Consequences of Untreated Posttraumatic Stress Disorder Following War in Former Yugoslavia: Morbidity, Subjective Quality of Life, and Care Costs

Stefan Priebe[1], Aleksandra Matanov[1], Jelena Janković Gavrilović[1], Paul McCrone[2], Damir Ljubotina[3], Goran Knežević[4], Abdulah Kučukalić[5], Tanja Frančišković[6], Matthias Schützwohl[7]

[1]The Unit for Social & Community Psychiatry, Queen Mary University of London, London, United Kingdom

[2]Centre for Economic of Mental Health, Health Services Research Department, Institute of Psychiatry, London, United Kingdom

[3]Faculty of Humanities and Social Sciences, University of Zagreb, Zagreb, Croatia

[4]International Aid Network, Belgrade, Serbia

[5]Department of Psychiatry, University Medical Centre, Sarajevo, Bosnia and Herzegovina

[6]Centre for Psychotrauma, Psychiatric Clinic, University of Rijeka, Rijeka, Croatia

[7]Department of Psychiatry and Psychotherapy, Dresden Technical University, Dresden, Germany

Aim To assess long-term mental health outcomes in people who suffer from war-related posttraumatic stress disorder (PTSD) but do not receive appropriate treatment.

Methods We interviewed 264 subjects from former Yugoslavia, who lived in Croatia, Serbia, Germany, and the United Kingdom. All of them had suffered from PTSD at some point following the war, but never received psychiatric or psychological treatment. The interviews took place on average 10.7 ± 3.0 years after the war-related trauma. Outcomes were current PTSD on the Clinician Administered PTSD Scale for Diagnostic and Statistical Manual of Mental Disorders-IV, subjective quality of life (SQOL) on the Manchester Short Assessment of Quality of Life, and care costs. Socio-demographic characteristics, the level of traumatic war-events, and aspects of the post-war situation were tested for association with outcomes.

Results Current PTSD was diagnosed in 83.7% of participants, the mean SQOL score was 4.0 ± 0.9, and mean care costs in the last 3 months exceeded €1100 in each center. Older age, more traumatic war-events, lower education, and living in post-conflict countries were associated with higher rates of current PTSD. Older age, combat experience, more traumatic war-events, being unemployed, living alone, being housed in collective accommodation, and current PTSD were independently associated with lower SQOL. Older age and living in Germany were linked to higher costs of formal care.

Conclusion People with untreated war-related PTSD have a high risk of still having PTSD a decade after the traumatic event. Their SQOL is relatively low, and they generate considerable care costs. Factors that have been reported as influencing the occurrence of PTSD also appear relevant for recovery from PTSD. Current PTSD may impair SQOL independently of social factors.

Posttraumatic stress disorder (PTSD) is one of the most frequently reported mental health consequences of exposure to war experience, although studies on both refugees and war veterans yielded inconsistent findings on the exact prevalence rates (1-5). Some evidence suggests that a higher degree of exposure to both war-related traumatic events and the pressures of the post-migration environment can lead to higher rates of PTSD over many years (6-9). Evidence based treatments for PTSD exist and are – at least to some extent – available in most post conflict contexts in the Western world. In such contexts, it can be assumed that a significant number of people with war-related PTSD receive treatment from psychiatrists or psychologists or are prescribed anti-depressants by their general practitioner.

For various reasons, however, many people with serious and distressing levels of PTSD following war do not receive psychiatric or psychological treatment (10), and not much is known about their long term outcomes. It is not clear whether most of them recover from PTSD without treatment or the symptoms are likely to take a persistent course. Another question is what their subjective quality of life (SQOL) is, and what costs of formal and informal care they generate. Finally, it is not clear what factors are associated with more or less favorable outcomes in such populations, and whether current PTSD is associated with poorer SQOL.

The present study addressed these questions and assessed long term outcomes in people who suffered from PTSD at some point of time following the war in the former Yugoslavia in the 1990s, but never received psychiatric or psychological treatment in either primary or secondary care. Current PTSD, SQOL, and care costs were assessed as outcomes in refugees in Western Europe and in people who stayed in the area of conflict. Socio-demographic characteristics, the level of exposure to war stressors, and aspects of the post-war situation were tested for their association with more or less favorable outcomes.

