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Civilians in World War II and DSM-IV mental disorders: results from the World Mental Health Survey Initiative

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Abstract

Purpose Understanding the effects of war on mental disorders is important for developing effective post-conflict recovery policies and programs. The current study uses cross-sectional, retrospectively reported data collected as part of the World Mental Health (WMH) Survey Initiative to examine the associations of being a civilian in a war zone/region of terror in World War II with a range of DSM-IV mental disorders.

Methods Adults ($n = 3370$) who lived in countries directly involved in World War II in Europe and Japan were administered structured diagnostic interviews of lifetime DSM-IV mental disorders. The associations of war-related traumas with subsequent disorder onset-persistence were assessed with discrete-time survival analysis (lifetime prevalence) and conditional logistic regression (12-month prevalence).

Results Respondents who were civilians in a war zone/region of terror had higher lifetime risks than other respondents of major depressive disorder (MDD; OR 1.5, 95% CI 1.1, 1.9) and anxiety disorder (OR 1.5, 95% CI 1.1, 2.0). The association of war exposure with MDD was strongest in the early years after the war, whereas the association with anxiety disorders increased over time. Among lifetime cases, war

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exposure was associated with lower past year risk of anxiety disorders (OR 0.4, 95% CI 0.2, 0.7).

Conclusions Exposure to war in World War II was associated with higher lifetime risk of some mental disorders. Whether comparable patterns will be found among civilians living through more recent wars remains to be seen, but should be recognized as a possibility by those projecting future needs for treatment of mental disorders.
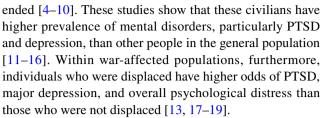
Keywords Civilians in war · World War II · Major depressive disorder · Anxiety disorders

Introduction

The World Bank estimates that over 1 billion people worldwide live in regions affected by armed conflict [1], while the UN High Commissioner for Refugees (UNHCR) estimates that 60 million civilians were forcibly displaced from their homes due to war and political violence as of 2015, the largest number since World War II [2]. These figures have brought increased attention to the mental health of war-affected populations. Understanding the relationship between war and mental health is important to design and implement policies both during conflict and in post-conflict settings to prevent the onset and persistence of mental disorders. Such information could also help improve the accuracy of estimates of the costs of war from a public health perspective [3].

Information on the mental health consequences of war comes largely from studies of individuals from war-affected countries in the few years after the conflicts have ended [4–10]. These studies show that these civilians have higher prevalence of mental disorders, particularly PTSD and depression, than other people in the general population [11–16]. Within war-affected populations, furthermore, individuals who were displaced have higher odds of PTSD, major depression, and overall psychological distress than those who were not displaced [13, 17–19].

An accurate account of the mental health costs of war also needs to take into consideration the long-term mental health trajectories of survivors. Although there is limited research on the longer-term mental health of war-affected populations, several longitudinal studies report a reduction in psychiatric symptoms and mental health diagnoses over time [20–24]. In recent decades, researchers have examined World War II survivors to understand the long-term effects of war on mental health [25]. A significant body of research with subgroups including World War II veterans [26–28], holocaust survivors [29–31], and children evacuated during wartime [32–34] has shown that psychological distress often persisted for many years.

The existing World War II studies often focused on cohorts exposed to very specific traumatic events during the war, such as being a prisoner of war or enslaved in a concentration camp. Fewer studies examined long-term mental health outcomes in representative samples that included the full range of individuals from countries involved in World War II or that compared individuals in these countries that differed in the intensity of their exposure to the war [35–37]. This makes it difficult to differentiate between the risks to mental health due to the more general deprivations associated with living in a country during wartime and due to traumatic events associated directly with the conflict, such as living through battles and witnessing atrocities. Differentiating effects on mental disorders of living in a country at war and experiencing war-related traumatic events is important to identify the blend of trauma-focused and psychosocial approaches to mental health services likely to be most effective in assisting war-affected populations [38, 39]. The current report presents the results of an analysis that attempted to do this by analyzing cross-sectional retrospectively reported data collected as part of the WHO World Mental Health (WMH) Surveys [40] on the long-term associations of having been a civilian in a country involved in World War II and having experienced war-related traumas with subsequent first onset and persistence of mental disorders.

