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ORIGINAL PAPER

War trauma and PTSD in Ukraine's civilian population: comparing urban-dwelling to internally displaced persons

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Abstract

Introduction War in Ukraine started in March 2014 when Russia annexed Crimea and continues today in the Donbass region of Eastern Ukraine. Over 1.5 million people in these regions have been displaced from their homes. We conducted this study 36 months after the conflict began and interviewed civilians residing in Ukraine.

Purpose This study examines the prevalence of exposure to war trauma, rates of PTSD by symptom clusters, and whether socio-demographic factors are associated with positive scores for PTSD among civilian urban-dwelling and internally displaced persons in Ukraine during the ongoing conflict in its Donbass region.

Methods Face-to-face interviews were conducted using a multi-stage random sample of the general population in two large cities (Kharkiv and Lviv) in Ukraine ($n=1247$) and a purposive sample of internally displaced persons ($n=300$), half living in each city. Exposure to trauma, symptom clusters for Posttraumatic Stress Disorder (PTSD), and overall PTSD were assessed.

Results We found widespread direct exposure to conflict-related traumatic events (65%) among internally displaced people (IDPs) compared to a sizable minority (23%) of urban-dwelling people (UDPs). We found elevated prevalence of PTSD symptoms that were also uniformly spread within several socio-demographic factors. There were, however, significant differences in PTSD between (1) IDPs compared to UDPs and (2) those UDPs with Ukrainian compared to Russian ethnic identity, the former of each pair showing increased likelihoods of positive PTSD scores.

Conclusions Ukraine's adult civilians, enduring the prolonged engagement in war with Russia and Russian separatists, have elevated rates of PTSD. Moreover, those who have been displaced by the ongoing conflict (IDPs) have significantly higher levels of PTSD compared to UDPs.

Keywords Ukraine · Russia · War · Post-traumatic stress disorder (PTSD) · Civilians · Internally displaced persons (IDPs) · Ethnic identity

Introduction

The conflict between Russia and Ukraine started with the annexation of Crimea in March 2014. It quickly moved into the Donbass region of Ukraine where there emerged two pro-Russian proto states of Donetsk and Luhansk People's Republics (DPR and LPR). The war's front line stretches hundreds of kilometers from the Black Sea near Mariupol thru Donetsk and to the area around Luhansk. The war (as it finished its third year at the time of this study) had shaken Ukraine society with continuous traumatic violence that included the downing of a commercial airliner flight MH17 by a surface-to-air missile (killing 298 people on board) [1], left more than 34,000 causalities (2800 civilians) with 10,000 people dead and 24,000 injured [2] and left over 1.5 million internally displaced persons (IDPs) who had fled their homes in the war torn zone [3].

As with most wars, both combatants and civilians of the countries embroiled in war faced trauma. Although most of the research on trauma during armed conflicts has focused on the combatants, especially those who served in the armed forces, recently prevalence estimates of PTSD among all

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civilian populations exposed to conflict have been reported and range between 15.3 and 26% [4, 5]. These rates far exceed the evidence provided by epidemiologic surveys of PTSD past-year prevalence rates of 3.5% in High Income Countries (HICs) such as the United States [6] or worldwide estimates that averaged 3.2% lifetime (ranging from 0.0 to 9.2%) for representative samples of civilian populations [7]. A contemporaneous systematic review of the bibliographic record from several databases further confirmed the lack of studies about the mental health status of civilians displaced (either refugees or IDPs) due to armed conflict worldwide [8]. The vast majority of the earlier studies that focused on civilians in general were done in the High Income Countries (HICs) in Western societies [9]. Civilians living in countries designated by the World Bank as a Lower or Middle Income Country (LMIC) were not studied as often, yet armed conflicts are increasingly more likely to occur there and may have more detrimental impact in these compared to HICs populations [10]. For example, emerging studies have suggested that refugees and internally displaced persons (IDPs) in the LMIC countries are likely the most vulnerable, have greater likelihood of exposure or ongoing exposure to potentially traumatic events, and have fewer housing, economic, and mental health treatment opportunities than those in HICs [8, 11]. Reported PTSD prevalence rates among IDPs ranged from a low of 3% in Sri Lanka to 88.3% in Medellin, Columbia, although most were consistently in the higher range; 26 of the 30 studies reported rates greater than 10% and two-thirds of the studies reported rates over 30% [8]. Other studies in Israel that focused on its economically deprived Arab citizens found either high levels of PTSD prevalence rates overall (15–25%) or even higher levels of symptom severity compared to the elevated levels among Jewish citizens, both of whom have faced long-term exposure to political violence in the Middle East [12–15]. Refugees from the conflict in the Bosnian war were found to have 24–76% rates of PTSD prevalence [16], and those civilians who faced the impact following the war in Bosnia (an upper middle income country) were reported to have a 25% rate of PTSD prevalence [17]. Other recent studies of refugees from LMIC populations, such as those fleeing the Syrian conflict and living in Lebanon or Turkey, reported rates of PTSD between 20 and 34% [18–20]. To date, only one study has examined the impact of war trauma on IDPs in Ukraine [21], which is the only LMIC country in Europe at the time of this study [22]. We also could find none that directly compared, as we do, the experiences of IDPs to the other of residents in those communities where IDPs sought shelter.

