

Marital loss, gender and their association with mental health and physical health outcomes in Bosnian refugees: lesson reminder in a time of war

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Summary. Introduction. Mental health disorders and chronic health diseases are highly prevalent and impactful consequences of distressful experiences among refugees, yet a comprehensive conceptual model encompassing biopsychosocial factors is lacking. This study aims to assess the relevance of widowhood to PTSD and major depression maintenance as well as to adverse health outcomes in a cohort of Bosnian refugees. **Methods.** This longitudinal study included 526 subjects followed up for 3 years. The interviews were conducted in refugee camps in Varaždin, Croatia, in the Bosnian language. Data were collected using the Harvard Trauma Questionnaire and Hopkins Checklist-25, respectively. Physical health disorders were self-reported. **Results.** Both at baseline and endpoint female gender and marital loss are associated with a statistically significant higher burden of psychological and physical health outcomes. This group showed higher rates of PTSD and major depression disorders, as high comorbidity with hypertension, cardiovascular diseases, asthma and arthritis. **Discussion.** The results of the present study align with a wealth of literature studies linking marital loss to shifts in mental health and impaired physical health. A conceptual framework is provided for understanding how both mental health and physical health outcomes are highly dependent on social phenomena. **Conclusions.** This investigation reinforces the hypothesis of the role of social bonds and marital support in recovery from trauma experiences. Further studies are, however, needed for a better understanding of the consequences of adverse events on trauma-exposed subjects from a holistic bio-psycho-social point of view.

Key words. Chronic diseases, mental disorders, refugees, social ties.

Introduction

Health and mental illness are concepts that do not simply have biological and psychological aspects but also have concurrent social dimensions and nature.

Kawachi and Berkman¹ conceptualise social ties as having multiple levels which are associated with health benefits. One level is intimate relations, such as marriage, the other is social networks: closeness with

Perdita coniugale, genere e loro associazione con la salute mentale e gli esiti di salute fisica nei rifugiati bosniaci: promemoria di una lezione in tempo di guerra.

Riassunto. Introduzione. I disturbi mentali e le malattie croniche sono conseguenze altamente diffuse e di grande impatto delle esperienze dolorose tra i rifugiati, ma manca un modello concettuale completo che comprenda i fattori biopsicosociali. Questo studio mira a valutare la rilevanza della vedovanza nel disturbo da stress post-traumatico (PTSD) e nel mantenimento della depressione maggiore, nonché negli esiti avversi sulla salute in una coorte di rifugiati bosniaci. **Metodi.** Questo studio longitudinale ha incluso 526 soggetti seguiti per 3 anni. Le interviste sono state condotte nei campi profughi di Varaždin, in Croazia, in lingua bosniaca. I dati sono stati raccolti utilizzando rispettivamente l'Harvard Trauma Questionnaire e la Hopkins Checklist-25. I disturbi della salute fisica sono stati auto-riferiti. **Risultati.** Sia al basale che all'endpoint, il genere femminile e la perdita coniugale sono associati a un carico più elevato, statisticamente significativo, di esiti di salute psicologica e fisica. Questo gruppo ha mostrato tassi più elevati di PTSD e disturbi depressivi maggiori, come elevata comorbidità con ipertensione, malattie cardiovascolari, asma e artrite. **Discussione.** I risultati del presente studio sono in linea con numerosi studi presenti in letteratura che collegano la perdita coniugale ai cambiamenti nella salute mentale e alla compromissione della salute fisica. Viene fornito un quadro concettuale per comprendere come sia la salute mentale sia quella fisica dipendano fortemente dai fenomeni sociali. **Conclusioni.** Questa indagine rafforza l'ipotesi del ruolo dei legami sociali e del sostegno coniugale nel recupero dalle esperienze traumatiche. Ulteriori studi sono tuttavia necessari per una migliore comprensione delle conseguenze degli eventi avversi sui soggetti esposti a traumi da un punto di vista bio-psico-sociale olistico.

Parole chiave. Disturbi mentali, legami sociali, malattie croniche, rifugiati.

relatives and friends and the third is “weak” ties consisting of participation in community activities, volunteer work and participation in religious organisations. The latter provides a sense of belonging and social identity, which is relevant to the promotion of psychological well-being. All these levels are challenged in the group of people exposed to severe adverse events such as war and refugee. A growing body of knowledge

showed that refugees are highly likely to experience severe and repeated exposure to violence, traumatic loss, abuse of human rights and to witness the death of family members and friends^{2,3}. Despite this, to our knowledge, research on this topic in refugee populations is scarce, even if the number of displaced people worldwide has increased to above 89 million⁴. As it is stated in the United Nations statement for International Widows Day in 2014, distress related to marital loss is absent in statistics, unnoticed by researchers, neglected by local and international authorities and mostly overlooked by civil society organisations⁵. Widowhood is associated with multiple adverse physical and mental health outcomes with higher rates of morbidity, physician visits and mortality⁶⁻¹⁰. It has been shown that the prevalence of depression within the first year of widowhood is between 15-30% across the studies¹¹. Some cross-sectional studies showed that depressive symptoms remain high for many years following widowhood compared to married people^{12,13}. It is also unclear whether widowhood has stronger or more prolonged adverse effects on the well-being and health of men or women.