METHODS

The exploratory study was funded by the Research Directorate of the European Commission and conducted in 4 countries, ie, Croatia and Serbia as the largest countries in former Yugoslavia, and Germany and the United Kingdom (UK) as the 2 countries in Western Europe with the highest numbers of immigrants during the 1990s (11).

Participants and recruitment

We recruited people fulfilling the following inclusion criteria:

a) being of former Yugoslav origin and aged between 18 and 70;

b) direct exposure to potentially traumatic events during the war in former Yugoslavia in the 1990s;

c) a diagnosis of PTSD at any point of time since the war;

d) not having received psychiatric or psychological treatment at any time since the war; treatment was defined as any contact with psychiatric services or a psychologist, counselor or psychotherapist, or the prescription of antidepressants by a general practitioner;

e) capacity to provide informed consent.

The recruitment strategy was designed to recruit participants from different groups that had experienced war, ie, refugees, war veterans, and civilians. In all centers, recruitment was conducted through personal networking and contacting community organizations, which made establishing exact response rate impossible. Considering the specific context of each country additional recruitment strategies were adopted for all groups of potentially traumatized individuals. This included visiting collective centers in Germany and Serbia, and approaching war veteran organizations in Serbia and Croatia. In each country, recruitment focused on, but was not restricted to, groups living in the capital cities, ie, Belgrade, Berlin, London, and Zagreb.

Instruments

We assessed both PTSD at any time since the war and current PTSD. The former was an inclusion criterion for the study, the latter an outcome criterion. For both we used the Clinician Administered PTSD Scale for Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) – CAPS (12). CAPS is a structured clinical interview capturing the frequency and intensity of the 17 symptoms of intrusion, avoidance, and hyper-arousal, as well as their impact on social and occupational functioning. It measures the overall severity of PTSD symptoms and thus makes it possible to establish both a current (1 month) and/or lifetime (in this case since the war-related traumatic event) DSM-IV di-

agnosis of PTSD. The PTSD diagnosis was established using Blake's original scoring rule which considers a symptom as present if the frequency of the corresponding CAPS item is rated as 1 or higher and intensity is rated as 2 or higher (12).

SQOL was assessed on the Manchester Short Assessment of Quality of Life – MANSA (13) and defined as the mean score of 12 satisfaction ratings with different life domains and life in general. Each item is rated on a Likert type scale ranging from 1 (the lowest satisfaction) to 7 (the highest satisfaction) with 4 as a neutral middle point. The method is similar to the Quality of Life Interview (14) and has been previously applied in studies on populations with post-traumatic stress following war in former Yugoslavia (15).

Care costs were calculated on the basis of service use data for the 3 months prior to the interview, which were collected with the Client Service Receipt Inventory – CSRI (16). Services included primary and secondary health care, social care, medication, and informal care from family/friends. To ensure consistent costing methods, these data were combined with unit cost information (17,18) from one country (UK). The unit cost of homecare worker was used as a proxy value for unpaid informal care. Adjustments were made to reflect health care cost differences across countries (19). The costs in pounds were multiplied by 1.05 to represent prices in Germany 0.23, for prices in Serbia, and 0.39 for prices in Croatia. To report costs in Euros they were converted to 2004/5 Euros using an exchange rate of Ł1 = €1.4688.

Socio-demographic characteristics, war related experiences, and aspects of the post-war social situation were assessed to be tested for their association with outcomes. Socio-demographic characteristics were participants' age, sex, level of education (treated as a categorical variable with 3 levels: no education or primary education of up to 8 years; secondary education with 9 to 12 total years in education; and higher education with more than 12 years in education).

With respect to war experiences, we recorded the status in the war, ie, combat activity vs refugees and civilians. The exposure to traumatic events was assessed on the List of Stressors Scale, which records exposure to 20 traumatic events (eg, shelling, injury, death of a close person, physical attack, sexual assault). The list is based on and similar to other methods used to assess trauma exposure (20,21). Cumulative scores for the total number of traumatic events and for war-related traumatic events were obtained.