We report the results of 1547 face-to-face interviews with Ukrainian civilians living in the cities of Lviv or Kharkiv including IDPs to estimate the prevalence of symptoms of PTSD in both groups and to identify the nature and distribution of their demographic characteristics. Based on the foregoing literature we hypothesized that both IDPs and UDPs in Ukraine (as populations in a conflict-affected country) will have high levels of trauma exposure and symptoms of PTSD relative to typical rates of prevalence found in epidemiological studies. We also expect greater trauma exposure will be present among IDPs and as a result have higher prevalence and symptoms of PTSD compared to UDPs. We further expect that while markedly higher levels of exposure to trauma would tax even the most well-resourced civilian populations, the financial and economic difficulties in Ukraine will subject this vulnerable population to more severe symptom scores that contribute to higher prevalence rates of probable PTSD.

Methods

Sampling and data

This study uses data collected from two cities in Ukraine. Kharkiv is in Eastern Ukraine (close to the conflict zone) and located next to separatists-controlled Donetsk and Lugansk regions of Ukraine. It has received thousands of those fleeing the violent conflict happening in those regions. Lviv, on the other hand, is situated in Western Ukraine farther from the front but it is also an important source of government troops and volunteer battalions fighting separatists and Russian armed forces in Donetsk and Lugansk regions. The target population consisted of the adult Ukrainian residents (aged 18 years or older) living in one of these two cities. There was no upper age limit, but respondents were able to complete an interview designed and pre-tested to take 40–45 min. There were 52 respondents who were not interviewed because they were unable to answer questions due to incapacity (e.g. hearing, speaking, illness, intoxication, etc.).

For the urban-dwelling persons (UDPs) sample, households were selected using a stratified multi-stage sample selection procedure in which street routes within randomly selected city neighborhoods in each of six city administrative districts were randomly selected, and then on each street route, households were randomly selected. We mapped each city into neighborhoods, 70 in Lviv and 83 in Kharkiv (identified as at least two parallel or perpendicular streets with a shared playground or similar area, a grocery store, and access to public transportation). These neighborhoods were also perceived by city residents as separate residential areas and informally identified by specific names (e.g. "Rogan" in Kharkiv or "Pidzamche" in Lviv). This strategy is consistent with the general definition of a neighborhood as a geographical and social subsection of a larger community in which residents share a common sense of identity that persists over time [23].

Twenty-six neighborhoods in Lviv and twenty-six neighborhoods in Kharkiv were then randomly selected from these 153 neighborhoods. This multi-stage clustered sampling procedure has been validated in previous research in Ukraine [24] and for this study provided a list of 5,357 potential households. We randomly replaced targeted participants who could not be interviewed (77% percent of original oversample). A substantial number of replacements were for targeted households in which a suitable respondent could not be located or could not be scheduled for an interview within the allocated limit of 3 callbacks. Within each sampled household, one adult whose birthday was most recent was interviewed. Of those randomly contacted either in the original or initial oversampling, 616 adult participants were interviewed from Lviv, and 631 from Kharkiv ($n = 1247$ total), yielding a representative sample of adult households in these cities with a maximum sampling error of 2.8%.

