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Psychological Symptoms as Long-Term Consequences of War Experiences

Stefan Priebe[a] Jelena Jankovic Gavrilovic[a, k] Stephen Bremner[b] Dean Ajdukovic[c] Tanja Franciskovic[d] Gian Maria Galeazzi[e] Abdulah Kucukalic[f] Dusica Lecic-Tosevski[g] Nexhmedin Morina[h] Mihajlo Popovski[i] Matthias Schützwohl[j] Marija Bogic[a]

[a]Unit for Social and Community Psychiatry, and [b]Centre for Primary Care and Public Health, Barts and London School of Medicine and Dentistry, Queen Mary University of London, London, UK; [c]Faculty of Philosophy, University of Zagreb, Zagreb, [d]School of Medicine, University of Rijeka, Rijeka, Croatia; [e]Department of Psychiatry, University of Modena and Reggio Emilia, Modena, Italy; [f]School of Medicine, University of Sarajevo, Sarajevo, Bosnia and Herzegovina; [g]Belgrade University School of Medicine, Belgrade, Serbia; [h]Department of Clinical Psychology, University of Amsterdam, Amsterdam, The Netherlands; [i]Faculty of Philosophy, University of Skopje, Skopje, FYR Macedonia; [j]Department of Psychiatry and Psychotherapy, University of Technology, Dresden, Germany; [k]Dudley and Walsall Mental Health Partnership Trust, Dudley, UK

Key Words
War experiences · Long-term mental distress · Ex-Yugoslavia · Refugees

Abstract
Background/Aims: War experiences can affect mental health, but large-scale studies on the long-term impact are rare. We aimed to assess long-term mental health consequences of war in both people who stayed in the conflict area and refugees. ***Method:*** On average 8 years after the war in former Yugoslavia, participants were recruited by probabilistic sampling in 5 Balkan countries and by registers and networking in 3 Western European countries. General psychological symptoms were assessed on the Brief Symptom Inventory and posttraumatic stress symptoms on the Impact of Event Scale-Revised. ***Results:*** We assessed 3,313 interviewees in the Balkans and 854 refugees. Paranoid ideation and anxiety were the severest psychological symptoms in both samples. In multivariable regressions, older age, various specific war experiences and more traumatic experiences after the war were all associated with higher levels of both general psychological and posttraumatic stress symptoms in both samples. Additionally, a greater number of migration stressors and having only temporary legal status in the host country were associated with greater severity of symptoms in refugees. ***Conclusions:*** Psychological symptoms remain high in war-affected populations many years after the war, and this is particularly evident for refugees. Traumatic war experiences still predict higher symptom levels even when the findings have been adjusted for the influence of other factors.

Introduction

War experiences can lead to mental distress which may last for many years [1, 2].

Much research has investigated mental consequences of war in terms of mental disorders as distinct categories defined by diagnostic manuals, whilst other studies assessed symptoms on continuous scales. Increased rates

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Prof. Stefan Priebe
Unit for Social and Community Psychiatry
Queen Mary University of London
Newham Centre for Mental Health, London E13 8SP (UK)
E-Mail s.priebe@qmul.ac.uk

of psychiatric disorders such as depression, anxiety and posttraumatic stress disorder (PTSD) have been reported in various epidemiological studies of war-affected community samples [3, 4]. Similarly, increased numbers of multiple somatic complaints, psychotic symptoms as well as other symptoms of specific and non-specific mental distress are common in this population, either in combination with posttraumatic stress or on their own [5–7].

As compared to psychiatric diagnoses, psychological symptoms measured on continuous scales provide a more differentiated measure of mental distress and facilitate the exploration of associations with risk factors. Continuous scores were found to be more statistically robust for such analyses than categorical diagnoses [8]. Previous meta-analytic studies suggested a range of predictors of PTSD and its symptoms in adults, including gender, age, education, previous trauma, trauma severity, perceived life threat, additional social stress and lack of social support [9, 10].

The CONNECT study assessed mental health consequences of the war in former Yugoslavia in both people who stayed in the area of conflict and refugees in Western Europe. The study was conducted in 5 Balkan countries, i.e. Bosnia-Herzegovina, Croatia, Kosovo (which was a province of Serbia at the time), Republic of Macedonia and Serbia, and in Germany, Italy and the UK as the 3 European countries with the highest number of immigrants at the time of the war. Prevalence rates of mental disorders, on average 8 years after the war experience, and factors associated with different disorders in the two groups have been reported in previous papers [11, 12]. Findings suggest that mental disorders are highly prevalent, with 33.5 and 28.3% of respondents reporting anxiety and mood disorders in the Balkan sample, while these figures were 43.7 and 43.4%, respectively, amongst the refugees [11, 12].