As variables reflecting the post-war social situation, we recorded current place of living (resettled in Western Europe/stayed in post-conflict countries), living status (alone/with someone), employment (yes/no), living in collective accommodation (yes/no), and the receipt of welfare benefits (yes/no). A variable recording the current place of living was introduced in order to explore how possible interaction effects between the setting and various independent variables influence the outcomes.

Procedure

The nature and aims of the study were explained to all potential participants. Once participants agreed to take part in the study, an interview was arranged and conducted.

All interviewers were qualified psychologists, physicians, or anthropologists who received additional training in administering the study instruments. Interviews were conducted in Bosnian, Serbian, Croatian, and Albanian by native speakers and in Germany by a bi-lingual German researcher. Interviewing took place in various settings, such as the homes of participants, community organizations, or on the premises of the centers involved in the study. Written informed consent was obtained from all participants.

Data were collected between 2002 and 2005, which was on average 10.7 years after the exposure to war events for the interviewees in this study. Ethics approval was obtained from relevant committees in all study centers.

Statistical analysis

Descriptive statistics were used to describe the distribution of all assessed variables including the outcomes, ie, the existence of a current PTSD diagnosis on CAPS, SQOL on MANSA, and care costs on CSRI.

To analyze the factors associated with current PTSD, a logistic regression model was employed. Factors associated with MANSA and care costs were analyzed using linear regression models. Regression analyses were conducted in 2 steps. In the first step, univariate analyses were performed to identify the significant univariate predictors of the given outcome variable. Variables that were significant at $P < 0.05$ were entered into a multivariate analysis in the second step. The factors with non-significant associations were removed one by one until all the variables in the final model reached significance. The analysis of SQOL was performed with and without a diagnosis of current

PTSD on CAPS as an independent variable. Receiving operating curve (ROC) was used to assess the predictive performance of an estimated logistic regression model. Adjusted R^2 assessed the goodness-of-fit of a linear regression model. Two linear regression models were constructed to identify factors associated with costs. The models differed by the inclusion/exclusion of informal care costs. The models used bootstrap methods due to the expected skewness in the distribution of the regression residuals. In all costs analyses, we considered the country of residence as a factor (rather than comparing those resettled in Western Europe vs those who stayed in the post-conflict countries) because of the substantial differences between health care systems in each country, which may have influenced service use and care costs.

All of the data from the study were managed and analyzed using SPSS, version 13.0 (SPSS Inc., Chicago, IL, USA) and Stata version 8.1 (Stata Corp, College Station, TX, USA).

RESULTS

Participants' characteristics

A total of 799 participants consented to take part in the study. Out of them, 111 participants had not experienced any potentially traumatic event during the war in former Yugoslavia and 210 participants did not fulfill the criteria on CAPS for PTSD since the war; further 203 participants were excluded as they had received some form of treatment (183 had some psychological or psychiatric treatment, 6 had contact with other mental health services, and 14 received antidepressants from their general practitioner). In addition, 3 participants terminated the interview early, and 8 participants were excluded due to large number of missing data. Therefore, data on 264 participants were analyzed (Table 1). Of these, 173 lived in Croatia and Serbia, and 91 in Germany and the UK.

Participants were between 18 and 69 years old, with 55.3% being unemployed and 42.8% in receipt of welfare benefits. On average, they had experienced 5.8 ± 3.2 war-related traumatic events, and 10.7 ± 3.0 years had elapsed since the initial exposure to traumatic events in the war.

Current PTSD

Overall, 221 (83.7%) participants met the diagnostic criteria on CAPS for current PTSD at the time of the interview. The results of univariate and multivariate logis-

tic regression analyses of factors associated with PTSD at the time of the interview are presented in Table 2. The final model identified 4 factors significantly associated with current PTSD: older age, primary and no education as compared with higher education, living in post-conflict countries, and more war-related traumatic events. The value of estimated area under ROC curve was 0.81 ($P < 0.001$, 95% CI 0.74 to 0.88), indicating a very good performance of the established model in terms of sensitivity and specificity.

To assess if the effect of current place of living (post-conflict countries vs resettled in the Western Europe) depends on other factors, we tested the interaction terms between this variable and the rest of the significant predictors (age, education, number of war-related traumatic events) by introducing them to the model one by one. None of the added interaction terms reached significance and were consequently not included in the final model.