We focus on three issues: overall lifetime risk of mental disorders associated with several indicators of war-related trauma exposure; variations in the strength of these associations over time; and the associations of the same exposures with persistence of disorders among respondents with lifetime histories of the disorders considered. Based on prior research, we anticipated that there would be

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significant associations of war-related exposures with lifetime mental disorders that would decay over time. Based on evidence that war-related disorders are often chronic, we also examine the persistence of these disorders in the WMH data.

Methods

Sample

The WMH Surveys have been administered in representative household samples of adults in 28 countries [41]. Our focus in this study is on a subsample of WMH countries that was directly involved in World War II: Belgium, France, Germany, Italy, Japan, Netherlands, Romania and Ukraine. The WMH surveys in these countries were based on stratified multistage clustered area probability household samples [42, 43] that were nationally representative in all countries other than Japan. The Japanese WMH survey was representative of a number of major cities in Japan [44]. Interviews in each WMH survey were carried out face-to-face in the homes of respondents. Informed consent was obtained from all study participants prior to administering the interview. Institutional review boards (IRB) of the organizations that carried out the survey in each country reviewed and provided IRB approval. Completed survey data were weighted to adjust for differential probabilities of selection within and between households and to match the sample with sociodemographic and geographic characteristics of the country. The sample considered in the current report consists of the 3,370 WMH respondents in the target surveys who were born in the country and were alive before the end of World War II.

Measures

Civilian in a war zone/region of terror

Respondents were asked a series of yes–no questions about lifetime exposure to traumatic experiences. Two of the 28 questions in that series were: "Were you ever an unarmed civilian in a place where there was a war, revolution, military coup or invasion?" and "Did you ever live as a civilian in a place where there was ongoing terror of civilians for political, ethnic, religious or other reasons?" If individuals responded in the affirmative to either of these questions, they were asked how old they were at the time this exposure started. Those who reported exposures that started during the years of World War II were identified as having been directly exposed to the war during World War II.

Sociodemographic characteristics

Sociodemographic covariates of interest include age at the start of the war, age at interview, sex, country of residence, and urbanicity of childhood home. Country of residence was coded as a series of dummy variables, one for each of the countries in the analysis. Childhood urbanicity was also coded as a series of dummy variables for residing in a large city, suburbs, small city, town/village, rural area, and moving around a lot.

War-related trauma

Six kinds of war-related traumatic events were assessed in the WMH traumatic experiences checklist in addition to being a civilian in a war zone/region of terror: being displaced, combat experience, witnessing atrocities, witnessing someone being seriously injured or killed or discovering a dead body, being kidnapped, and being stalked. As with the other traumatic experiences described above, respondents who reported each experience were asked their age at its occurrence and were coded as the experience being related to World War II if the experience occurred during the years of the war. Each exposure was coded as a yes–no dummy variable.

Mental disorders

Mental disorders measured on a lifetime and past-year basis included major depressive disorder, a number of anxiety disorders (agoraphobia with/without panic disorder, generalized anxiety disorder, panic disorder, post-traumatic stress disorder [PTSD], social phobia, specific phobia), and alcohol use disorder (alcohol abuse with or without dependence). All these disorders were assessed with the WHO Composite International Diagnostic Interview (CIDI) Version 3.0 [45], a fully structured interview administered by trained lay interviewers. DSM-IV criteria were used in making diagnoses. Prior research indicates good concordance between DSM-IV diagnoses of these disorders based on the CIDI and independent blinded diagnoses based on the Structured Clinical Interview for DSM-IV [46]. Age-of-onset of disorders was determined by retrospective recall of study participants using special probing techniques designed to optimize accuracy of dating [47]. The dependent variables considered here for lifetime onset were all individual disorders, as well as one group of disorders (any anxiety disorder). In the analysis of 12-month prevalence, limited sample sizes restricted the analysis to major depressive disorder and any anxiety disorder.
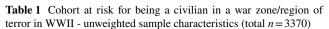
Data analysis