The oversampling of IDPs was obtained using snowball sampling techniques involving non-profit organizations and known resettlement areas in these same urban areas to identify those who had fled the conflict zones. Established non-profit organization working with IDPs in Ukraine (e.g., CrimeaSOS) provided contact information for IDPs to SOCIOINFORM. In addition, potential respondents were contacted in known resettlements areas such as a modular house settlement for IDPs in Kharkiv supported by humanitarian aid from the German government [25]. They contacted households of IDPs until they obtained a quota of 150 participants from each urban area (31 households in Lviv and 25 in Kharkiv declined to participate).

Data were conducted in-person using a structured questionnaire from April 5 thru July 22, 2017 (36–39 months after the beginning of the war). Most data were collected from participants through face-to-face interviews; self-reports on certain sensitive issues (e.g., violent behavior) were answered by participants away from the interviewer on a short self-administered questionnaire and sealed in an envelope. The instrument used in the survey contains mostly items validated in previous surveys of adults [24, 26]. The questionnaire was written in English, translated into Ukrainian and Russian languages, and then back translated into English by linguists fluent in these languages. The following procedures were used to obtain our final sample.

SOCIOINFORM, a survey research organization based in Ukraine, collected the data. This organization has a track of conducting surveys for many international organizations including United Nations. All interviewers who visited the study participants were trained to conduct the face-to-face interviews and qualified to do so in either the Ukrainian or Russian language, whichever the participant preferred. The interviewers obtained oral informed consent after the subjects had read the informed consent form and had agreed to participate in the study. The University of Miami and Northeastern University Institutional Review Boards approved the consent form and the study.

Measures

The interview consisted of 244 questions drawn from previous studies including several dealing with responses to terrorism and ongoing political violence, crime, and mental health [24, 26–28]. The coding for PTSD follows the examples of previous studies and compares favorably to the internal reliability obtained for those studies [29–31].

Sociodemographic measure We selected our sociodemographic variables because prior studies found them significantly associated with PTSD in situations of ongoing trauma exposure [13, 32–34]. These include self-reported years of age, sex (female = 1, male = 0), education (1 = Incomplete secondary, 2 = Completed secondary, 3 = Vocational/technical. 4 = Some college, 5 = College degree, 6 = Graduate degree), fulltime employment (fulltime = 1, other = 0), marital status (married = 1, other = 0), ethnicity (Ukrainian = 1, Russian = 0) and city of residence (Lviv = 1, Kharkiv = 0). These may show whether inequality in exposure or outcomes was present. Ethnic identities other than Ukrainian and Russian (n = 51) were a very small proportion of the sample and coded as missing for the multivariate analyses.

Exposure Three questions were asked to determine if the criterion for a traumatic event exposure (A1) had occurred in which they experienced, confronted or witnessed actual death or serious injury as a result of the Crimea annexation or the ongoing war in the Donbass region. A participant who answered yes to any one or more of these three questions was determined to have been exposed to a traumatic event.

PTSD symptom clusters (PSCs) The questions used in this study measured PTSD symptoms using adapted DSM 5 criteria [35]. Participants were asked to indicate "to what extent" they experienced each of the 20 symptoms during the past month. The answer scale ranged from "not at all" to "a very great degree. Items with responses of "a great degree" or "a very great degree" (i.e., more than "a small degree") were considered severe enough to satisfy the endorsement criteria for the PTSD symptoms ($\alpha = 0.88$). These endorsed symptoms comprise the four PSC clusters (B through E) of PTSD (DSM 5). There are 5 re-experiencing items for cluster B (PSC-B), which includes self-reports of incidences such as repeated thoughts, dreams, or reminders of the experience. PSC-C includes 2 avoidance items that determine if someone tries to avoid thoughts or situations that might remind them of the experience. The 7 negative thoughts or feelings items for cluster D (PSC-D) include trouble remembering, feeling distant or cut off from others or numb towards others, etc. Finally, 6 arousal and reactivity items for cluster E (PSC-E) include feeling irritable, super alert, jumpy or having difficulty concentrating.