Subjective Quality of Life

Mean SQOL score on MANSA was 4.0 ± 0.9. The life domain score was 3.5 ± 1.4 for life in general; 2.9 ± 1.5 for employment; 3.0 ± 1.4 for finances; 4.3 ± 1.5 for social relations; 3.6 ± 1.4 for leisure activities; 3.9 ± 1.6 for accommodation; 4.4 ± 1.4 for personal safety; 5.0 ± 1.4 for living situation; 4.3 ± 1.7 for sexual life; 5.1 ± 1.5 for family relationships; 3.8 ± 1.4 for physical health; and 3.8 ± 1.5 for mental health.

The results of the univariate and multivariate regression analyses of SQOL without considering current PTSD as a potential factor are presented in Table 3. The final model identified 6 factors significantly associated with SQOL. Older age, combat experience, more war-related traumatic events, being unemployed, living alone, and being accommodated in collective centers were all associated with lower SQOL. The adjusted R^2 of the final model was 0.27.

When the analysis was repeated with current PTSD as an additional factor, PTSD was included as a significant predictor in the final model (coefficient -0.38, $P = 0.008$, 95% CI, -0.66 to -0.10). All the factors with previously significant associations with SQOL remained significant after the addition of current PTSD with only small changes to the strength of their associations. Participants who still had PTSD at the time of the interview reported a lower quality of life, and this association of PTSD and lower SQOL was independent of the influence of age, education, war-related variables, and aspects of the objective social situation after the war. The adjusted R^2 of the final model with current PTSD was 0.28.

Care costs

The costs for formal and informal care in the 3 months prior to the interview are shown for samples in each country in Table 4. The total care costs for the 3-month period were on average €1150 or more in each country. Most of these costs were accounted for by informal care.

The model to identify predictors of costs excluding informal care ($R^2 = 0.097$) revealed that costs in Germany were significantly higher than in Croatia (adjusted mean difference, €985; 95% CI, 352 to 1834) and London (adjusted

mean difference, €830; 95% CI, 246 to 1615). The difference between Germany and Serbia was large but not quite significant (adjusted mean difference, €794; 95% CI, -20 to 1838). Costs in the UK were also significantly higher than in Croatia (adjusted mean difference, €481; 95% CI, 170 to 849). Age was also a significant predictor of costs, with every year related to a mean increase of €20 (95% CI, 4 to 41). Participants with no or primary education had higher costs than those with higher education (adjusted mean difference, €312; 95% CI, 25 to 686). No other variables were significant. Current PTSD was not significantly associated with costs (95% CI, -970 to 350).

TABLE 1. Summary statistics of characteristics of participants and outcomes*

Characteristics	Total sample (n = 264)	Countries			
		Croatia (n = 88)	Serbia (n = 65)	Germany (n = 47)	United Kingdom (n = 64)
Sex, No. (%):					
male	124 (47.0)	45 (51.1)	23 (35.4)	26 (55.3)	30 (46.9)
female	140 (53.0)	43 (48.9)	42 (64.6)	21 (44.7)	34 (53.1)
Age, mean±SD	42.6 ± 11.8	43.9 ± 10.8	43.3 ± 12.0	37.3 ± 10.6	44.0 ± 12.8
Education, No. (%):					
primary and no education	76 (28.8)	27 (30.7)	10 (15.4)	26 (55.3)	13 (20.3)
secondary education	135 (51.1)	47 (53.4)	44 (67.7)	13 (27.7)	31 (48.4)
higher education	52 (19.7)	13 (14.8)	11 (16.9)	8 (17.0)	20 (31.3)
missing information	1 (0.4)	1 (1.1)	–	–	–
Combat experience, No. (%):					
yes	54 (20.5)	36 (40.9)	8 (12.3)	8 (17.0)	2 (3.1)
no	210 (79.5)	52 (59.1)	57 (87.7)	39 (83.0)	62 (96.9)
War-related traumatic events, mean±SD	5.8 ± 3.2	5.9 ± 2.8	4.2 ± 2.5	6.7 ± 3.5	6.7 ± 3.8
Unemployed, No. (%):					
yes	146 (55.3)	38 (43.2)	36 (55.4)	40 (85.1)	32 (50)
no	118 (44.7)	50 (56.8)	29 (44.6)	7 (14.9)	32 (50)
Receiving welfare benefits, No. (%):					
yes	113 (42.8)	8 (9.1)	17 (26.2)	39 (83.0)	49 (76.6)
no	151 (57.2)	80 (90.9)	48 (73.8)	8 (17.0)	15 (23.4)
Living in collective accommodation, No. (%):					
yes	40 (15.2)	2 (2.3)	16 (24.6)	22 (46.8)	0
no	224 (84.8)	86 (97.7)	49 (75.4)	25 (53.2)	64 (100)
Living alone, No. (%):					
yes	33 (12.5)	9 (10.2)	3 (4.6)	12 (25.5)	9 (14.1)
no	231 (87.5)	79 (89.8)	62 (95.4)	35 (74.5)	55 (85.9)
Married or cohabiting:					
yes	180 (68.2)	63 (71.6)	43 (66.2)	33 (70.2)	41 (64.1)
no	84 (31.8)	25 (28.4)	22 (33.8)	14 (29.8)	23 (35.9)
Outcomes:					
Current PTSD, No. (%):					
yes	221 (83.7)	77 (87.5)	58 (89.2)	42 (89.4)	44 (68.8)
no	43 (16.3)	11 (12.5)	7 (10.8)	5 (10.6)	20 (31.3)
Subjective quality of life, mean±SD	4.0 ± 0.9	4.1 ± 0.9	3.9 ± 0.7	3.6 ± 1.1	4.1 ± 1.0