The associations of war-related trauma exposure with subsequent first onset of mental disorders were assessed with discrete-time survival analysis. The latter models used person-year as the unit of analysis and a logistic link function [48]. A dummy variable for being a civilian in a war zone/region of terror in World War II was used to predict subsequent first lifetime onset of mental disorders throughout the life course. The years of risk were classified as beginning at the start of World War II and continuing throughout the life course. Being a civilian in a war zone/region of terror started for each respondent at the age when the respondent reported it as starting within the years of the war. Baseline (as of the beginning of the war) sociodemographic characteristics were time-invariant. Control variables were also included for person-year. Respondents who reported onsets of the outcome disorder prior to the beginning of World War II were excluded from the analysis. We examined change in the strength of the association of being a civilian in a war zone/region of terror with first onset of each disorder over time by adding to the base models interactions of exposure with person-year. The analysis of persistence, in comparison, was carried out at the person-level and predicted 12-month prevalence among lifetime cases controlling for age-of-onset and time-since-onset. A logistic link function was used in this analysis. Coefficients and standard errors were exponentiated in all analyses and are reported here as odds ratios (ORs) with 95% confidence intervals (CI). Standard errors were estimated with the Taylor series method [49] to adjust for sample weighting and clustering. Statistical significance was evaluated consistently with 0.05 level design-based Wald Chi-square tests.

Table 1 Cohort at risk for being a civilian in a war zone/region of terror in WWII - unweighted sample characteristics (total $n = 3370$)

	Total sample	Not in war zone/region of terror $n = 2700$	Civilian in war zone/region of terror $n = 670$
	n (%)	n (%)	n (%)
Country			
Germany	282 (8.4)	210 (74.5)	72 (25.5)
France	305 (9.1)	230 (75.4)	75 (24.6)
Netherlands	258 (7.7)	176 (68.2)	82 (31.8)
Romania	714 (21.2)	693 (97.1)	21 (2.9)
Ukraine	464 (13.8)	236 (50.9)	228 (49.1)
Italy	520 (15.4)	461 (88.7)	59 (11.2)
Japan	560 (16.5)	492 (87.9)	68 (12.1)
Belgium	267 (7.9)	202 (75.7)	65 (24.3)
Geographical location growing up			
Large city	478 (14.5)	365 (76.4)	113 (23.6)
Suburbs	155 (4.7)	116 (74.8)	39 (25.2)
Small city	515 (15.6)	392 (76.1)	123 (23.9)
Town/village	1275 (38.5)	1103 (86.5)	172 (13.4)
Rural area	867 (26.1)	657 (75.6)	210 (24.2)
Moved around a lot	19 (0.6)	11 (57.9)	8 (42.1)
Sex			
Male	1344 (39.9)	1122 (83.5)	222 (16.5)
Female	2026 (60.1)	1578 (77.9)	448 (22.1)
		Mean	SD	Mean	SD
Age at interview		67.8	7.2	71.8	6.6
Persistence of mental disorders among lifetime cases			
Past 12 months major depressive episode			
Yes	264 (35.3)	180 (65.7)	94 (34.3)
No	502 (64.7)	363 (72.3)	139 (27.7)
Past 12 months anxiety disorder			
Yes	291 (60.1)	218 (74.9)	73 (25.1)
No	193 (39.9)	127 (65.8)	66 (34.2)

Results

Sample distributions of war exposure

Mean respondent age at the start of World War II was 5.3 years-old (SD = 5.6, range = 1–30), with 96.1% of respondents under age 18. Respondents who reported being a civilian in a war zone/region of terror were older at the beginning of the war than those living in the same country who were not exposed to war-related traumas (8.0 vs 4.6, $p < 0.0001$; age at interview: 71.8 vs. 67.8, $p < 0.0001$). Only about one-fifth (19.9%) of respondents ($n = 670$) reported being civilians in a war zone/region of terror during the war even though all respondents lived in countries at war (Table 1). The proportion of respondents who reported being in a war zone/region of terror varied substantially across

countries from a high of 49.1% in Ukraine to a low of 2.9% in Romania, reflecting differences in the intensity of combat across the countries during the war. Exposure was similar both for men (16.5%) and women (22.1%) and for respondents with different levels of urbanicity of childhood residence (13.5–25.2%). The exception is a much higher level of exposure (42.1%) among respondents who reported moving around a lot during their childhoods, presumably reflecting geographic relocation in response to exposure to the war.