Although an extensive body of literature concerning PTSD among male veterans in conflict settings, epidemiological studies in trauma spectrum disorders including PTSD have always reported a significant gender difference with women reporting higher symptom severity¹⁴⁻¹⁶. In the context of armed conflict, women in civilian populations may be exposed to the same traumatic experiences as active soldiers (bombarding, missiles, being surrounded by the enemy, etc.), yet women may be additionally exposed to a wide range of specific gender-based violent acts, such as forced pregnancy, abduction, rape, sexual slavery, and forced prostitution during wars¹⁷. Multimorbidity with chronic physical impairment has been deeply investigated as well¹⁸⁻²³. A previous study of our research group²⁴ showed worsened physical health among women more than in men affected by PTSD, especially concerning hypertension, cardiovascular diseases, arthritis, and anaemia, and hypothesised a crucial link between mental and physical health impairment with loss of social support.

The present study aims to deeply examine the relationships between PTSD and physical health diseases with gender and marital status in a cohort of Bosnian refugees following the war in the '90s. Although our database was collected a while ago, we decided to go back to our findings for a few reasons. First, there are rare longitudinal studies on refugee populations conducted recently after adverse events and we aim to raise awareness of the need to pay more attention to this vulnerable group and persisting research gaps. Secondly, long-term consequences on health as well as on the social and economic quality of people's lives are of interest to public health, health care systems and the economy.

Despite robust literature related to war trauma, PTSD and physical health conditions among veterans, there is a lack of research done on civilians, especially women, who have experienced prolonged war-related traumatisation. Awareness of this fact is even more important in areas with a recent history of conflicts^{25,26}, as well as in ongoing conflict settings where a large part of forcibly displaced refugees are women²⁷, to help develop and deploy effective and affordable multi-sectoral collaborative care models and therapy.

Methods

The study took place a few weeks after the Dayton Accords, in December 1995, which put an end to violent battles in Bosnia & Herzegovina (BH)²⁸, the most dramatic conflict in the former Yugoslavia. The final figures on the horrendous atrocities committed during the war (1992-1995) in BH²⁹: 103,000 killed, of which 60% civilians, 30,000 missing persons, 170,000 wounded, over 20,000 raped, and over 2 million became refugees or displaced persons, most of them driven from their homes in pogroms of "ethnic cleansing". Due to the war in Bosnia and Herzegovina, a large number of refugees came to the Republic of Croatia from 1992 to 1995. In 1992 Croatian government established organised refugee camps, among others in Varaždin, Northeastern Croatia.

The non-governmental organisation (NGO) Ruke, Zagreb (Croatia) provided counseling and psychosocial services to camp residents in Varazdin since 1992. In February 1996 (the base point of the present study), 1275 individuals lived in the camp and 573 adult residents were interviewed in partnership with Harvard Program of Refugee Trauma. In 1999 (the end point of this investigation), Harvard Program of Refugee Trauma and 9 members of the original interviewing staff located and re-interviewed 376 (70,4%) of the remaining residents^{30,31}. Study design and informed consent procedure were approved by the Human subject committee of the Harvard Medical School and Ethical Committee, Clinical Hospital Centre Zagreb. Approximately 90 minutes of interviews were done in Bosnian. Respondents were informed about the aim of the study, confidentiality and anonymity rules, voluntary participation and that they could choose not to answer the questions. In addition, participants were asked to indicate their education and marital status: only subjects who had not changed their marital status since their arrival at the Varaždin refugee camp in 1992 until the endpoint of the investigation in 1999 were included in the study. Afterwards, respondents were interviewed with the Bosnian validated versions of the Harvard Trauma Questionnaire (HTQ)^{32,33} and of the Hopkins Symptom Checklist 25 (HCSL-25)³⁴.