*Abbreviations: PTSD – posttraumatic stress disorder; SD – standard deviation.

In the model including informal care ($R^2 = 0.080$), costs in Germany were significantly higher than in the UK (adjusted mean difference, €983; 95% CI, 45 to 2077) and in Serbia (adjusted mean difference, €1386; 95% CI 319 to 2622). The only other variable that was a significant predictor was living status. Participants who were living alone had mean costs €862 lower than participants who were living with someone (95% CI, 223 to 1589). Participants with PTSD had costs on average €547 higher, but again this was not significant (95% CI, -363 to 1393).

DISCUSSION

Our study has 3 main findings. First, the outcomes in people who had PTSD at some point in time following war but never received psychiatric or psychological treatment were on average unfavorable. At the time of the interview, 83.7% of the participants still had PTSD, SQOL was relatively low, and care costs were considerable. Second, factors that have been found to increase the risk of developing PTSD, ie, higher age, lower education, and the experience of more traumatic events, were also linked with poorer chances for recovery. Third, the experience of more traumatic events and current PTSD had a negative impact on SQOL, which is independent of adverse social factors and in addition to their negative influence.

Having higher education reduced the odds of having a diagnosis of current PTSD as compared with no or primary education. An association between higher education and

TABLE 2. Results from logistic regression model analyses of current PTSD (n = 264)*

Independent variables	No (%) for		Univariate analysis		Multivariate analysis	
	current PTSD (n = 221)	no PTSD (n = 43)	odds ratio 95% CI	P	odds ratio 95% CI	P
Sex:						
male	110 (49.8)	14 (32.6)	2.05 (1.03 to 4.10)	0.041		
female	111 (50.2)	29 (67.4)	1.00			
Age, mean ±SD	43.3 ± 12.1	38.6 ± 8.8	1.04 (1.01 to 1.07)	0.017	1.04 (1.00 to 1.08)	0.030
Education:				<0.001		<0.001
primary and no education	73 (33.3)	3 (7.0)	1.00		1.00	
secondary education	115 (52.0)	20 (46.5)	0.24 (0.07 to 0.82)	0.024	0.29 (0.08 to 1.05)	0.059
higher education	32 (14.5)	20 (46.5)	0.07 (0.02 to 0.24)	<0.001	0.08 (0.02 to 0.31)	<0.001
Combat experience:						
yes	51 (23.1)	3 (7.0)	4.00 (1.19 to 13.47)	0.025		
no	170 (76.9)	40 (93.0)	1.00			
Number of traumatic events in war, mean ±SD	6.2 ± 3.3	4.1 ± 2.5	1.30 (1.13 to 1.50)	<0.001	1.27 (1.09 to 1.48)	0.015
Unemployed:						
yes	130 (58.8)	16 (37.2)	2.41 (1.23 to 4.73)	0.010		
no	91 (41.2)	27 (62.8)	1.00			
Receiving welfare benefits:						
yes	98 (44.3)	15 (34.9)	1.49 (0.75 to 2.94)	0.253		
no	123 (55.7)	28 (65.1)	1.00			
Current place of living:						
resettled in Western Europe	170 (76.9)	40 (93.0)	0.46 (0.24 to 0.89)	0.021	0.39 (0.18 to 0.83)	0.015
living in post-conflict countries	51 (23.1)	3 (7.0)	1.00			
Living in collective accommodation:						
yes	39 (17.6)	1 (2.3)	9.00 (1.20 to 67.38)	0.032		
no	182 (82.4)	42 (97.7)	1.00			
Living alone:						
yes	26 (11.8)	7 (16.3)	0.69 (0.28 to 1.70)	0.415		
no	195 (88.2)	36 (83.7)	1.00			
Married or cohabiting:						
yes	157 (71)	23 (53.5)	0.47 (0.24 to 0.91)	0.026		
no	64 (29)	20 (46.5)	1.00			