Associations of being a WWII civilian in a war zone/region of terror and lifetime mental disorders

Lifetime prevalence of major depressive disorder, excluding respondents with depression prior to the war ($n = 14$, 0.4% of the sample), was 11.0% in the total sample and 17.3%

Table 2 Prevalence of DSM-IV mental disorders and association between being a civilian in a war zone/region of terror and subsequent first onset among people who were alive during WWII

	Prevalence—total sample	Prevalence—civilians not in war zone	Prevalence—civilians in war zone	Demographic adjusted[1]
	% (SE)	% (SE)	% (SE)	OR (95% CI)
Mood disorder				
Major depressive disorder[a]	11.0 (0.3)	9.4 (0.3)	17.3 (0.4)	1.5 (1.1, 1.9)*
Anxiety disorders				
PTSD[b]	2.8 (0.2)	2.4 (0.2)	4.5 (0.2)	1.3 (0.8, 2.2)
Generalized anxiety disorder[c]	2.7 (0.2)	2.4 (0.2)	4.0 (0.2)	1.2 (0.8, 2.0)
Specific phobia[d]	3.2 (0.2)	3.2 (0.2)	3.2 (0.2)	1.2 (0.7, 1.9)
Social phobia[e]	1.1 (0.1)	1.1 (0.1)	1.0 (0.1)	1.4 (0.3, 6.1)
Panic disorder[f]	1.4 (0.1)	1.1 (0.1)	2.5 (0.2)	1.9 (0.9, 4.1)
Agoraphobia with/without panic[g]	0.4 (0.1)	0.5 (0.1)	0.1 (0.03)	0.1 (0.01, 1.0)
Any anxiety disorder[h]	8.6 (0.3)	7.7 (0.3)	12.3 (0.3)	1.5 (1.1, 2.0)*
Substance disorders				
Alcohol[i]	3.9 (0.2)	4.0 (0.2)	3.8 (0.2)	1.3 (0.7, 2.3)

*Significant at $p < 0.05$

[1] All models controlled for sociodemographic predictors including person-year at risk, geographical region growing up, WMH survey country, sex, and age at start of WWII

[a] $n = 3356$

[b] $n = 3366$

[c] $n = 3368$

[d] $n = 3323$

[e] $n = 3367$

[f] $n = 3366$

[g] $n = 3369$

[h] $n = 3311$

[i] $n = 3370$

among respondents who were civilians in a war zone/region of terror (Table 2). Lifetime prevalence of anxiety disorders, excluding respondents with onset of an anxiety disorder prior to the war ($n = 59$, 1.8% of the sample), was 8.6% in the total sample and 12.3% among those who were civilians in a war zone/region of terror. Lifetime prevalence of alcohol disorder was 3.9% in the total sample and l3.8% among respondents those who were in a war zone/region of terror during the war. After controlling for pre-war sociodemographic characteristics, being a civilian in a war zone/region of terror was significantly associated with lifetime risk of major depression (OR 1.5, 95% CI 1.1, 1.9) and any anxiety disorder (OR 1.5, 95% CI 1.1, 2.0). There was no association of being a civilian in the war and alcohol disorder (OR 1.3, 95% CI 0.7, 2.3).

We next explored the extent to which controlling for six war-related stressors assessed in the survey accounted for the gross associations of being a civilian in a war zone/region of terror with subsequent onset of MDD (Table 3). When all six war traumas were included in a multivariate model, none of them was associated with this outcome. Nor was the joint test of the significance of all six traumas associated with onset of depression. We explored whether there was a dose–response relationship between number of war-related traumatic events and major depression or whether exposure to any traumatic event was more strongly associated with onset of the disorder. Odds of onset of major depression did not change with exposure to an increased number of events (OR 1.2, 95% CI 0.97, 1.6), but experiencing any of the six war traumas was associated with a marginally higher odd of major depression (OR 1.5, 95% CI 1.0, 2.2). After controlling for exposure to any war trauma in addition to other sociodemographic characteristics, being a civilian in a war zone/region of terror during WWII was still independently associated with lifetime onset of major depression (OR 1.4, 95% CI 1.0, 1.8).