The HTQ is a cross-cultural screening measure assessing trauma events and symptoms, translated and validated in several languages for many regions. It consists of four parts: part I queries exposure to potentially traumatic events (PTEs) and stressors; part II elicits a description of an index trauma and any ongoing stressors; part III assesses traumatic brain injury; part IV measures symptoms corresponding to the DSM-IV-TR and locally relevant idioms of distress. For the purposes of this study, parts one and four of the HTQ for DSM-IV were administered. Previous studies showed robust internal consistency for both part one (0.90) and part four (0.96) and inter-rater reliability of 0.93 for trauma events and 0.98 for symptoms³³. HCSL-25 is a symptom inventory scale that measures symptoms of anxiety and depression. It consists of 25 items on a four-point Likert scale: 1= "Not at all"; 2= "A little"; 3= "Quite a bit"; 4= "Extremely". The tool has two well-known dimensions: items 1 to 10 belong to the anxiety dimension, whereas items 11 to 25 constitute the depression one. The HSCL-25 score is calculated by dividing the total score of items by the number of items answered, so the final score can range from 1 to 4. A cutoff value of 1.75 is generally used for the diagnosis of major depression, defined as "depression in need of treatment". To replicate DSM-IV criteria for diagnosis of depression (HCSL-25) and PTSD (HTQ) algorithm method was selected as scale cut-off points have not been established in this population³³⁻³⁵. For diagnosis of PTSD, the DSM-IV positive algorithm included positive response, 3 or 4 on HTQ, on either depressed mood or diminished interest or pleasure, and at least four of six Criterion A symptoms according to DSM-IV which was valid diagnostics manual in the time when the research was conducted³⁶. Exposure to a traumatic event, which is criterion A, was deemed to have been met by all respondents^{31,37}. Medical conditions were defined as self-

reported history of high blood pressure, heart disease, stroke, cancer, anaemia, tuberculosis, diabetes, arthritis, peptic ulcer, asthma, cirrhosis or liver disease, alcohol or drug abuse, gynaecological disorder, epilepsy. As participants were residents in the refugee camp, we were not able to reach their medical records³⁷.

For statistical analysis, SPSS version 17.01 (SPSS, Inc Chicago, IL) (1998) software was used. Chi-square test was used to compare differences between groups of nominal variables and Mann Whitney U or Kruskal-Wallis for assessing differences between ordinal variables. The level of statistical significance set to alpha= 0.05.

Results

We were interested in differences in physical and psychological symptoms in our subjects depending on their marital status. As we suppose that there could be a different connection between those symptoms and marital status depending on gender, analyses were done on two gender levels. Also, all analyses were done separately on the base sample and the endpoint. It is important to point out, however, that in some groups we had quite a low number of respondents.

SAMPLE OF RESPONDENTS

To respond to our main research question, firstly, descriptive and demographic variables of four groups of respondents were analysed. Separate analyses were done for the basepoint (table 1) and endpoint sample (table 2).

Data in table 1 show that there were differences in age, gender and finished level of education when we compared different marital status groups of respondents in the base sample.

Table 1. Differences in descriptive variables in the research sample according to marital status in base point research.

		Marital status								Statistical analyses
		M (n=252)		S/D (n=65)		W (n=118)		NM (n=91)		
		n	%	n	%	n	%	n	%	
Age	18-34 yrs	41	16%	8	12%	7	6%	47	52%	$\chi^2(9) = 146.8;$ $p < .01$
	35-54 yrs	96	38%	31	48%	22	19%	30	33%	
	55-64 yrs	75	30%	20	31%	32	27%	8	9%	
	65+ yrs	40	16%	6	9%	57	48%	6	7%	
Gender	Female	137	54%	40	62%	92	78%	44	48%	$\chi^2(3) = 24.3;$ $p < .01$
	Male	115	46%	25	38%	26	22%	47	52%	
Education	N-Primary	87	35%	20	31%	68	58%	20	22%	$\chi^2(9) = 37.6;$ $p < .01$
	Primary	59	23%	14	22%	19	16%	17	19%	
	Secondary	70	28%	18	28%	21	18%	37	41%	
	University	36	14%	13	20%	10	8%	17	19%	

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married; N-Primary= not finished primary school.

Table 2. Differences in descriptive variables in the research sample according to marital status in endpoint research.

		Marital status								Statistical analyses
		M (n=176)		S/D (n=34)		W (n=51)		NM (n=13)		
		N	%	N	%	N	%	N	%	
Age	18-34 yrs	24	14%	1	3%	4	4%	16	31%	$\chi^2(9) = 72.9; p < .01$
	35-54 yrs	72	41%	17	50%	19	19%	20	39%	
	55-64 yrs	40	23%	11	32%	23	23%	9	18%	
	65+ yrs	40	23%	5	15%	54	54%	6	12%	
Gender	Female	68	38%	14	41%	19	19%	27	53%	$\chi^2(3) = 19.9; p < .01$
	Male	110	62%	20	59%	81	81%	24	47%	
Education	N-Primary	63	35%	10	29%	58	58%	15	29%	$\chi^2(9) = 24.9; p < .01$
	Primary	49	27%	8	24%	19	19%	10	19%	
	Secondary	46	26%	10	29%	14	14%	18	35%	
	University	21	12%	6	18%	9	9%	9	17%	

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married; N-Primary= not finished primary school.

Data in table 2 show that there were differences in age, gender and finished level of education when we compared different marital status groups of respondents in the end sample.