In this paper we go beyond defined categories of mental disorders and aim to address two questions: (a) what is the level of psychological symptoms in general and of PTSD symptoms in particular in war-affected communities in the Balkans and in refugees several years after the war experience, and (b) what participant characteristics and experiences are associated with higher symptom levels in the two groups?

Methods

This was a multi-centre epidemiological survey in 8 countries conducted as part of the CONNECT project. The rationale and methods of the project have been described in detail elsewhere [11–13].

Sampling Techniques and Participants

Participants in the 5 Balkan countries were recruited using a multi-stage probabilistic sampling frame and random walk approach in war-affected regions [11]. Participants in Western Europe were identified through data registers, community organizations and snowballing [7, 12]. Inclusion criteria were: born within the territory of former Yugoslavia; age between 18 and 65 years; experience of at least 1 war-related potentially traumatic event (to ensure that all participants had in fact been affected by war); no severe learning difficulty and no organic mental impairment; experience of the last war-related event at the age of 16 or older.

Procedures and Measures

The interviews were carried out face to face between January 2005 and November 2006. All interviewers were trained in the assessments used in the survey.

Sociodemographic characteristics (gender, age, school education, marital status and employment status) were obtained on a brief structured questionnaire. The experience of potentially traumatic events before, during and after the war was assessed on a 24-item version of the Life Stressor Checklist-Revised [14].

Participants' general psychological symptoms in the past 7 days were obtained on the 53-item self-report Brief Symptom Inventory (BSI) [15]. We used the Global Severity Index (GSI) of the BSI, which is a measure of overall psychological distress level, as the main outcome. Symptoms of posttraumatic stress were self-rated on the Impact of Event Scale-Revised (IES-R) [16]. Mental disorders were assessed on the Mini International Neuropsychiatric Interview [17].

Refugee participants in Western Europe were also asked about possible migration stressors and the aspects of cultural adaptation resulting in a cumulative score of the number of stressors experienced (range 0–6). The self-perceived level of acceptance by the host country and the command of the language of host country were assessed using single Likert-type items (1 = not at all, 5 = entirely). We also assessed whether the interviewees had a temporary or permanent legal status in the country of residence.

Written informed consent was obtained from all participants prior to the interview. The study was approved by the relevant national ethics committees.

Data Analysis

The objective of the statistical modelling was to construct predictive models for the mean GSI and IES-R scores. The GSI was modelled using a multiple linear regression, with standard errors robust to non-constant variance and a square-root transformation of the outcome variable to yield residuals that more closely followed a normal distribution. The IES-R mean had a mixture distribution with a large number of respondents scoring 0. From the IES-R mean score, we defined a 5-category outcome, taking the integral values from 0 to 4 and constructed a predictive model using a partial proportional odds regression [18]. This is an extension of ordinal logistic regression in which the assumption of parallel lines (proportional odds) is relaxed, an assumption often unmet in such models. Odds ratios are reported, and additional parameters characterizing deviations from proportionality are described.

The candidate predictor variables were age, gender (female vs. male), educational attainment (secondary or higher vs. primary or none), count of prewar traumatic events (table 1), individual war-related traumatic events (see table 2 for a complete list), count

Table 1. Sociodemographic and trauma-related characteristics of the sample

	Total	Balkan sample	Refugees
Total participants	4,167	3,313	854
Female gender, n	2,221 (53.3)	1,783 (53.8)	438 (51.3)
Mean age ± SD, years	42.3 ± 11.8	42.5 ± 12.0	41.6 ± 10.8
Education level attained, n			
None or primary education	1,195 (28.7)	1,007 (30.4)	188 (22.0)
Secondary school	1,972 (47.3)	1,618 (48.8)	354 (41.5)
Vocational/tertiary	1,000 (24.0)	688 (20.8)	312 (36.5)
Marital status, n			
Married/cohabiting	2,981 (71.5)	2,328 (70.3)	652 (76.4)
Single	695 (16.7)	606 (18.3)	89 (10.4)
Divorced/separated	252 (6.1)	176 (5.3)	76 (8.9)
Widowed	239 (5.7)	202 (6.1)	37 (4.3)
Employment status, n			
Employed	1,539 (36.9)	1,188 (35.9)	351 (41.1)
Unemployed	1,983 (47.6)	1,545 (46.6)	438 (51.3)
Retired	470 (11.3)	439 (13.2)	31 (3.6)
Training/education	175 (4.2)	141 (4.3)	34 (4.0)
Mean number of traumatic events ± SD			
Prewar traumatic events	0.8 ± 1.1	0.7 ± 1.1	1.1 ± 1.3
War traumatic events	4.7 ± 3.2	4.2 ± 2.8	6.8 ± 3.6
Postwar traumatic events	0.7 ± 0.9	0.6 ± 0.8	1.1 ± 1.3
Mean time since index war trauma ± SD[a], years	8.6 ± 3.4	8.1 ± 3.3	10.5 ± 3.1
Mean number of migration stressors ± SD	–	–	2.6 ± 1.6
Feeling accepted in host country, n	–	–	505 (59.5)
Being able to communicate in host language, n	–	–	457 (53.8)
Having a temporary legal status, n	–	–	497 (58.2)

Figures in parentheses indicate percentages.
[a] Time since the most traumatic war event.

of postwar traumatic events, marital status (being single, widowed or divorced vs. being married or cohabiting) and employment status (being in employment or not). All of these variables were considered theoretically meaningful and have been found to be associated with long-term mental sequelae of war in other studies [2, 3, 6].