*Abbreviations: PTSD – posttraumatic stress disorder; SD – standard deviation; CI – confidence interval.

better outcomes in people affected by war-related PTSD was identified in previous research (2). In our study, this association was not due to better employment chances of people with higher education, as the employment status was not included as a significant predictor in the final model predicting current PTSD. Also, better access to treatment did not play a role, because none of the people in this study had received any psychiatric or psychological treatment. One may assume that higher education equips people with better coping skills to aid their recovery from PTSD. Similarly, younger people may have more resources and a greater flexibility to overcome PTSD.

A number of studies have shown that a higher level of exposure to war-related traumatic events increases the risk of having a diagnosis of PTSD several years after the war, with most of the research focusing on refugees rather than peo-

ple who stayed in the area of conflict (22-26). For example, Steel et al (6) reported that, despite substantial overall decreases in the prevalence of mental disorders over time, a high trauma exposure was the strongest, and the only consistent, predictor of long-term mental illness including PTSD in refugees from Vietnam even 14 years after their exposure to traumatic events. Our study confirms such a finding and suggests that the experience of more traumatic events hinders the recovery from PTSD independently of other considered factors.

We also found a better recovery rate in refugees living in Western Europe than in people who stayed in Croatia and Serbia following the war. This is inconsistent with the results of a meta-analysis of studies on psychological consequences of forced displacement in former Yugoslavia by Porter and Haslam (27), which suggested displacement as

TABLE 3. Results from linear regression model analyses of MANSA (n = 264)*

Independent variables	Univariate analysis			Multivariate analysis		
	coefficient	95% CI	P	coefficient	95% CI	P
Sex:						
male	-0.32	-0.55 to -0.09	0.006			
female	0.00					
Age, mean	-0.02	-0.03 to -0.01	<0.001	-0.02	-0.03 to -0.01	<0.001
Secondary education	0.03	-0.20 to 0.26	0.814			
Higher education	0.40	0.11 to 0.68	0.006			
Combat experience:						
yes	-0.47	-0.75 to -0.19	0.001	-0.42	-0.67 to -0.16	0.001
no	0.00			0.00		
Number of traumatic events in war, mean	-0.08	-0.11 to -0.05	<0.001	-0.06	-0.09 to -0.03	<0.001
Unemployed:						
yes	-0.52	-0.74 to -0.30	<0.001	-0.43	-0.64 to -0.22	<0.001
no	0.00			0.00		
Receiving welfare benefits:						
yes	-0.40	-0.62 to -0.17	0.001			
no	0.00					
Current place of living:						
resettled in Western Europe	-0.13	-0.36 to -0.10	0.255			
living in post-conflict countries	0.00					
Living in collective accommodation:						
yes	-0.63	-0.94 to -0.32	<0.001	-0.54	-0.83 to -0.25	<0.001
no	0.00			0.00		
Living alone:						
yes	-0.44	-0.78 to -0.10	0.011	-0.40	-0.70 to -0.11	0.008
no	0.00			0.00		
Married or cohabiting:						
yes	0.15	-0.10 to 0.39	0.228			
no	0.00					

*Abbreviations: MANSA – Manchester Short Assessment of Quality of Life (13); CI – confidence interval.

an additional risk for mental distress. However, the difference in PTSD rates between the samples in the post-conflict areas and Western Europe in this study should be taken with caution and could well have been influenced by inconsistent sampling in the 4 countries.