TOTAL NUMBER OF PHYSICAL SYMPTOMS IN BASE POINT AND END POINT SAMPLE

We were interested in differences in a total number of physical symptoms according to gender and

marital status, age and marital status and education and marital status. To this aim, three ANOVAs were done both in the base and endpoint sample (table 3).

Results of marital status x gender in base point sample (n=525) show that there was significant difference in total number of symptoms according to gender (F(1/518)=4.27; p<0.05) and marital status (F(3/518)=13.28; p<0.01), but there was no interaction between two variables (F(3/518)=1.43; df=3; p>0.05). Total number of symptoms was significantly larger in

Table 3. Differences in number of physical symptoms according to marital status and age, gender as well education.

Analysis	Source	Base point		End point	
		Statistics	Post hoc	Statistics	Post hoc
Marital status X Gender	Gender	F(1/518) = 4.27; p<.05	M (female)= 2.16 M (male)= 1.75	F (1/365) = 4.41; p<0.05	M (female)= 2.12 M (male)= 1.53
	Marital status	F(3/518) = 13.28; p<.01	M (w)= 2.82 M (m)= 2.06 M (s/d)= 1.94 M (nm)= 1.00	F (3/365) = 7.21; p<0.01	M (w)= 2.86 M (m)= 1.86 M (s/d)= 1.78 M (nm)= 1.18
	Interaction	F(3/518) = 1.43; p>.05		F (3/365) = 0.41; p>.05	
Marital status X Age	Age	F(3/510) = 18.12; p<.01	M (65+ yrs)= 2.97 M (55-64 yrs)= 2.79 M (s35-54 yrs)= 1.68 M (18-34 yrs)= 0.76	F (3/354) = 14.89; p<.01	M (65+ yrs)= 3.29 M (55-64 yrs)= 2.67 M (s35-54 yrs)= 1.34 M (18-34 yrs)= 0.36
	Interaction	F(9/510) = 0.27; p>.05		F (9/354) = 0.53; p>.05	
Marital status X Education	Education	F(3/510) = 5.98; p<.01	M (LT prim)= 2.51 M (prim)= 1.92 M (second)= 1.48 M (voc/univ)= 1.93	F (3/354) = 5.47; p<.01	M (LT prim)= 2.52 M (prim)= 1.58 M (second)= 1.97 M (voc/univ)= 1.10
	Interaction	F (3/510) = 1.09; p>.05		F (12/354) = 1.07; p>.05	

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married; LT (PRIM)= not finished primary school; PRIM= primary school; SECOND= secondary school; VOC/UNI= university.

females than in males. Separated analyses of Scheffe tests on marriage groups showed that never-married respondents had significantly the lowest total number of symptoms ($M=1.00$), followed by separated/divorced ($M=1.94$) and married ones ($M=2.06$) which do not differ significantly from each other. Widowed respondents had significantly the highest total number of physical symptoms ($M=2.82$). It is important to stress that not married respondents are significantly the youngest ones. In the endpoint sample ($n=364$) similar results were obtained. There was significant difference in total number of symptoms in according to gender ($F(1/365)=4.41$; $p<.05$) and marital status ($F(3/365)=7.21$; $p<.01$), but there was no interaction between two variables ($F(3/365)=0.41$; $p>.05$). Again, the total number of symptoms was larger in females ($M=2.12$) than in males ($M=1.53$). Separated analyses of Scheffe tests on marriage groups show that widowed respondents have a significantly larger total number of symptoms ($M=2.86$) than never married ($M=1.18$), separated/divorced ($M=1.78$) and married ($M=1.86$) respondents. Other differences were not found. Again, not married respondents are significantly the youngest ones.

Regarding marital status and gender in the base sample ($n=526$), results of ANOVA showed that there was significant difference in total number of symptoms according to age ($F(3/510)=18.12$; $p<.01$) and no interaction between age and marital status was found ($F(9/510)=0.27$; $p>.05$). Separated analyses of Scheffe tests on age groups showed there was significant difference in number of symptoms between all groups of respondents except two eldest groups of respondents which do not differ statistically significant. Results at the endpoint ($n=373$) were close to the base point. It emerged, again, a significant difference in the total number of symptoms according to age ($F(3/354)=14.89$; $p<.01$) and there was no interaction between the two variables ($F(9/354)=0.53$; $p>.05$). Separated analyses of Scheffe tests on age groups showed there was significant difference between two younger and two elder age groups and no difference among them.