Because of their low frequency, the war-related traumatic events of sexual and non-sexual assaults by a known person or by a stranger, respectively, were combined. Also, the item 'natural disaster' was dropped because of the lack of connection with war. For each outcome in each sample, two multivariable models were then constructed, using a manual forward selection procedure. Variables were entered into the models in three separate blocks, removing any not significant at the 5% level prior to considering the next block. In the first model, prewar factors (gender, age, educational attainment and count of prewar traumatic events) comprised the first block, war factors (individual war experiences) the second block and postwar factors (count of postwar traumatic events, marital status and employment status) the third block. To assess whether the symptom differences are fully explained by existence of a mental disorder, the second model additionally included a variable on the presence of any mental disorder. Additionally, data on postmigration factors were considered as potential predictors in the refugee sample. The following variables were entered as a fourth block in the model for this sample: felt accepted in host environment [4 or 5 (yes) vs. 1, 2 or 3 (no)], could communicate in host language [4 or 5 (yes), vs. 1, 2 or 3 (no)], had only temporary legal status in the host country (yes vs. no) and count of migration stressors. We adjusted for country in all reported models. After fitting each set of predictor variables, we computed the variance inflation factor to check for multicollinearity. The variance inflation factors from all of the models were <4 (with >10 indicating a serious problem). All analyses were performed in Stata 10.1 [19].

Results

Sample Description

In the Balkan countries, 70.1% of eligible participants were interviewed. In the Western countries, 52.9% of those who responded to invitation letters were assessed, whilst response rates for snowball sampling could not be established [20]. The total sample size was 4,167, with

3,313 participants in the Balkan countries (≥637 in each country) and 854 participants in the Western European countries (≥255 in each country).

Sociodemographic, war and postwar characteristics of the two samples are reported in table 1.

Refugees in Western Europe reported more potentially traumatic experiences before, during and after the war, and had experienced a mean of 2.6 migration stressors (SD = 1.6). The average length of time between the most traumatic war event and the interview was 8.1 years (SD = 3.3) in the Balkan sample, and 10.5 years (SD = 3.1) in refugees.

War Experiences

Participants experienced different potentially traumatic events during the war. The frequency of these experiences is shown in table 2.

In both samples the most frequently experienced traumatic war events were shelling, lack of shelter and being under siege. Most experiences were more frequent among refugees in Western Europe. The largest differences were observed for the experience of non-sexual assaults, being kidnapped, imprisonment and torture for which refugees reported between 4- and 5-fold higher rates.

Psychological Symptoms and Posttraumatic Stress

Table 3 displays the mean scores and standard deviations on the 9 primary symptom subscales and 3 global indices of the BSI, as well as the overall mean score and 3 symptom subscales of the IES-R.

The mean GSI was 0.7 (SD = 0.7) for the Balkan sample and 1.1 (SD = 0.9) for the refugee sample. The mean number of symptoms with a positive (non-zero) response was 20.6 (SD = 14.4) and 25.4 (SD = 15.3), respectively. Subscales with the highest mean scores were paranoid ideation and anxiety, whilst psychoticism had the lowest mean score. The total IES-R mean score was 1.1 (SD = 1.1) for the Balkan sample and 1.5 (SD = 1.2) for the refugee sample. All 9 subscales and 3 global indices (GSI, positive symptom total and positive symptom distress index) on the BSI as well as the mean scores and the 3 symptom subscales on the IES-R were higher in the refugee sample than in the Balkan sample.

Participant Characteristics and Experiences Associated with Psychological Symptoms as Measured by the GSI

Table 4a presents the results from the multiple linear regression of the GSI for the Balkan sample, while table 4b presents results for the refugee sample.

In the multiple linear regression analyses (model 1), greater severity of general psychological symptoms in both samples was associated with female gender, older age and more traumatic experiences before the war.

Exposure to certain types of war-related traumatic experiences was also significantly associated with a higher GSI score. Being ill without access to medical care, lack of food or water and experience of torture were associated with a higher level of psychological symptoms in both samples. In the Balkan sample, significant associations were also found with serious injury, combat, sudden death of a dear person (not due to violence), life-threatening illness, witnessing murder or death, learning of the murder or death of a dear person, and being lost. Shelling or bombardment was associated with a lower symptom level. Additional war-related experiences associated with severer symptoms in the refugee sample were physical or sexual attack by a known individual, and lack of shelter.