We undertook this same set of analyses to assess the relationship between being a civilian in World War II and lifetime onset of any anxiety disorder (Table 4). The joint test of all six war traumas in a multivariate model was statistically significant ($\chi_6^2 = 20.0$, $p = 0.003$). However,

Table 3 Multivariate associations of being a civilian in a war zone/region of terror and war traumas with subsequent first onset of major depression among people who were alive during WWII

	Model 1 OR (95% CI)	Model 2[a] OR (95% CI)	Model 3 OR (95% CI)
Person-year at risk			
Age 1–20 (ref)	1	1	1
Age 21–30	1.9 (1.4, 2.7)	1.9 (1.4, 2.7)	1.9 (1.4, 2.7)
Age 31–40	2.2 (1.5, 3.2)	2.2 (1.5, 3.2)	2.2 (1.5, 3.2)
Age 41–50	2.6 (1.8, 3.7)	2.6 (1.8, 3.7)	2.6 (1.8, 3.6)
Age 51+	2.7 (2.0, 3.7)	2.7 (2.0, 3.6)	2.7 (2.0, 3.6)
	$x^2 \, 4df = 41.1, \, (p < 0.0001)$	$x^2 \, 4df = 40.8, \, (p < 0.0001)$	$x^2 \, 4df = 40.8, \, (p < 0.0001)$
Age at start of war	1.0 (0.9, 1.0)	0.9 (0.9, 1.0)	0.9 (0.9, 1.0)
Geographical location growing up			
Large city (ref)	1	1	1
Suburbs	1.4 (0.8, 2.6)	1.5 (0.8, 2.7)	1.4 (0.8, 2.6)
Small city	1.0 (0.7, 1.5)	1.0 (0.7, 1.5)	1.0 (0.7, 1.5)
Town/village	1.1 (0.8, 1.5)	1.1 (0.8, 1.6)	1.1 (0.8, 1.5)
Rural area	1.2 (0.8, 1.7)	1.2 (0.9, 1.8)	1.2 (0.9, 1.8)
Moved around a lot	1.7 (0.5, 6.5)	1.6 (0.5, 5.7)	1.7 (0.5, 5.8)
	$x^2 \, 5df = 4.0, \, (p = 0.54)$	$x^2 \, 5df = 3.6, \, (p = 0.61)$	$x^2 \, 5df = 4.4, \, (p = 0.49)$
Male sex	0.5 (0.4, 0.6)	0.5 (0.4, 0.6)	0.5 (0.4, 0.6)
WMH country			
Japan (ref)	1	1	1
Belgium	2.2 (1.4, 3.4)	2.2 (1.4, 3.4)	2.2 (1.4, 3.4)
Germany	1.5 (0.9, 2.4)	1.5 (0.9, 2.4)	1.5 (0.9, 2.3)
Italy	2.3 (1.5, 3.3)	2.2 (1.5, 3.3)	2.2 (1.5, 3.3)
The Netherlands	2.5 (1.7, 3.8)	2.5 (1.6, 3.7)	2.5 (1.6, 3.8)
France	5.0 (3.4, 7.4)	5.0 (3.4, 7.4)	5.0 (3.4, 7.4)
Ukraine	5.0 (3.2, 7.7)	5.0 (3.2, 7.7)	4.9 (3.2, 7.6)
Romania	0.9 (0.5, 1.4)	0.9 (0.5, 1.4)	0.9 (0.5, 1.4)
	$x^2 \, 7df = 144.1, \, (p < 0.0001)$	$x^2 \, 7df = 148.5, \, (p < 0.0001)$	$x^2 \, 7df = 146.6, \, (p < 0.0001)$
Civilian in war zone	1.5 (1.1, 1.9)*	1.4 (1.1, 1.9)*	1.4 (1.0, 1.8)*
War traumas			
Displacement	–	1.1 (0.6, 2.1)	–
Saw atrocities	–	0.9 (0.4, 2.2)	–
Stalked	–	2.7 (0.5, 13.4)	–
Kidnapped	–	1.6 (0.7, 3.9)	–
Witnessed death	–	1.5 (0.9, 2.6)	–
Combat	–	0.2 (0.02, 1.3)	–
Any war trauma	–	–	1.5 (1.0, 2.2)*