PTSD Symptom Scale (PSS) This type of symptom scale [29] has long been used as a valid and reliable assessment of psychopathology, which was obtained here by counting each symptom endorsed by the respondent for DSM 5 [35] criteria in the symptom clusters with a threshold for each cluster: B (1 or more), C (1 or more), D (2 or more), and E (2 or more). When all symptom clusters are endorsed at or above their respective threshold, the overall result is coded equal to 1. If the threshold for any one of these four clusters is not met, it is coded equal to 0.

Internally displaced person Participants were placed into one of two groups: (1) those who were purposely sampled internally displaced persons (IDPs) and (2) the systematic random sample within randomly selected clusters of urban-dwelling residents whose status was relatively more stable or secure (UDPs). Residents were IDPs if they had been identified prior to sampling as displaced either by the Donbass War or the Annexation of Crimea.

Results

Demographic characteristics of participants by sample are presented in Table 1. The samples for IDPs and UDPs do not differ significantly in full-time employment, marital status, or ethnicity (both are largely Ukrainian).

The IDPs are significantly younger (40.9 years old) compared to UDPs (45.4 years old) and better educated (e.g., 68.7% vs 54.5% with some college). There are also significantly more women among the IDPs (62.7%) compared to UDPs (55.3%).

Exposure The level and type of exposure to trauma related events of the war in Donbass are shown in Table 2 separately for the Ukrainian UDP and IDP populations.

For all three indicators of A1 criteria (exposure to traumatic events), civilian IDPs have much greater exposure than UDPs in Ukraine. The 2 × 2 chi-square tests were significant for all the exposure criteria at $p < 0.001$, supporting our earlier expectations. Beyond the statistical difference, it should be noted that these deeply meaningful traumatic events were also qualitatively different, with exposure differences ranging from 2.4 to 18.4 times greater for the three A1 criteria indicators.

Displacement Most people in the sample of IDPs had been displaced by the Donbass War (87.3%), whereas a minority had been displaced by the annexation of Crimea (12.3%). Only one person in the sample of IDPs reported neither reason as a cause for their displacement. And only 7 participants (less than 1%) of the random sample of UDPs reported earlier displacement for either reason.

PTSD symptoms The percent of Ukrainian UDPs and IDPs who endorse PTSD diagnostic criteria (DSM 5) for cluster B re-experiencing symptom (1 or more), cluster C avoidance symptoms (1 or more), cluster D negative thoughts and feelings (2 or more) and Cluster E arousal symptoms (2 or more) are shown in Table 3.

For each cluster, the percent of IDPs who meet the criterion is greater than it is for UDPs. The 2 × 2 chi-square tests were significant for all of these at $p < 0.001$, supporting our

Table 1 Demographic characteristics of participants by UDPs[a] ($n = 1247$) or IDPs[a] ($n = 300$)

Characteristic	UDPs Mean (SD) or %	IDPs Mean (SD) or %
*Age****	45.4 (17.3)	40.9 (14.5)
Age range	18–94	18–79
Sex		
Male	44.7%	37.2%
Female*	55.3%	62.7%
Ethnicity		
Ukrainian	87.0%	83.0%
Russian	10.5%	10.3%
Other	2.5%	6.7%
*Education****		
< High School	1.8%	2.0%
High school	14.1%	6.3%
Vocational	29.6%	23.0%
Some College	54.5%	68.7%
Residence		
Lviv	49.9%	50.0%
Kharkiv	50.6%	50.0%
Employed		
Full time	49.0%	45.0%
Other	51.0%	55.0%
Marital status		
Single	21.2%	22.0%
Married	52.0%	53.3%
Other	23.8%	24.7%

[a]Urban-dwelling (UDPs) and internally displaced people (IDPs)

*$p < .05$; ***$p < .001$ (t test for difference in mean or proportion)

Table 2 Rate of exposure to Donbass war trauma among urban-dwelling (UDPs) and internally displaced people (IDPs) in Ukraine

	UDPs ($n = 1,247$) (%)	IDPs ($n = 300$) (%)
No exposure***	77.0	35.0
Witnessed exposure of others (death or injury)***	2.2	40.4
Exposure of friends or relatives who were injured or died***	16.2	39.0
Personal exposure***	13.7	44.7

***$p < 0.001$ (t-test for difference in mean or proportion)

previously stated expectations. A closely similar pattern was seen when DSM 5 criteria were examined for PSS (26.3% for IDPs and 8.3% for UDPs) with the same significant differences found to exist between IDPs and UDPs.

