "shop". (*After the child chooses one item, he/she goes back and starts to play the games.*)

Now we're going to play some games. Let us begin right now.

## **2. Explanation of the game (ingroup treatment)**

There is a photo on the screen of this laptop. Do you recognize the photo?

*(Check that the child recognizes the photo of her/his class. If the child does not recognize the photo, tick the box in the answer-sheet.)*

Yeah, that's right, that's your class photo!

Now I see that you wrote your name on this paperbag *(in the case of small children who cannot write: Now I see that your name is written on this paperbag.)*. We will also make a paperbag ready for a child from your class, but we both do not know the name of the child. We only know that it is a child from your kindergarten/school class.

*(Make paperbag ready)*

### **Game A (here the sharing game)**

Okay! Now we have two cardboards. On each cardboard there are two circles with arrows. One arrow points to the laptop with the photo, the other arrow points to you.

On the first cardboard *(move the cardboard in front of the child)* I now put one token on the circle that is closer to the photo *(put the token there)* and I put another token on the circle that is closer to you.

On the second cardboard *(move the other cardboard in front of the child)* I put two tokens on the circle that is closer to you. The second circle, which is next to the photo, stays empty.

Now your task is to choose one of the two cardboards. If you choose this cardboard *(move the first cardboard to the child)*, you receive the token in this circle *(i.e., the circle closer to the child)* from which the arrow points to you. The other arrow on this cardboard points to the photo, so this means that the token in this circle *(i.e., the circle that is closer to the photo)* goes to a kid from your kindergarten/school class. If you choose this cardboard we will give this token to one of the children from you class later today.

If you choose this cardboard, *(move the second cardboard in front of the child)* then you get two tokens and the kid from your kindergarten/school class gets no tokens. *(Show the child which circle/tokens we are talking about and where it goes.)*

## **3. Questions to check the children's comprehension of the payoff implications of different choices.**

If you choose the first cardboard, what does another child in your kindergarten/school class get? *(child answers)*

What do you get when you choose this cardboard? *(child answers)*

*If the child has problems answering the control questions, explain the rules again and ask*

*additional “comprehension questions” regarding the implication of this choice for the allocation of payoffs. Once the child answers the questions correctly move on:*

What does the other kid from your kindergarten/school class get if you choose the other cardboard?

What do you get if you choose the other cardboard?

*If the child has problems answering these questions explain the payoff implications of choosing “the other cardboard” again and ask further comprehension questions.*

*If the child has still problems to answer the second set of comprehension questions play the games with her/him but tick the box in the answer-sheet.*

*Finally, before we play the game ask the following:*

Do you have any questions? ...

Alright, now you can choose a cardboard.

*Tick in the answer-sheet which of the two options the child chose.*

*Tick in the answer-sheet how many seconds it took the child to decide.*

*Once the child has chosen a cardboard say:*

OK, then the other kid from your kindergarten/school class gets one (or zero, depending on the child's choice) token and you get one token (or two tokens, depending on the child's choice). Put tokens in the child's paperbag and the other child's paperbag.

*After this ask the child: Why did you choose this cardboard?*

*Record the answer (in English) in the answer-sheet.*

#### **4. After all four games have been completed**

OK, you have X tokens. The other kid has Y tokens. Do you think the other kid is happy?

*Record the answer (in English) in the answer-sheet.*

Do you think he or she would have been happier if you had chosen differently?

*Record the answer (in English) in the answer-sheet.*

#### **5. Saying good-bye**

OK, we're done with the games. Thanks a lot for playing with us! You did a super job! The assistant will now take you to the shop so you can buy your prizes!

Now you can go back into class to Mrs. X. Please remember not to talk to the others about the game until all the kids have played. That's really important for us! Thanks!

Bye-bye!

## **Sierra Leone (site #2)**

### **1. Greeting and introductory instructions for the group**

Hi! Thank you for being here today!

Let's start by introducing our research team. We are researchers from the University of San Francisco (USA). If, at any point in the future, you'd like to contact us or know more about this study, feel free to contact the principal and the teacher of this school. They will have our phone numbers and contact information. The main researcher responsible for this study is Alessandra Cassar (Email: [acassar@usfca.edu](mailto:acassar@usfca.edu)).

Thank you for agreeing to participate in this study that concerns the economics of decision making. Your participation in this study is voluntary. However, we think you will find this interesting. You could make a considerable amount of additional money in addition to the participation fee you are about to receive. The amount of money that you will go home with depends partly on your choices in the activities that follow and partly on luck. You should understand that this is not our own money. It is money given to us by our university to use to do a research study. This study may take about three hours, so if you think you will not be able to stay that long without leaving please let us know now.

Before we proceed any further, let me stress something that is very important. Many of you were invited here without understanding very much about what we are planning to do today. If at any time you find that this is something that you do not wish to participate in for any reason, you are of course free to leave whether we have started the task or not and the initial fee is yours to keep.

If you have heard about a task that has been done here in the past you should try to forget everything that you have been told. This is a completely different task. We are about to begin the task. It is important that you listen as carefully as possible, because only people who understand the task will actually be able to participate in it. We will run through many examples. To be sure that you understand how to do it, each of you will have a chance to ask questions by raising your hand.