The last part with ANOVA regarding marital status and education on the basepoint sample showed that there was a significant difference in a total number of symptoms in base point according ($n=526$) to education ($F(3/510)=5.98$; $p<.01$), but there was no interaction between education and marital status ($F(3/510)=1.09$; $p>.05$). Total number of symptoms was larger in respondents from the lowest level of education ($M=2.51$) than in those who finished high school ($M=1.48$). Results at the endpoint ($n=374$) were like the base point. It was shown again that there was significant difference in total number of symptoms according to education ($F(3/354)=5.47$; $p<.01$) and there was no interaction between two variables ($F(12/354)=1.07$; $p>.05$). Total number of symptoms

was larger in respondents from the lowest level of education ($M=2.52$) than in those who finished primary school ($M=1.58$) and university ($M=1.10$). No other differences were found in the endpoint sample of respondents.

SPECIFIC PHYSICAL AND PSYCHOLOGICAL SYMPTOMS IN BASE POINT AND END POINT SAMPLE

Differences in specific physical symptoms according to the marital status of females were calculated using Chi-square test (table 4).

Results from the base sample show that there were differences in the female gender ($N=313$) according to the marital status in the following physical symptoms: high blood pressure ($\chi^2=16.5$; $df=3$; $p<0.01$), heart diseases ($\chi^2=17.4$; $df=3$; $p<0.01$) and asthma ($\chi^2=8.0$; $df=3$; $p<0.05$). Widows had more problems with blood pressure (59%) and heart diseases (53%) than married (34%, 30%), separated/divorced (33%, 35%) and never married (34%, 23%) females. Asthma was the highest in widowed females (20%), then in married (12%) and separated/divorced (13%) ones and the lowest in the group of never married (2%) females.

Results from endpoint ($n=244$) showed again the difference in high blood pressure ($\chi^2=11.0$; $df=3$; $p<0.05$), heart diseases ($\chi^2=17.7$; $df=3$; $p<0.01$) and asthma ($\chi^2=9.8$; $df=3$; $p<0.05$), but also in tuberculosis ($\chi^2=10.3$; $df=3$; $p<0.05$), diabetes ($\chi^2=9.6$; $df=3$; $p<0.05$) and arthritis ($\chi^2=15.9$; $df=3$; $p<0.05$). High blood pressure was more present in widowed (54%) than in married (41%) females, followed by separated/divorced (30%) and it was the lowest among newer married females (21%). Heart disease, arthritis and asthma were the most often found in widowed (53%, 58%, 21%) and separated/divorced (45%, 50%, 20%) females than in married (26%, 37%, 10%) and never married (21%, 42%, 0%) ones. Diabetes was most often found in widowed females (21%) in comparison to married (9%), separated/divorced (10%) and never married females (4%). Tuberculosis was most often present in never-married females (4%) in comparison to around 0% in all other groups of females.

It is important to underline that among never-married females there were the highest percentage of young females (18-34), while in the other three groups there was the lowest percentage of young females. This was true for the base ($\chi^2=77.4$; $df=9$; $p<0.01$) and endpoint ($\chi^2=51.9$; $df=9$; $p<0.01$) samples.

Differences in psychological symptoms according to the marital status of females were also calculated using Chi-square test (table 5).

Regarding psychological differences in the base sample of females ($n=313$), there were significant differences in the percentage of asymptomatic ($\chi^2=16.9$; $df=3$; $p<0.01$) females according to their marital sta-

Table 4. Differences in specific physical symptoms according to marital status of females.

	Base point (n=313)						End point (n=244)					
	χ^2	P	M	S/D	W	NM	χ^2	P	M	S/D	W	NM
High blood pressure	16.5	0.00	34%	33%	59%	34%	11.0	0.03	41%	30%	54%	21%
Heart disease	17.4	0.00	30%	35%	53%	23%	17.7	0.00	26%	45%	53%	21%
Stroke	5.3	0.15	4%	8%	12%	5%	3.6	0.46	2%	0%	5%	0%
Cancer	2.6	0.46	4%	8%	2%	2%	4.7	0.32	2%	0%	2%	0%
Anaemia	6.1	0.10	28%	43%	36%	20%	1.3	0.86	31%	30%	28%	25%
Tuberculosis	2.3	0.51	1%	0%	2%	0%	10.3	0.04	1%	0%	0%	4%
Diabetes	6.5	0.09	9%	8%	13%	0%	9.6	0.05	9%	10%	21%	4%
Arthritis	6.7	0.08	26%	30%	38%	18%	15.9	0.00	37%	50%	58%	42%
Peptic ulcer	6.8	0.08	11%	13%	18%	2%	2.5	0.64	7%	0%	7%	4%
Asthma	8.0	0.05	12%	13%	20%	2%	9.8	0.04	10%	20%	21%	0%
Hepatic cirrhosis	2.6	0.46	6%	13%	8%	5%	3.0	0.56	1%	0%	4%	4%
Kidney disease	7.0	0.07	18%	25%	27%	9%	2.4	0.67	20%	30%	28%	21%
Gynaecological disease	7.4	0.06	15%	10%	18%	2%	2.3	0.68	15%	5%	10%	8%
Seizure	0.8	0.84	1%	0%	1%	0%	0.0	0.00	0%	0%	0%	0%

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married.