Multiple logistic regression analyses

Logistic regression models were estimated to assess the vulnerabilities of demographic groups to PSS separately for UDPs and IDPs. The final regression models are reported in Tables 4 and 5.

The only demographic variable associated with the presence of PTSD (DSM 5) was Ukrainian ethnicity (adjusted OR = 2.990) among UDPs. Those whose ethnic identity was Ukrainian had significantly higher rates of a probable PSS than those of Russian ethnicity The participant's age, sex, marital status, employment status, educational attainment and city of residence were not significantly associated with probable PTSD for either UDPs or IDPs. Data entry and statistical analysis was performed using IBM Statistical Package for the Social Science (IBM SPSS) version 25.0.

Table 3 Rate of positive PTSD symptoms (DSM 5) and symptom clusters among urban-dwelling (UDPs) and internally displaced people (IDPs) in Ukraine

	UDPs ($n = 1247$) (%)	IDPs ($n = 300$) (%)
DSM 5 PTSD clusters and PTSD Screening Score (PSS)		
Criterion B: intrusion or re-experiencing (one required)	43.1	75.3
Criterion C: avoidance (one required)	29.9	54.0
Criterion D: negative thoughts or feelings (two required)	30.0	60.0
Criterion E: arousal or reactivity (two required)	19.3	48.3
DSM 5 PTSD Screening Score (PSS)	8.3	26.3

Table 4 Logistic regression of PTSD (DSM 5) Screening Score on sociodemographic characteristics of urban-dwelling people (UDPs) in Ukraine ($n = 1216$)

	B	S.E.	*p*	Adj. odds ratio (95% CI)
Female (Ref. male)	0.249	0.216	0.249	1.283 (0.840, 1.958)
Ukrainian (Ref. Russian)	1.095*	0.529	0.038	2.990 (1.060, 8.433)
Married (Ref. Other)	0.282	0.218	0.196	1.325 (0.865, 2.031)
Employed (Ref. Other)	0.410	0.227	0.071	1.506 (0.966, 2.349)
Age	0.008	0.007	0.262	1.008 (0.994, 1.021)
Education	− 0.094	0.085	0.272	0.910 (0.770, 1.076)
Lviv (Ref. Kharkiv)	0.425	0.219	0.053	1.529 (0.995, 2.349)
Constant	− 4.136	0.754	0.000	0.016

UDPs sample size is reduced because 31 subjects were excluded who had ethnic identities other than Ukrainian or Russian

*$p < 0.05$

Table 5 Logistic regression of PTSD (DSM 5) Screening Score on Sociodemographic characteristics of internally displaced persons (IDPs) of Ukraine ($n = 280$)

	B	S.E.	*p*	Adj. odds ratio	(95% CI)
Female (ref. male)	0.017	0.296	0.956	1.017	(0.569, 1.817)
Ukrainian (ref. Russian)	− 0.564	0.438	0.197	0.569	(0.241, 1.341)
Married (ref. other)	− 0.048	0.287	0.868	0.953	(0.544, 1.673)
Employed (ref. other)	− 0.373	0.302	0.217	0.689	(0.381, 1.244)
Age	− 0.005	0.010	0.634	0.995	(0.975, 1.015)
Education	− 0.046	0.126	0.716	0.955	(0.747, 1.222)
Lviv (ref. Kharkiv)	− 0.117	0.296	0.693	0.890	(0.498, 1.589)
Constant	0.062	0.803	0.938	1.064	

IDPs sample size is reduced because 20 subjects were excluded who had ethnic identities other than Ukrainian or Russian