Mean score of SQOL in this study was 4.0, which reflects exactly the neutral middle point of the 7-point rating scale. This is substantially lower than findings in most studies in clinical samples (28-30). On average, participants expressed explicit dissatisfaction with their life in general and the domains of

TABLE 4. Service use and care costs (2004/5 Euros) during previous 3 months*

Type of services	No. (%) using service	Mean ± standard deviation contacts by users	Mean ± standard deviation cost across sample
Croatia (n = 87):			
general practitioner	49 (56)	3.6 ± 3.4	34 ± 77
primary care nurse	33 (38)	3.8 ± 3.6	3 ± 8
social worker	4 (5)	1.0 ± 0.0	1 ± 3
other inpatient*	1 (1)	5.0 (-)	14 ± 128
other outpatient	22 (25)	3.9 ± 3.6	51 ± 130
informal care†	53 (61)	304 ± 412‡	1378 ± 2631
medication	35 (15)	–	21 ± 45
other	0 (0)	–	0 ± 0
total			1500 ± 2651
Serbia (n = 65):			
general practitioner	38 (58)	2.4 ± 2.4	12 ± 25
primary care nurse	23 (35)	2.7 ± 3.9	1 ± 2
social worker	1 (2)	1.0 (-)	1 ± 4
other inpatient*	4 (6)	33.8 ± 38.2	216 ± 1216
other outpatient	31 (48)	3.4 ± 2.8	46 ± 80
informal care†	39 (60)	320 ± 261‡	843 ± 1124
medication	44 (68)	–	32 ± 37
other	0 (0)	–	0 ± 0
total			1150 ± 1628
Germany (n = 47):			
general practitioner	27(57)	5.6 ± 11.5	177 ± 400
primary care nurse	0 (0)	–	0 ± 0
social worker	2 (4)	2.5 ± 0.7	7 ± 35
other inpatient*	3 (6)	10.0 ± 8.9	452 ± 2153
other outpatient	31 (66)	3.7 ± 4.3	284 ± 504
informal care†	29 (62)	112 ± 116‡	1380 ± 2117
medication	41 (87)	–	91 ± 79
other	1 (2)	6.0 (-)	3 ± 20
total			2394 ± 3528
United Kingdom (n = 64):			
general practitioner	38 (59)	2.5 ± 1.8	53 ± 73
primary care nurse	13 (20)	1.6 ± 1.2	4 ± 11
social worker	16 (25)	2.6 ± 1.5	62 ± 130
other inpatient*	3 (5)	2.0 ± 1.0	55 ± 271
other outpatient	19 (30)	1.9 ± 1.0	58 ± 119
informal care†	31 (48)	102 ± 107‡	939 ± 1717
medication	40 (63)	–	56 ± 66
other	3 (5)	5.0 ± 1.0	9 ± 43
total			1237 ± 1879

*Contacts = number of days.
†Contacts = number of hours in past 3 months.
‡Decimal values were provided only for measurements smaller than 100.

employment, financial situation, leisure activities, and physical and mental health. Such low SQOL is unusual, particularly in non-clinical samples. However, mean scores were only marginally lower than those found in war-affected civilians in Serbia (15) and more favorable than those in patients with PTSD in East London (31), both obtained on the same scale.

Older age and adverse social living conditions after the war, ie, unemployment, living alone, and being housed in collective centers, were associated with lower SQOL. Yet, even after adjusting for these factors, combat experience and an exposure to more traumatic war events still had a negative influence on SQOL, and a current diagnosis of PTSD added to the probability of having lower SQOL (15,32). One can conclude that more than 10 years after the war the traumatic experiences still impact on SQOL and that having PTSD leads to poorer SQOL independently of the current social situation. Both social interventions and effective treatment of PTSD may therefore help improve SQOL, and the effects of the 2 approaches may be independent of each other. In health care services, it is often discussed whether socially disadvantaged people with PTSD should first receive social support so that they are in a better position to benefit from psychological treatment, or whether effective treatment of PTSD is paramount to enable patients to improve their social situation on their own. The findings of this study suggest that both approaches are likely to complement each other in improving SQOL, but that overcoming social disadvantage alone may not be sufficient to overcome PTSD.