Table 5. Differences in psychological symptoms according to the marital status of females.

	Base point (n=213)						End point (n=132)					
	χ^2	P	M	S/D	W	NM	χ^2	P	M	S/D	W	NM
No symptoms	16.9	0.00	57%	58%	33%	61%	8.6	0.07	62%	65%	38%	50%
PTSD only	3.3	0.35	6%	0%	8%	5%	4.3	0.36	2%	5%	10%	4%
Depression only	6.3	0.10	17%	15%	29%	23%	10.4	0.03	24%	15%	25%	23%
Dep & PTSD	7.2	0.07	20%	28%	30%	11%	16.5	0.00	12%	15%	27%	23%

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married.

tus while other differences were not found. Widowed females were less often (33%) asymptomatic than married (57%), separated/divorced (58%) or never married ones (61%).

Results from endpoint (n=244) showed that there were significant differences in number of asymptomatic ($\chi^2=16.5$; $df=3$; $p<0.01$) females and females with comorbidity of PTSD and depression ($\chi^2=10.4$; $df=3$; $p<0.05$) according to their marital status. Number of asymptomatic females was the lowest in widowed (38%), then in never married females (50%) and it was higher in married (62%) and separated/divorced (75%) females. The number of females with comorbidity of depression and PTSD was the highest in widowed ones (27%), then in never married (13%), married (12%) and separated/divorced (15%) females.

The same analyses were done on males and results are shown in table 6.

Results on males from the base sample (n=213) show that there were differences according to their marital status in following physical symptoms: high blood pressure ($\chi^2=12.6$; $df=3$; $p<0.01$), heart diseases ($\chi^2=18.1$; $df=3$; $p<0.01$), peptic ulcer ($\chi^2=9.5$; $df=3$; $p<0.05$) and asthma ($\chi^2=13.1$; $df=3$; $p<0.05$). So, in comparison to females in the base point, males had one additional symptom connected to their marital status - peptic ulcer. Widowers had more problems with blood pressure (50%), heart diseases (46%) and asthma (42%) than married (36%, 27%, 24%), separated/divorced (32%, 20%, 24%) and never married (13%, 4%, 6%) males. All results were the lowest in never-married males' group - the youngest ones according to analyses of age and marriage. Peptic ulcer

Table 6. Differences in specific physical symptoms according to the marital status of males.

	Base point (n=213)						End point (n=132)					
	χ^2	P	M	S/D	W	NM	χ^2	P	M	S/D	W	NM
High blood pressure	12.6	0.01	36%	32%	50%	13%	7.3	0.12	35%	50%	53%	19%
Heart disease	18.1	0.00	27%	20%	46%	4%	9.9	0.04	32%	29%	42%	7%
Stroke	4.5	0.21	12%	20%	15%	4%	1.6	0.81	4%	7%	11%	4%
Cancer	6.2	0.10	2%	0%	8%	0%	2.5	0.65	1%	0%	5%	0%
Anaemia	4.3	0.23	17%	16%	23%	6%	8.2	0.08	6%	7%	26%	7%
Tuberculosis	1.8	0.62	7%	4%	8%	2%	4.0	0.40	4%	7%	16%	4%
Diabetes	6.1	0.10	8%	4%	0%	0%	2.7	0.60	7%	7%	16%	4%
Arthritis	7.0	0.07	25%	8%	23%	11%	7.1	0.13	31%	14%	32%	7%
Peptic ulcer	9.5	0.02	22%	8%	12%	4%	4.4	0.36	12%	7%	5%	0%
Asthma	13.1	0.00	24%	24%	42%	6%	8.8	0.07	18%	0%	37%	11%
Hepatic cirrhosis	2.8	0.42	7%	0%	12%	6%	5.4	0.25	4%	0%	16%	4%
Kidney disease	4.6	0.20	19%	4%	15%	11%	4.3	0.36	16%	0%	16%	7%
Seizure	1.0	0.79	3%	8%	4%	4%	6.2	0.18	4%	0%	0%	4%

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married.

was more detected in married men (22%) than in widowed (12%), separated/divorced (8%) and never-married ones (4%).

Results from the endpoint (n=132) showed again the difference in heart diseases ($\chi^2=9.9$; $df=3$; $p<0.05$) of males according to their marital status. Heart disease, found in widowed (42%) males was more often present than in married (32%) and separated/divorced (29%) ones. It was even lower in never-married ones (7%).

Again, among never married males there was the highest percentage of younger males (18-34), while in the other three groups it was the lowest percentage of young males. Also, in widowed ones there was a low percentage of middle-aged males (35-54 y.o.) – this was true for base ($\chi^2=84.28$; $df=9$; $p<0.01$) and end point ($\chi^2=55.53$; $df=9$; $p<0.01$).