Discussion

Overall, this study presents several important findings regarding the experiences of trauma and mental health in a country at war. First, not surprisingly, our findings in Ukraine match those in recent studies that reveal that civilians in conflict-affected populations experience elevated levels of both trauma and symptoms of mental illness which recently is occurring more often in LMICs with limited resources [8]. Since WWII, civilians in most HICs have not experienced war on their territory. Indeed, the United States during its major conflicts since the Civil War is unusual in having its wars not, or nearly not, directly impacting civilian populations. Second, the impact of war varies greatly within the civilian population as large numbers of noncombatants flee the conflict forcing them to live as refugees or IDPs. Others remain on the home front (more remote from the combat) but must still manage the sacrifices required to support the war. This study shows both civilians fleeing their homes engulfed in conflict and those who remain in their homes remote from the conflict report trauma experiences from the war. Third, the types of symptom experienced by civilians appear to differ from the types of symptoms that combat veterans experience, who themselves show variations in symptoms by types of trauma experiences [36]. These differential trauma events and symptom responses pose questions of not only who is or is not affected by trauma events in general but also why some symptoms are driven more than others by different trauma events. Finally, we are only beginning to understand the social and cultural factors (e.g., community context or ethnicity) that are protective or may exacerbate the relationships among exposure to conflict, trauma, and mental health outcomes in civilian populations. We next turn to a discussion of each of these findings, beginning with the variations in trauma exposure.

Trauma exposure The elevated levels of trauma vary substantially between IDPs and UDPs. A large majority of IDPs reported one or more instances of trauma exposure (65%) caused by the conflict between Ukraine and Russia in two regions (Donbass and Crimea) of Ukraine. When combat veterans experience trauma they return to their homes, but IDPs flee from conflict by leaving their homes. For the former, home can be a place of some refuge. But for those who flee, home has become more dangerous than running for the border and facing the indignity and stigma that IDPs might anticipate and fear.

Although far fewer UDPs reported exposure to one or more types of trauma (23%) because of the conflict, this was still a substantially sized minority who were exposed to trauma. Some of these people may include combat veterans who returned from war to their homes in Kharkiv and Lviv, but these would account for a small portion of overall exposure. Before the outbreak of combat Ukraine's military had long been relatively inactive and small; based on the numbers of its small active armed forces and reserves (294,000 in an adult population of 39 million) [37] they represented a very small percentage of the population. Most of the UDPs reporting exposure are likely family members of injured or killed combatants or relatives (perhaps from Donbass) who had faced the brunt of the war in Eastern Ukraine. By comparison, the experiences of war trauma in some other European countries are found at much lower rates ranging from 0% in Switzerland to 10% in Croatia (an outlier) [38]. The high rate of war trauma exposure among the UDPs of Ukraine compared to those living in other European countries indicates that even civilians who are not forced to flee the fighting in Eastern Ukraine also face a potential substantial burden caused by exposure to it.

The comparisons of exposure to trauma among different subpopulations involved in the same war have obvious implications for variations in the experiences of PTSD symptoms. The higher rate of exposure among IDPs compared to UDPs, as expected, reflects the greater impact among those who are forced from their homes in the face of armed conflict. These comparisons of symptom experiences are discussed next.

PTSD symptom clusters Among the PTSD clusters, "intrusion or re-experiencing" the events of the conflict in Crimea or Donbass is the most common symptom cluster for both IDPs and UDPs. In our study, a majority of IDPs report levels of symptoms that meet thresholds for the "intrusion or re-experiencing" symptom cluster as well as the symptom clusters for "avoidance" and "negative thoughts or feelings" of the conflict. The symptom cluster of "arousal or reactivity" has the lowest prevalence rate for both IDPs and UDPs. This suggests that characteristics of the trauma and population exposed to it can influence the number, cluster type, and severity of symptoms of PTSD. These findings reinforce those of earlier studies that contrast the experience of PTSD symptoms by civilians (often using noncombat trauma) with the combat trauma of veterans. Such studies reveal varying rates symptoms and severity of symptoms for each of the clusters [39], most of which are not yet identified or clearly understood.