In terms of postwar context, greater exposure to traumatic experiences after the war was associated with severer psychological symptoms in both samples, while being in employment was associated with a lower symptom level. Being single, widowed or divorced was associated with greater severity of symptoms in the Balkan sample. Amongst the refugees a higher symptom level was also associated with a greater number of migration stressors and having only temporary legal status. Feeling accepted in the host country and being able to communicate in the host language were associated with less severe symptoms. The overall model explained 22% of the variance in the GSI in the Balkan sample and 32.5% in the refugee sample.

The estimates from model 2, adjusting model 1 for any mental disorders, are shown in the right half of table 4a and b. In the Balkan sample, a number of prewar traumatic events as well as two of the war-related traumatic events, serious injury and torture, were no longer significantly associated with severity of psychological symptoms. In the refugee sample, being ill without access to medical care was the only war-related event that lost significance after adjusting for mental disorders. Being single, widowed or divorced ceased to be significantly associated with symptoms in the Balkan sample, while a number of postwar traumatic events, count of migration stressors, being in employment and having only temporary legal status lost significance in the refugee sample. The existence of a mental disorder was associated with a higher GSI. Model 2 explained 44.7% of the variance in the GSI in the Balkan sample and 52.6% in the refugees.

Table 2. Number (percentages in parentheses) of potentially traumatic war events experienced by interviewees in Balkan countries and by refugees in Western Europe

Potentially traumatic event	Total	Balkan sample	Refugees
Serious accident, fire or explosion	245 (5.9)	200 (6.0)	45 (5.3)
Natural disaster	48 (1.2)	36 (1.1)	12 (1.4)
Non-sexual assault by someone known	216 (5.2)	79 (2.4)	137 (16.0)
Non-sexual assault by stranger	556 (13.3)	241 (7.3)	315 (36.9)
Sexual assault by someone known	17 (0.4)	4 (0.1)	13 (1.5)
Sexual assault by stranger	39 (0.9)	8 (0.2)	31 (3.6)
Imprisonment	305 (7.3)	139 (4.2)	166 (19.4)
Life-threatening illness	136 (3.3)	105 (3.2)	31 (3.6)
Sudden death of a dear person	389 (9.3)	290 (8.8)	99 (11.6)
Lack of food or water	1,676 (40.2)	1,222 (36.9)	454 (53.2)
Ill without access to medical care	458 (11.0)	274 (8.3)	184 (21.5)
Lack of shelter	2,243 (53.8)	1,694 (51.1)	549 (64.3)
Expelled from home under threat	1,669 (40.1)	1,267 (38.2)	402 (47.1)
Combat	736 (17.7)	544 (16.4)	192 (22.5)
Shelling or bombardment	3,523 (84.5)	2,798 (84.5)	725 (84.9)
Mine explosion	314 (7.5)	233 (7.0)	81 (9.5)
Siege	1,835 (44.0)	1,329 (40.1)	506 (59.3)
Serious injury	317 (7.6)	226 (6.8)	91 (10.7)
Witnessed an assault, murder or death	1,213 (29.1)	791 (23.9)	422 (49.4)
Learned about murder or death of a dear person	1,689 (40.5)	1,187 (35.8)	502 (58.8)
Disappearance or kidnapping of a dear person	883 (21.2)	579 (17.5)	304 (35.6)
Torture	394 (9.5)	192 (5.8)	202 (23.7)
Being lost	447 (10.7)	287 (8.7)	160 (18.7)
Kidnapped	247 (5.9)	100 (3.0)	147 (17.2)

Table 3. General psychological symptoms and symptoms of posttraumatic stress in war-affected communities in the Balkans and refugees in Western European countries (means ± SD)

	Total	Balkan sample	Refugees
BSI			
Somatization	0.87 ± 0.9	0.79 ± 0.9	1.17 ± 1.1
Obsessive-compulsive disorder	0.87 ± 0.9	0.78 ± 0.8	1.21 ± 1.1
Interpersonal sensitivity	0.74 ± 0.9	0.67 ± 0.8	1.00 ± 1.1
Depression	0.85 ± 0.9	0.77 ± 0.9	1.17 ± 1.1
Anxiety	0.93 ± 1.0	0.86 ± 0.9	1.24 ± 1.2
Hostility	0.67 ± 0.8	0.64 ± 0.8	0.81 ± 0.9
Phobic anxiety	0.61 ± 0.8	0.52 ± 0.7	0.95 ± 1.1
Paranoid ideation	0.95 ± 0.9	0.89 ± 0.9	1.22 ± 1.0
Psychoticism	0.49 ± 0.7	0.44 ± 0.6	0.71 ± 0.9
GSI	0.78 ± 0.7	0.71 ± 0.7	1.05 ± 0.9
Positive symptoms total	21.6 ± 14.7	20.6 ± 14.4	25.4 ± 15.3
Positive symptom distress index	0.03 ± 0.01	0.03 ± 0.01	0.04 ± 0.02
IES-R			
Intrusion	1.23 ± 1.2	1.14 ± 1.1	1.59 ± 1.3
Avoidance	1.17 ± 1.1	1.10 ± 1.1	1.43 ± 1.2
Hyperarousal	1.14 ± 1.2	1.06 ± 1.2	1.45 ± 1.4
IES-R mean	1.18 ± 1.1	1.10 ± 1.1	1.49 ± 1.2

SD = Standard deviation.