Regarding psychological differences in base point (n=213) as well as in the endpoint (n=132) sample of males there were no significant differences in psychological symptoms of males according to their marital status (table 7).

Discussion

While a long tradition of research demonstrates that being married is positively related to health and longevity³⁸, we know less about the long-term implications of changes in marital status on either mental or physical well-being. Most existing investigations that do examine marital transitions link these changes to shifts in mental health, such as increased occurrence of depressive^{20,22} and anxiety symptoms¹⁹.

Table 7. Differences in psychological symptoms according to the marital status of males.

	Base point (n=213)						End point (n=132)					
	χ^2	P	M	S/D	W	NM	χ^2	P	M	S/D	W	NM
No symptoms	5.2	0.16	65%	54%	46%	70%	3.5	0.48	69%	64%	53%	78%
PTSD only	3.3	0.34	6%	0%	12%	4%	7.2	0.13	15%	14%	37%	11%
Depression only	4.2	0.24	13%	25%	23%	11%	6.1	0.19	4%	14%	0%	11%
Dep & PTSD	0.6	0.89	16%	21%	19%	15%	4.0	0.40	12%	7%	11%	0%

Legend: M= married; S/D= separated/divorced; W= widowed; NM= never married.

While other studies were conducted in non-war contexts, such as rural China²³, India^{18,21}, Australia¹⁹, South Korea²⁰ and Japan²², the peculiarity of our study consists of dramatic setting conditions when the investigation was conducted. Moreover, our investigation found that widowhood was associated not only with an increased risk of PTSD, but a higher prevalence of health impairments as well.

The results of the present study align with a wealth of literature studies debating whether PTSD development depends on more than trauma exposure or severity³⁹.

The atrocities of war trauma, destruction of homes, livelihoods, as well as mental breakdown from overnight displacement and family separations, force victims to temporarily ignore their worries and anxieties. As documented in the literature⁴⁰, this leads to suppression of emotions and the potential development of neuropsychiatric conditions such as PTSD and depressive disorders. In this framework, other pre- and post-war stressors as marital dissolution and its implications (e.g., the stress of bereavement, loss of social support and companionship, the difficulties of running a household alone) may represent a further risk factor for physical and mental health decline. In postwar settings, widows are additionally subjected to experience the fear of being alone and loss of self-esteem as women, to feel unable to assume the responsibility to take care of children in often broken families, and to worry about practical problems, e.g. decline in income, related to living alone.

Our results are also congruent to Yehuda's diathesis-stress model of PTSD⁴¹, which asserts that the traumatic event serves as the primary stressor, and thus activator of PTSD symptoms, whereas pre- and post-war variables are likely to influence PTSD symptomatology and related comorbidity, by producing vulnerability, resilience, and recovery from adversities.

The same conceptual model may be applied even to Major Depression (MD). MD is the psychiatric comorbidity most associated with PTSD, with more than half of all patients with PTSD also meeting diagnostic criteria for MD⁴². As emphasised by several authors, MD and PTSD display a range of overlapping clinical features and a common neurobiological footprint. From a clinical point of view, the two disorders share a high presence of negative emotional states⁴³, distress and cognitive biases⁴⁴. Neurobiologically, a structural change commonly documented in PTSD and MD is the volume reduction of the hippocampus, a limbic system structure involved in cognition, memory, and regulation of the hypothalamic-pituitary-adrenal (HPA) axis.

In addition, it is well known that the scars of past war trauma and post-war stressors extend often beyond PTSD, MD and other psychopathological con-

ditions – they can manifest as somatic comorbidities as well. PTSD and major depression are associated with multiple physiological pathways including the cited HPA-axis, the sympathetic nervous system and the inflammatory response⁴⁵ which mediates primarily with hypertension onset and cardiovascular health problems⁴⁶. The correlation of PTSD and depression with hypertension, diabetes and cardiovascular diseases has been investigated in several longitudinal and cross-sectional studies⁴⁷ as well as systematic reviews and meta-analyses⁴⁸. About marital status, although a body of literature has reported inconsistent findings, a recent meta-analysis including 34 studies with more than two million participants provided evidence for increased odds of CVDs (OR:1.46; 95% CI 1.00-2.01) for unmarried (never married, divorced or widowed) compared with married participants⁴⁹. On the other hand, evidence is still sparse on the relation between hypertension and diabetes with marital status and widowhood: a study by Perkins et al.²¹ on a sample of 9,615 adults suggests that men who were widowed within 0-4 years were at greater risk for diabetes compared to married men, while recently widowed and long-term women were more likely to develop hypertension. These data need, however, to be confirmed in larger population studies. Poor health behaviours, unhealthy nutrition and a sedentary lifestyle are among the most emphasised risk factors mediating the association between widowhood and risk for CVD and cardiac mortality⁵⁰.