*Significant at $p < 0.05$

[a]Joint significance of 6 coefficients associated with war traumas in multivariate model ($p = 0.15$)

being stalked was the only war-related trauma that was significantly associated with the outcome in the multivariate model (OR 8.7, 95% CI 2.8, 26.8). We explored whether there was a dose–response relationship between number of war-related traumatic events and onset of anxiety disorders, or whether exposure to any traumatic event was associated with the outcome. Neither number of traumas (OR 1.1, 95% CI 0.7, 1.8) nor presence of any of the traumas (OR 1.1, 95% CI 0.8, 1.5) was associated with lifetime risk of anxiety disorders. After controlling for the war trauma of being stalked and other sociodemographic characteristics, being a civilian in a war zone/region of terror during World War II remained associated with lifetime risk of any anxiety disorder (OR 1.4, 95% CI 1.0, 2.0).

Time decay in the significant associations

We assessed whether the significant associations between being a civilian in World War II with subsequent age-of-onset of first episode of MDD and anxiety disorders changed over time by constructing models that included

Table 4 Multivariate associations of being a civilian in a war zone/region of terror and war traumas with subsequent first onset of any anxiety disorder among people who were alive during WWII

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Person-year at risk			
Age 1–20 (ref)	1	1	1
Age 21–30	0.4 (0.2, 0.5)	0.4 (0.2, 0.6)	0.4 (0.2, 0.5)
Age 31–40	0.4 (0.3, 0.6)	0.4 (0.3, 0.6)	0.4 (0.3, 0.6)
Age 41–50	0.4 (0.3, 0.6)	0.4 (0.3, 0.6)	0.4 (0.3, 0.6)
Age 51+	0.4 (0.3, 0.5)	0.4 (0.3, 0.5)	0.4 (0.3, 0.5)
	$x^2 \, 4df = 65.0, (p < 0.0001)$	$x^2 \, 4df = 65.4, (p < 0.0001)$	$x^2 \, 4df = 65.0, (p < 0.0001)$
Age at start of war	1.0 (0.9, 1.0)	0.9 (0.9, 1.0)	0.9 (0.9, 1.0)
Geographical location growing up			
Large city (ref)	1	1	1
Suburbs	1.5 (0.6, 3.6)	1.5 (0.6, 3.6)	1.5 (0.6, 4.0)
Small city	1.2 (0.7, 2.0)	1.3 (0.8, 2.1)	1.2 (0.7, 2.1)
Town/village	1.2 (0.8, 1.9)	1.2 (0.8, 1.9)	1.2 (0.8, 2.0)
Rural area	1.2 (0.7, 1.9)	1.2 (0.3, 4.6)	1.2 (0.7, 1.9)
Moved around a lot	1.2 (0.3, 4.5)	1.5 (0.7, 2.9)	1.2 (0.3, 4.6)
	$x^2 \, 5df = 1.1 \, (p = 1.0)$	$x^2 \, 5df = 1.4 \, (p = 0.93)$	$x^2 \, 5df = 1.2 \, (p = 1.0)$
Male sex	0.4 (0.3, 0.6)	0.4 (0.3, 0.6)	0.4 (0.3, 0.6)
WMH country			
Japan (ref)	1	1	1
Belgium	1.5 (0.7, 2.9)	1.5 (0.7, 2.9)	1.4 (0.7, 2.9)
Germany	2.2 (1.3, 3.7)	2.2 (1.3, 3.7)	2.1 (1.3, 3.6)
Italy	2.1 (1.2, 3.5)	2.0 (1.2, 3.5)	2.1 (1.2, 3.6)
The Netherlands	2.3 (1.2, 4.2)	2.3 (1.2, 4.2)	2.3 (1.3, 4.2)
France	3.6 (2.2, 5.9)	3.6 (2.2, 5.9)	3.6 (2.2, 5.9)
Ukraine	2.9 (1.8, 4.5)	2.9 (1.8, 4.5)	2.9 (1.9, 3.5)
Romania	0.7 (0.4, 1.4)	0.7 (0.4, 1.4)	0.7 (0.4, 1.4)
	$x^2 \, 7df = 47.7 \, (p < 0.0001)$	$x^2 \, 7df = 48.4 \, (p < 0.0001)$	$x^2 \, 7df = 48.5 \, (p < 0.0001)$
Civilian in war zone	1.5 (1.1, 2.0)*	1.5 (1.1, 2.1)*	1.4 (1.0, 2.0)*
War traumas			
Displacement	–	0.7 (0.3, 1.4)	–
Saw atrocities	–	1.0 (0.4, 2.7)	–
Stalked	–	8.8 (2.9, 26.8)*	8.7 (2.8, 26.8)*
Kidnapped	–	2.0 (0.6, 7.0)	–
Witnessed death	–	1.1 (0.5, 2.1)	–
Combat	–	0.5 (0.1, 2.9)	–