The levels of service use and care costs are substantially higher than those found in the general population in the UK. According to the General Household Survey (33), 14% of people in the UK had an outpatient appointment within the 3 months before the survey. The corresponding figure in our study was 30% for the sample in the UK and between 25% and 66% in the other countries.

Costs excluding informal care were higher in Germany than the in other countries, which may be driven by the specific features of the German health care system, which has easier access to specialist care than elsewhere. Aspects of the health care systems may also account for other differences in costs found between countries that were not explained by characteristics of the participants.

Older people generated more costs of formal care reflecting a greater demand for health care as people age. When informal care was included, participants living with some-

one had higher costs, which is explained by the greater availability of care from family members. Total costs in the UK were not dissimilar to Croatia and Serbia when informal care was included. This does suggest that family members may be taking on caring responsibilities more in those countries than in the UK. However, it is of interest that informal care costs in Germany were also high. Overall, the key reason for the cost differences between centers appears to be the variability in the supply of and access to care.

War-related variables and current PTSD were not significantly associated with costs. Thus, this study did not provide evidence for the assumption that ongoing untreated PTSD increases the use of health care services.

The study has several strengths. The diagnosis of past and current PTSD was assessed using a standardized and well validated clinical interview (34). All participants were interviewed in their native language, thus reducing the possibility of errors caused by translation. All interviewers were qualified and trained researchers. The definition of PTSD treatment as an exclusion criterion was comprehensive and rigorously applied. Also, we studied groups with and without combat experience and refugee samples, as well as people who stayed in the area of conflict, and considered these factors in the multivariate analyses.

There are 5 major limitations: 1) We did not recruit a random sample. Instead we used a combination of different recruitment methods, which has been suggested as an appropriate strategy to reduce selection bias when random sampling cannot be achieved (35). A strong systematic selection bias would have particularly affected the prevalence rates of PTSD and the mean score of SQOL in the sample, while the associations between predictive factors and outcomes are likely to be more robust toward sample differences. 2) The data on war experiences and past PTSD were obtained retrospectively and may have been influenced by memory bias. It has been suggested that retrospective reporting can inflate the effects of traumatic events on current mental health (36-38). 3) Past PTSD was assessed for any point in time between the war experience and the interview, since we felt that asking participants for the exact time of symptoms may have led to very unreliable results. Yet, in the analyses the period of time between the first onset of PTSD and interview was not considered. 4) Only basic socio-demographic characteristics and a few aspects of the war experience and current social situation were considered in the analysis, and the associations found may be due to the influence of

unobserved confounding factors. In particular, we did not document physical illnesses that are likely to have been associated with health care costs. 5) Service costs relied on self-report of service use during the past 3 months as the only approach for measuring the range of services we were interested in. While there is a possibility of recall bias, other studies have found self-report of service use data to be a reliable method (39,40).

The findings suggest a poor long-term prognosis of war-related PTSD without treatment, but the obvious conclusion that the affected people should therefore receive treatment requires sound evidence that treatment would indeed be effective. Although there is substantial evidence on the general effectiveness of PTSD treatment, this is not based on studies specifically with people who suffer from war-related PTSD several years after the end of the war. The effects of psychological treatments such as trauma-focused cognitive behavioral therapy need to be established in trials focusing on this target group, which differs from the typical clientele of clinical trials on PTSD in various respects, such as having had more protracted traumatic experience, suffering from longer-term mental health problems, and living in more adverse social conditions. One end point in such studies should be to test whether clinical improvement indeed leads to better SQOL. Based on the findings of this study, the hypothesis for such trials would be that effective treatment reduces distress and improves SQOL, but would not necessarily lead to health savings in health care costs. Social intervention programs providing independent accommodation and employment may be similarly evaluated, also using SQOL as one end point.

Finally, prospective studies with more detailed assessments and qualitative research may help explain the associations of war experience, subsequent PTSD, and SQOL identified in this study.

Acknowledgments

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