Our results related to asthma incidence in our sample converge with the literature data as well. Whether and to which extent marital status and widowhood can interplay with the pathogenesis of asthma must be elucidated, however, several authors argue that the multiple stresses of a troubled marriage or widowhood could foster heightened inflammation and inflammatory stress responses, which would, in turn, promote a wide range of diseases included asthma⁵¹. Moreover, some sources agree on associating marital disruption and widowhood with high rates of uncontrolled asthma, due to poorer social support⁵².

Considerations on the link between the examined psychiatric diagnoses and social factors with arthritis differ relatively from those mentioned for cardiovascular diseases and asthma. There has been a long interest in the literature between stress, traumatic events, and immune mediated diseases, including several forms of arthritis⁵³ but social factors, such as marital change and widowhood, have not been examined as possible predictive variables in this association.

Ultimately, two other variables were assessed in our study: age and education. No significant differences were found between symptomatology and level of education. Regarding age and total number

of symptoms reported a significant correlation was found, but no interaction emerged between age and marital status. Against this result, in the literature a correlation between age differences, widowhood and physical impairment was revealed in three studies^{18,21,23}. Widowers' physical health was in decline and dropped more rapidly after the age of 70²³. In addition, two studies revealed that the prevalence of non-communicable diseases among widows increased significantly with age and the same pattern was also observed for other types of disease^{18,21}.

The study has both strengths and limitations. A significant strength of this study is the longitudinal design and assessment of a population at high risk for both psychological and somatic distress. The collected data allows a prospective look at refugees' experience of health status as a refugee cohort and their health outcomes in a post-conflict society thus providing informed insights for shaping policies. To the best of our knowledge, there are only a few similar longitudinal studies conducted recently after adverse events and our study contributes significantly to raise awareness on refugees' health and to limit the actual research gap in this area. Increased understanding of PTSD and physical health conditions among civilians exposed to war trauma is crucial in areas with a recent history of conflicts^{25,26}, as well as in ongoing conflict settings, to help develop and deploy effective and affordable multi-sectoral collaborative care models and therapy.

The limitation of our study is that most of the variables are based on self-reported data such as measures of trauma, physical functioning and health status. In addition, in some groups we had quite low numbers of respondents, for example the group of never-married subjects, that affected statistically significant comparisons with other groups. Further, all women did not become widows or separated in the time when the study was conducted but regardless of when the loss appeared there was a lack of marriage as a protective factor for all women included in the study. Moreover, since our study was conducted, diagnostic criteria in DSM and ICD have changed. DSM-IV diagnostic criteria were valid until 2013 and were used in our study. However, recent studies comparing DSM-5 and DSM-IV diagnostic criteria for PTSD in traumatised refugees⁵⁴ and examining the construct validity of HTQ and HSCL-25 suggest the applicability of these instruments in the refugee population⁵⁵.

Conclusions

This study contributes to advances in knowledge as it analyses longitudinally the impact of war trauma and other crucial social variables, such as marital status and widowhood, on several mental and physical-

related health outcomes among a significant sample of older adults resettled in a refugee camp, and, thus, by providing an understanding of PTSD and related disorders in a determined social context.

Over recent decades there has been a growing focus in trauma research on the identification of predictors of PTSD onset and recovery from a holistic biopsychosocial approach⁵⁶. According to this perspective, a biological diathesis⁵⁷ may play a role in the development and maintenance of PTSD; a psychological diathesis – including peri-traumatic distress and dissociation – mainly predicts PTSD onset; ultimately, social factors appear to relate to PTSD chronicity and recovery⁵⁸. Literature data suggest that social relations are an effective emotion regulator where the behaviours of others can soothe or exacerbate trauma-driven fears⁵⁹. A pioneering study by Koenen et al⁶⁰ has identified social bonds as both a risk and protective factor, where positive social network interactions can facilitate the resolution of PTSD by helping trauma survivors regulate their emotions, particularly emotions of fear, anxiety, and mistrust. Instead, negative interactions or loss of important relationships contribute to PTSD maintenance. The results of our investigation reinforce the hypothesis of the role of social bonds and marital support in recovery from trauma experiences, with respect not only to mental health consequences but physical outcomes as well.

More longitudinal studies are needed for a better understanding of possible factors related to bio-psycho-social consequences of adverse events on trauma-exposed subjects. Interventions that aim to improve social bonds and perceived supportiveness of relationships⁶¹ in survivors of war trauma are likely to be beneficial. Further intervention and prevention research that addresses changes in physiology and health care in the context of humanitarian crises would be valuable. The multifaceted needs of millions of refugees escaping in recent years from war zones and complex political contexts impose to address these goals in a coordinated, multidisciplinary, fashion.

Conflict of interests: the authors have no conflict of interests to declare.

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