Prevalence estimates of PTSD Prevalence estimates of PTSD vary across Europe, and those variations are attributed to both cultural and social influences with differing rates of victimization or exposure to trauma chief among them. Our findings suggest that, using PSS as a conservative estimate for prevalence [29], PTSD rates are likely very high among IDPs and slightly elevated (at the top range of estimates) among UDPs compared to rates in community (civilian) samples of the general populations in other European nations [7, 38, 40]. The higher rate of PTSD among

IDPs indicated by the PSS score is consistent with other national studies around the globe [41–43], both regionally (Bosnia) and recently (Syrian refugees and a recent study of Ukrainian IDPs) [16–19, 21]. Our multivariate analyses find that ethnic identity is the only other factor we examined that is associated with increased likelihood of PTSD. Those with a Ukrainian ethnic identity are more vulnerable among UDPs, but not among IDPs. Age, sex, education, employment status, and religiosity were found to be unrelated to PSS for either group.

Russian ethnic identity, it seems, is a protective factor among UDPs (but not IDPs) in Ukraine's two large cities, yet it remains to be determined what that protective process entails. The threat of loss among those who identify as Ukrainian and find themselves in conflict with Russia may, perhaps, make them more vulnerable than Russians living in Ukraine (the latter of whose interests would presumably be better protected by Russian influence). For example, those whose ethnicity is Ukrainian may be more likely than those whose ethnicity is Russian to fear loss of territory and political independence. As a result, those who identify as Ukrainian may be more negatively affected by the ongoing violent conflict with that invading neighboring country. It is also interesting to note that while the city of residence did not have a significant effect in the regression results, it's bivariate association with PSS was significant showing higher PSS in Lviv, the city farther from the front lines. The fear of invasion should be less threatening as distance from the front increases. But citizens in Lviv also reported a lower percent of Russian ethnicity, suggesting cultural and social distance are possible competing explanations for vulnerability to PTSD in Ukraine. However, the protective effect of Russian identity was not found for those Ukrainian citizens who are IDPs. Perhaps experiences of actual loss, being forced to flee from conflict and becoming displaced may be levelers of any buffering effects associated with a Russian identity. In addition, the losses that do occur among UDPs may be less prevalent or severe or both compared to those who have been displaced. In other words, those who experience the losses associated with becoming displaced have more in common than their ethnic identity would differentiate them from each other. This is consistent with extending Conservation of Resource (COR) theory [44, 45], which postulates loss is more harmful than gain is beneficial, and suggests that actual loss is more harmful than the threat of loss from traumatic stressors. COR theory suggests further that when the levels of trauma exposure and resultant PTSD are very high, as we found for the IDP population, these individuals will experience a drain of public protective resources that is likely to be overwhelming.

The study has several strengths. It is a large community-based study of civilian war-trauma during an ongoing war between Ukraine and Russia. Because the Russian invasion of Crimea commenced only 3 years before data collection, and the invasion of Eastern Ukraine is an ongoing conflict, memory bias is greatly reduced, and contextual meaning is still likely to be largely intact. Both factors increase the likelihood that the stressful experiences of the conflict remain meaningful to the subjects, as they are likely to feel continued future and worsening threat. In addition, face-to-face interviews were conducted in the subject's preferred language by experienced interviewers who worked for a well-established survey research organization. The survey employed standardized measures of PTSD symptoms and previously validated measures of trauma exposure. The large sample size not only reveals significant effects but also has enough power to interpret nonsignificant ones.

The limitations of the study include the purposive sampling procedure for and smaller sample size of interviews from IDPs, as opposed to the multi-stage random sampling procedure for the resident populations of the cities. The smaller effect sizes in the IDP sample, however, largely account for their lack of significance observed here (rather than the loss of power due to reduced sample size). Even so, such results should be interpreted with caution. In addition, we do not have complete data in this sample on prior or active military service. Because of incomplete information from the full sample, we cannot definitively apportion how much exposure was experienced by civilians versus previously serving military veterans who experienced PTE during combat and have returned to civilian life. Our evidence suggests that this is relatively small, however, given the small size of Ukraine's armed forces. We also did not have information about the interviewers' status with respect to exposure, former military service ethnic identification, or sociodemographic backgrounds. Subjects thus were matched only on the basis of a common language. Finally, without a representative sample of IDPs, it is difficult to generalize the prevalence rates of PSS. These observed rates, however, are likely to be conservative because the most severely impacted IDPs will likely be more difficult to find and interview. In addition, earlier studies have concluded that human rights violations of civilians during war may have even longer-term significant pathological impact on mental health [17].