Table 4. Multiple linear regression models for GSI, adjusting for sociodemographic, prewar, wartime and postwar traumatic factors, with and without adjustment for any mental disorders

a Balkan sample

Independent variables	Multiple regression model 1			Multiple regression model 2		
	coeff.	95% CI for coeff.	p value	coeff.	95% CI for coeff.	p value
Female vs. male	0.114	0.087 to 0.142	<0.001	0.080	0.056 to 0.104	<0.001
Age	0.003	0.002 to 0.004	<0.001	0.002	0.001 to 0.003	<0.001
Count of prewar traumatic events	0.016	0.001 to 0.032	0.033	0.006	–0.007 to 0.019	0.350
Traumatic war events						
Life-threatening illness	0.112	0.030 to 0.193	0.007	0.068	0.000 to 0.136	0.051
Sudden death of a dear person	0.068	0.022 to 0.114	0.004	0.039	0.001 to 0.077	0.044
Lack of food or water	0.067	0.029 to 0.105	0.001	0.043	0.010 to 0.077	0.010
Ill without access to medical care	0.093	0.044 to 0.143	<0.001	0.065	0.022 to 0.108	0.003
Combat	0.070	0.025 to 0.116	0.003	0.055	0.017 to 0.093	0.004
Shelling or bombardment	–0.158	–0.197 to –0.119	<0.001	–0.148	–0.182 to –0.114	<0.001
Serious injury	0.097	0.036 to 0.159	0.002	0.048	–0.002 to 0.097	0.058
Witnessed murder or death	0.077	0.040 to 0.113	<0.001	0.033	0.003 to 0.064	0.033
Learned about murder/death of dear person	0.059	0.028 to 0.090	<0.001	0.035	0.009 to 0.060	0.008
Torture	0.089	0.030 to 0.148	0.003	0.036	–0.014 to 0.087	0.157
Being lost	0.127	0.077 to 0.178	<0.001	0.114	0.073 to 0.155	<0.001
Count of postwar traumatic events	0.053	0.036 to 0.070	<0.001	0.026	0.011 to 0.040	0.001
Employed	–0.100	–0.127 to –0.073	<0.001	–0.044	–0.067 to –0.021	<0.001
Single, widowed, divorced vs. married/cohabiting	0.052	0.023 to 0.081	<0.001	0.023	–0.001 to 0.047	0.062
Any mental disorder	n.a.	n.a.	n.a.	0.424	0.400 to 0.448	<0.001
Intercept	0.710	0.632 to 0.787	<0.001	0.579	0.513 to 0.645	<0.001

Coeff. = Regression coefficient; CI = confidence interval. Dependent variable: BSI global, transformed by taking the square root to improve model fit. Model 1 fitted to 3,274 observations. Multiple R^2 value = 22%. Model 2 fitted to 3,274 observations. Multiple R^2 value = 44.7%. Both models adjusted for country. Standard errors are robust to non-constant variance. n.a. = Not included in model.

b Refugee sample, additionally with migration factors

Independent variables	Multiple regression model 1			Multiple regression model 2		
	coeff.	95% CI for coeff.	p value	coeff.	95% CI for coeff.	p value
Female vs. male	0.132	0.076 to 0.189	<0.001	0.090	0.040 to 0.140	<0.001
Age	0.003	0.000 to 0.006	0.038	0.002	0.000 to 0.005	0.070
Secondary or higher education vs. primary or none	–0.111	–0.178 to –0.045	0.001	–0.043	–0.105 to 0.019	0.172
Count of prewar traumatic events	0.039	0.018 to 0.060	<0.001	0.036	0.018 to 0.055	<0.001
Traumatic war events						
Assault by known individual	0.151	0.075 to 0.227	<0.001	0.125	0.060 to 0.190	<0.001
Lack of food or water	0.101	0.041 to 0.160	0.001	0.059	0.008 to 0.110	0.023
Ill without access to medical care	0.098	0.027 to 0.169	0.007	0.043	–0.019 to 0.105	0.175
Lack of shelter	0.073	0.014 to 0.131	0.015	0.071	0.019 to 0.123	0.007
Torture	0.114	0.038 to 0.190	0.003	0.067	0.000 to 0.133	0.049
Count of postwar traumatic events	0.037	0.014 to 0.060	0.002	0.014	–0.007 to 0.035	0.199
Employed	–0.095	–0.158 to –0.032	0.003	–0.043	–0.097 to 0.011	0.119
Accepted in new environment	–0.120	–0.178 to –0.061	<0.001	–0.057	–0.107 to –0.007	0.025
Can communicate in host language	–0.069	–0.133 to –0.006	0.033	–0.065	–0.119 to –0.010	0.020
Count of migration stressors	0.036	0.017 to 0.055	<0.001	0.012	–0.005 to 0.028	0.166
Temporary legal status	0.084	0.021 to 0.146	0.009	0.022	–0.033 to 0.077	0.432
Any mental disorder	n.a.	n.a.	n.a.	0.459	0.403 to 0.515	<0.001
Intercept	0.581	0.408 to 0.754	<0.001	0.406	0.249 to 0.563	<0.001