This study will consist of several activities and a final survey. For each of the activities you will be asked to make one decision. At the end, we will randomly select one of these tasks to be the one that is actually paid. We will select it by having one of you point to one of different folded pieces of paper that will have the letter of the task chosen inside it. After the task that will be paid is chosen, we will ask you to participate in the survey. At the end, we will ask you to step aside for a moment and then call you back in, one at a time, to pay you in private.

You will be given 5,000 SLL for your participation. This money is to thank you for your help and to compensate you for the time you will spend here today. This money will be given to you at the end of all the activities and the survey. But you must understand that this money is yours regardless of your actions during the activities. Through the activities you will be able to earn additional money, how much depends on your actions and on luck. But the 5,000 SLL for your participation will not be taken away from you, even if you leave before the end.

It is very important that you follow a few simple rules: you cannot talk to each other during the activities, because your decisions have to be completely private and individual; you cannot leave the room during the activities; and you cannot use your mobile phone. If you break any of these rules we will have to ask you to leave, and you will receive only your participation fee. If you break the rules, and in particular if you talk to each other during the activities, you will not receive any additional money. Please turn off your mobile phones now.

You will be given instructions and practice opportunities for the tasks. The instructions are simple and you will benefit from following them carefully.

In order for this study to be carried out correctly, we really need you to not talk about the task while we are here together. This is very important and please be sure that you obey this rule, because it is possible for one person to spoil the task for everyone, in which case we would not be able to continue with the study. Do not worry if you do not completely understand the task as we go through the examples here in the group.

In addition, it is very important that you don't tell for the next 4 days anything to anybody (not your wife, husband, sister, friend, children) what you were asked to do. This will spoil the study for somebody else that could participate after you.

Thank you for participation!

*(If it is a problem: Please make sure your mobile phones are turned off to avoid interruptions during the meeting!)*

## **2. Explanation of the game**

Ingroup treatment: For each task that you will perform today, you will be asked to allocate money between yourself and another person that lives in your village. You do not know the name of this person. We do not know it either right now. We both only know that it is going to be an adult from your village.

[Or outgroup treatment: Here is a list of villages. Your village is \_\_\_\_\_ (point to the name of the village). The other villages listed here are all different villages very distant from here. For each task that you will perform today, you will be asked to allocate money between yourself and another person that lives in a very distant village. You do not know the name of this person. We do not know it either right now. We both only know that it is going to be an adult from a village located far away from here.]

*Experiment assistant writes participant IDs on envelopes and distributes them to participants as they arrive. After all participants are seated with their envelopes, experiment assistant passes around decision sheets to all participants one task at a time. After the end of each task, folding a decision sheet and placing it in the envelope is demonstrated. Experiment assistant ensures all decision sheets have in fact been placed in the envelopes. At the end of all tasks, experiment assistant collects envelopes from all participants before the randomly choosing of the task which the earnings will be based on.*



We will pass around decision sheets for each task. After you are done making your decision for each task, you will need to fold the sheet with your choice and place it in the envelope we provided (*demonstrate*). Please do not make your decision until I have completed the explanation of the task.

### **Game C (here the sharing game)**

*Experiment assistant passes around the decision sheets for task C.*

*Experimenter holds up a big size reproduction of the decision sheets and illustrates.*

There is a big letter C on the top right corner of the sheets. This is the name of this task, task C. Each decision sheet contains two circles with arrows. One arrow points to the word SEND and the other arrow points to the word KEEP. Each token on the sheet will be exchanged for 500 Leones.

On this sheet there are depicted 10 tokens on the circle that points to SEND and there are another 10 tokens on the circle that points to the word KEEP. On the second sheet there are depicted 5 tokens on the circle that points to SEND and there are 15 tokens on the circle that points to the word KEEP.

Now your task is to choose one of the two decisions. If you choose the decision on the first sheet you receive the 10 tokens shown in the circle from which the arrow points to KEEP. The other arrow on this decision points to SEND, so this means that the 10 tokens in this circle will go to a person from your village. If you choose this decision we will give these tokens to one of the adults from your village later today. If you choose the second sheet, then you get 15 tokens and the person from your village gets 5 tokens.

Your choice will remain anonymous. After you decide, fold the decision sheet with your choice and put it in the envelope provided. Fold the other sheet and leave it in your box. *Experimenter demonstrates this and repeats what choosing each decision sheet means. After the subjects make their choice, experiment assistant collects all the folded sheets that were not placed in the envelope, shuffles them around in front of participants at the end of collection, and counts them to ensure that everyone inserted one sheet in the envelope.*

If this is the task that gets randomly selected at the end of the session, you will be paid according to this choice that you are about to make.

### **3. Questions to check the subject's comprehension of the payoff implications of different choices.**

If you choose the decision on this sheet, what does another person in your village get? (*subject answers*)

What do you get when you choose the decision on this sheet? (*subject answers*)

*If the subject has problems answering the control questions, explain the rules again and ask additional “comprehension questions” regarding the implication of this choice for the allocation of payoffs. Once the subject answers the questions correctly move on:*

What does the other person from your village get if you choose the other decision?

What do you get if you choose the other decision?

*If the subject has problems answering these questions explain the payoff implications of choosing “the other sheet” again and ask further comprehension questions. If the subject has still problems to answer the second set of comprehension questions play the games with her/him but tick the box in the answer-sheet.*

*Finally, before we play the game ask the following:*

Do you have any questions? ...

Alright, now you can choose a decision. I will turn my back so you can make your choice in private.