Conclusions

Trauma is an inevitable consequence of armed conflict, and the research literatures shows a growing interest in the variable responses to it. Exposure to trauma during armed conflict has an enormous potential to harm mental health, and the most common mental health response to combat trauma studied has been PTSD. However, for countries at conflict with each other, most of the attention has been given to PTSD among the armed combatants, especially combatants

or veterans of North American or European armed forces. Yet no less obvious is the prospect that the civilian citizens suffer wars' impact and consequences as well. In this study, we examined the impact of civilian exposure to armed conflict in an understudied lower income country to determine whether the criteria for exposure and PTSD are social and culturally meaningful for their experiences. The results reveal uniformly and widespread elevated levels of both exposure and its consequences (in terms of PTSD symptoms) in the general population and these are most severe for those civilian IDPs who fled the conflict zones. Trauma itself is understudied in a population where social and cultural contexts often fail to recognize mental illness. Yet both factors can be important determinants of social psychological responses to trauma.

Past research has linked specific experiences of trauma to individual symptom clusters of PTSD, and this study shows a wide range of symptoms between clusters expressed among these civilian populations. Intrusion and re-experiencing were the most common symptoms; arousal or reactivity symptoms were the least. This variety of responses to trauma is supported by conflicting findings of cluster models from previous studies that suggest different cultural or etiological factors might be involved [46]. Understanding these relationships may have both theoretical and clinical implications for the presentation of PTSD in civilian versus combat veteran populations exposed to war trauma. Given that both the range of responses from resilience (little likelihood of developing only a few or any symptoms at all) up to chronic PTSD (long term symptoms), such an understanding may help in designing public health responses to such large populations of civilians exposed to war.

Not everyone who is exposed to trauma develops symptoms at clinically significant levels for PTSD. Resistance and resilience have been found to be highest among combat veterans [47] and lowest among victims of terrorist attacks [31, 48] according to comparisons of results from earlier research. Prior training (as in the cases of combat personnel), protective factors (sociodemographic, social and historical context), and resources (personal or social) are often posited among the putative multiple factors that differentiate those who continue to do well in the face of trauma and those who go on to face deleterious effects. These samples of civilians exposed to war (especially the majority of whom are living in low-to-middle income countries) exhibit symptoms place them among the populations most vulnerable to the deleterious effects of trauma [5]. This is not surprising as Ukrainian civilians live in a low-income country and largely lack the resources necessary to mitigate the effects of trauma. The possible lack of protective factors can also vary widely between individuals at the micro level of analyses, neighborhood context at the mezzo level, to social and institutional context at the macro level. Moreover, given the high rates of probable PTSD exhibited here we might expect (as prior studies have found) pressure cooker effects, such that the impact of social support can become detrimental as people who are more socially connected experience more constant exposure not only to their own traumas, but also the traumas of loved ones [49]. The complexities of the trauma experiences of civilians during combat on their own territory warrant further investigations along these lines.

Based on the strength of the findings, limitations notwithstanding, this study has shown the substantial violent conflict exposure and its detrimental consequences among civilians in the LMIC of Ukraine, and future researchers undoubtedly should explore the longer-term effects in this population. On a theoretical level, future research should also explore the differential impact on symptom clusters as they relate to specific war trauma and exposure to violence as they relate to the separate samples, geographical and demographic populations. We also believe these high rates of symptoms are important to acknowledge in a population that will continue to have high levels of need for mental health care in a LMIC country with little access to and support for seeking or providing such care. Lastly, we should not ignore the potential impact on political attitudes and violence as harmful responses to the traumatic stress [50, 51].

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Availability of data and material Data sharing is restricted under the IRB protocol for protection of human subjects. Authors are committed to complying with the American Sociological Association's ethical standards of data sharing consistent with that protocol.

Code availability NA.

Declarations

Conflict of interest The authors declare that they have no competing interests.

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