Coeff. = Regression coefficient; CI = confidence interval. Dependent variable: BSI global, transformed by taking the square root to improve model fit. Model 1 fitted to 825 observations. Multiple R^2 value = 32.5%. Model 2 fitted to 825 observations. Multiple R^2 = 52.6%. Both models adjusted for country. Standard errors are robust to non-constant variance. n.a. = Not included in model.

Table 5. Multiple partial proportional odds regression models for IES-R, adjusting for sociodemographic, prewar, wartime and postwar traumatic factors, with and without adjustment for any mental disorders

a Balkan sample

Independent variables	Multiple regression model 1			Multiple regression model 2		
	OR	95% CI for OR	p value	OR	95% CI for OR	p value
Female vs. male	1.66	1.43 to 1.93	<0.001	1.49	1.27 to 1.74	<0.001
Age	1.02	1.02 to 1.03	<0.001	1.02	1.01 to 1.03	<0.001
Count of prewar traumatic events	1.09	1.02 to 1.17	0.012	1.05	0.98 to 1.12	0.193
Traumatic war events						
Life-threatening illness	2.28	1.57 to 3.31	<0.001	1.90	1.29 to 2.81	0.001
Sudden death of a dear person	1.52	1.01 to 2.30	0.017	1.35	0.87 to 2.10	0.180
Lack of food or water	1.59	1.31 to 1.93	0.001	1.47	1.20 to 1.80	<0.001
Combat	1.58	1.08 to 2.31	<0.001	1.53	1.04 to 2.26	0.030
Siege	1.41	1.14 to 1.73	<0.001	1.38	1.11 to 1.70	0.003
Serious injury	1.73	1.30 to 2.30	<0.001	1.48	1.10 to 1.98	0.009
Witnessed murder or death	2.54	1.82 to 3.55	<0.001	2.41	1.72 to 3.36	<0.001
Learned about murder/death of a dear person	1.44	1.23 to 1.68	<0.001	1.34	1.14 to 1.57	<0.001
Torture	2.22	1.64 to 2.99	<0.001	1.84	1.36 to 2.48	<0.001
Being lost	1.58	1.23 to 2.03	<0.001	1.66	1.29 to 2.14	<0.001
Mine explosion	1.32	1.01 to 1.73	0.040	1.27	0.97 to 1.67	0.081
Count of postwar traumatic events	1.14	1.05 to 1.25	0.002	1.05	0.96 to 1.15	0.240
Single, widowed, divorced vs. married/cohabiting	1.56	1.25 to 1.95	<0.001	1.44	1.15 to 1.80	0.002
Any mental disorders	n.a.	n.a.	n.a.	3.01	2.38 to 3.80	<0.001

OR = Odds ratio; CI = confidence interval. Dependent variable: IES-R mean cut into 5 categories: lowest (reference category, 0), {0}, (0, 1], (1, 2], (2, 3], highest (3, 4]. Independent variables, i.e. proportional odds assumption relaxed on (ORs are deviations from proportionality in 3 of the 5 IES-R categories): (1) sudden death of a dear person: model 1 (1.00, 0.99, 0.41), model 2 (1.01, 0.97, 0.39); (2) combat: model 1 (0.84, 0.94, 1.69), model 2 (0.88, 0.97, 1.66); (3) witnessed murder or death: model 1 (0.57, 0.61, 0.76), model 2 (0.52, 0.54, 0.68); (4) single, widowed, divorced vs. married/cohabiting: model 1 (0.79, 0.72, 0.56), model 2 (0.78, 0.70, 0.53); (5) any mental disorders: model 2 (2.23, 3.39, 6.02). Models 1 and 2 fitted to 3,154 observations. Both models adjusted for country. n.a. = Not included in model.

b Refugee sample additionally with migration factors

Independent variables	Multiple regression model 1			Multiple regression model 2		
	OR	95% CI for OR	p value	OR2	95% CI for OR	p value
Age, years	1.02	1.01 to 1.04	<0.001	1.02	1.00 to 1.04	0.136
Traumatic war events						
Lack of food or water	1.72	1.31 to 2.26	<0.001	1.53	1.16 to 2.03	0.003
Ill without access to medical care	1.54	1.12 to 2.12	0.008	1.22	0.88 to 1.69	0.225
Lack of shelter	1.34	1.01 to 1.76	0.041	1.39	1.05 to 1.84	0.023
Torture	1.61	1.16 to 2.22	0.004	1.38	0.99 to 1.92	0.055
Count of postwar traumatic events	1.14	1.03 to 1.27	0.011	1.05	0.94 to 1.16	0.408
Employed	0.60	0.44 to 0.81	0.001	0.78	0.58 to 1.06	0.110
Can communicate in host language	0.69	0.52 to 0.92	0.011	0.71	0.53 to 0.95	0.020
Temporary legal status	1.83	1.36 to 2.47	<0.001	1.51	0.96 to 2.36	0.073
Count of migration stressors	1.21	1.11 to 1.33	<0.001	1.12	1.02 to 1.23	0.015
Any mental disorders	n.a.	n.a.	n.a.	3.04	1.89 to 4.87	<0.001

OR = Odds ratio; CI = confidence interval. Dependent variable: IES-R cut into 5 categories: lowest (reference category, 0), {0}, (0, 1], (1, 2], (2, 3], highest (3, 4]. OR2 = Proportional odds assumption met in model 1 but relaxed on model 2 (ORs are deviations from proportionality in 3 of the 5 IES-R categories): (1) age (1.02, 1.01, 0.99); (2) temporary legal status (1.38, 0.86, 0.83); (3) any mental disorders (1.96, 2.45, 3.90); models 1 and 2 fitted to 828 observations. Both models adjusted for country. n.a. = Not included in model.

Participant Characteristics and Experiences Associated with PTSD Symptoms as Measured by the IES-R

The associations between PTSD symptoms and sociodemographic, prewar, wartime and postwar factors are shown in table 5a and b.

In the Balkan sample, the odds of experiencing a higher level of PTSD symptoms were significantly greater in females, older persons and those who had experienced more traumatic events before the war. Several war-related traumatic events were also associated with a higher number of PTSD symptoms: lack of food or water, life-threatening illness, serious injury, siege, sudden death of a dear person, learning of the death of a dear one, witnessing murder or death, being tortured, being lost, mine explosion, combat and sudden death of a dear person (not due to violence). Aspects of postwar context, namely a greater number of postwar traumatic events and being single, widowed or divorced, were also associated with severer PTSD symptoms.

In the refugee sample, variables significantly associated with IES-R category were older age and 4 war-related traumatic events: lack of food or water, being ill without access to medical care, lack of shelter and torture. A greater number of postwar traumatic events, count of migration stressors and having only a temporary legal status were also found to have significant associations with more PTSD symptoms, whilst being employed and the ability to communicate in the language of the host country were associated with less severe symptoms. After adjusting for the presence of any mental disorder, count of postwar traumatic events lost significance in both samples. In terms of war-related events, sudden death of a dear person and experience of a mine explosion lost significance in the Balkan sample, while being ill without access to medical care and torture lost importance in the refugee sample. Being employed and having only temporary legal status also lost significance in refugees.

Discussion

Main Findings

This study assessed psychological symptoms in general and PTSD symptoms in particular in war-affected communities in the Balkans and in refugees on average 8 years after the war. The results suggest that psychological symptom levels in both samples were relatively high in comparison to the non-war-affected populations in Western countries [15]. The raised scores were found on both BSI global indices and subscales, with particularly high levels of paranoid ideation and anxiety. PTSD symptoms were also substantially higher than in non-clinical community samples. Severer general psychological and PTSD symptoms in the Balkan and the refugee samples were associated with female gender, older age and more stressful experiences before the war, as well as the exposure to the several types of traumatic war experiences. The aspects of postwar context, including migration factors and temporary legal status in the refugee sample, were also associated with greater severity of psychological symptoms.

Strengths and Limitations

To our knowledge, this is the largest community-based study assessing mental distress more than 5 years after war experiences and using a consistent assessment methodology across several countries. It included civilians and people with combat experience, as well as people who stayed in the area of conflict and refugees. A multi-stage probabilistic sampling method in Balkan countries ensured that the findings are representative of large populations in the war-affected areas. Further strengths are that all interviewers were trained researchers and familiar with the given local context.

The study has also several limitations. The sampling procedure applied in Western European countries was less rigorous, possibly leading to non-representative samples. However, the absence of areas with a high density of refugees for a random walk approach and the data protection legislation in these countries do not allow for more rigorous random sampling. Whilst this may have influenced the identified symptom levels, it should be less problematic for establishing associations with other participant characteristics. Substantial, although inconsistent, evidence suggests a recall bias for traumatic experiences: that is people with current symptoms tend to report more traumatic events [21]. This bias may have exaggerated associations between mental distress and reported traumatic experiences in the current study. In the Balkan sample and the refugee sample, only 22 and 32.5% respectively, of the variation in psychological symptom levels were explained by the included independent variables. A further 23% (Balkans) and 20% (refugees) was explained by the existence of a mental disorder.

Comparison against the Literature

The results are consistent with other studies suggesting that war experience may be associated with long-term mental distress [5–7]. Previous studies in war-affected

community populations in former Yugoslavia using the same outcome measures reveal high levels of mental distress [6, 7]. However, symptom levels of posttraumatic stress are considerably lower than those previously reported for a convenience sample of 190 internally displaced war survivors in Bosnia and compatriot refugees living in the UK.

The elevation in the anxiety scores was also observed in other studies in similar populations [6, 22]. This may not be surprising since PTSD as an anxiety disorder is one of the most common mental disorders in the aftermath of trauma [3]. Raised levels of paranoid ideation were also reported in other refugee samples [23].

The results of our study confirm that most types of stressful war experiences are associated with more psychological symptoms. Serious injury, being ill without access to medical care, lack of food or water, life-threatening illness, torture, combat, lack of shelter, physical or sexual assault by someone known and being lost – all traumatic experiences with a significant physical component and threat to one's life – have a strong impact on mental distress. This is consistent with other studies examining the nature of war experiences and the severity of the psychological symptoms [7, 24-27]. Likewise, a loss of loved ones has also been recognized as a risk factor for increased symptom levels in war-affected populations [28].

Whilst some specific war experiences have been identified as risk factors, it is important to note that this increased risk may not reflect an impact of that particular experience alone since most participants experienced a complex combination of repeated war experiences over a longer period of time. Cumulative effects of trauma on mental health have been well documented in previous research [2, 29]. The statistical method of identifying associations of specific experiences with symptom levels in multivariable regression models does not fully reflect the often complex and prolonged nature of war experiences. The seemingly counterintuitive finding that the experience of bombardment and shelling was associated with lower symptom levels may also be explained by this complexity. The experience of at least one war-related potentially traumatic war event was an inclusion criterion, and many participants were included because they had experienced bombardment as the only potentially traumatic event, whilst on average participants had experienced 4.7 such events.

The severity of psychological symptoms was also influenced by several individual factors and postwar socioeconomic adversities. As suggested by previous studies, older age, female gender, not being married or cohabiting and being without employment were all associated with increased symptom severity [2, 6, 27].

Additional stressors encountered in a new country, such as separation from family, unemployment, difficulties with asylum procedures or even detention and adjustment problems, in particular difficulties in communicating in the language of the host country, make refugees more vulnerable to mental distress, even many years after resettlement [30, 31]. Our findings underline that such migration stressors have a negative impact on psychological symptoms beyond and independent of the influence of stressful experiences during the war. Many tested variables had a similar predictive value in those who had stayed in the Balkans and refugees. Yet some war experiences and social factors after the war showed different associations with symptom levels in the two samples. This may indicate different psychological processes of coping with traumatic war experiences and a different effect of social support and social stress after migration.

The existence of a mental disorder explained a substantial part of the variance in symptom levels. However, it did not fully explain the link between sociodemographic and trauma-related characteristics and psychological symptoms, with most factors remaining significant after adjustment for mental disorder. This finding adds to other studies on consequences of war in civilian populations which also indicated that the spectrum of posttraumatic reactions is much wider than the mental disorders as defined in diagnostic categories [6].

Conclusions

The substantially elevated symptom levels in war-affected populations several years after the war need to be considered in health care policies for both people living in war-affected regions and for refugees. The most prominent general psychological symptoms were paranoid ideation and anxiety. Given the traumatic nature of war experiences and the consistent finding in the literature that PTSD and depression are the most frequent mental disorders following war, anxiety and particularly posttraumatic stress symptoms, as well as depression, may be expected to be high. Raised levels of paranoia may be a result of the loss of trust in human relationships in war, particularly in the civil war context that characterized much of the conflict in former Yugoslavia [32].

Social factors, including those related to migration, were associated with symptom levels. The social situation may have influenced symptoms, or symptom levels may have impacted on the social situation, or both.

Findings on psychological symptoms in refugees may not be generalized to people who stayed in the area of conflict and vice versa. Studies predicting or identifying the mental health needs of war-affected populations therefore need to distinguish between these groups and assess other influential factors as identified in this and other studies. Qualitative and in-depth studies may be required to understand the long-term impact of specific war experiences on symptom levels, and such studies should not solely focus on symptoms of anxiety and depression.

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