*Significant at $p < 0.05$

an interaction term between being a civilian in the war and person-year. The interaction was significant in predicting MDD ($\chi_1^2 = 21.2$, $p < 0.0001$). Decomposition of the interaction predicting MDD showed that being a civilian in a war zone/region of terror was associated with MDD over the age ranges 1–20 (OR 2.4, 95% CI 1.5, 3.9) and 21–30 (OR 1.9, 95% CI 1.2, 3.0), but not thereafter (Ages 31–40 OR 1.7, 95% CI 0.9, 3.1; Ages 40–50 OR 1.4, 95% CI 0.7, 2.5; Ages 51+ OR 0.9, 95% CI 0.6, 1.3).

As with major depression, we assessed whether the observed relationship between being a civilian in World War II and anxiety disorders changed over time by constructing models with interaction terms between the exposure and person-years at risk. The interaction between being a civilian in the war and person-year was not significant ($\chi_1^2 = 0.12$, p = 0.74). However, when person-years were categorized into ages 1–30 and ages 31+, being a civilian in a war zone or region of terror was associated with onset of any anxiety disorder after age 30 (OR 1.8, 95% CI 1.2, 2.6) but not before (OR 1.1, 95% CI 0.7, 1.7).

Table 5 Multivariate associations of being a civilian in a war zone/region of terror and sociodemographic characteristics with persistence of major depression and anxiety disorders among lifetime cases

	Bivariate OR (95% CI)	Multivariate model 1 OR (95% CI)	Multivariate model 2 OR (95% CI)
Depression (n = 776)			
Age at interview	1.0 (0.99, 1.03)	1.01 (0.98, 1.03)	1.02 (0.9, 1.04)
Age at onset of major depressive episode	1.0 (0.99, 1.01)	1.01 (1.0, 1.02)	1.0 (1.0, 1.02)
Geographical location growing up			
Large city (reference)	1	1	1
Suburbs	0.7 (0.4, 1.5)	0.66 (0.4, 1.2)	0.7 (0.4, 1.3)
Small city	1.0 (0.5, 2.0)	0.79 (0.4, 1.6)	0.8 (0.4, 1.5)
Town/village	1.0 (0.6, 1.7)	0.90 (0.5, 1.5)	1.0 (0.6, 1.6)
Rural area	2.2 (1.2, 3.8)	0.87 (0.5, 1.7)	0.9 (0.5, 1.7)
Moved around a lot	<0.001 (<0.001, <0.001)	<0.001 (<0.001, <0.001)	<0.001 (<0.001, <0.001)
	x^2 $5df = 1509.6$, $(p < 0.0001)$	x^2 $5df = 1041.2$, $(p < 0.0001)$	x^2 $5df = 1523.5$, $(p < 0.0001)$
Male sex	0.8 (0.6, 1.1)	0.80 (0.55, 1.16)	0.8 (0.6, 1.2)
Civilian in war zone	1.0 (0.7, 1.6)	0.73 (0.43, 1.21)	0.6 (0.4, 1.1)
WMH survey site	x^2 $7df = 85.6$, $(p < 0.0001)$	x^2 $7df = 77.8$, $(p < 0.0001)$	x^2 $7df = 86.2$, $(p < 0.0001)$
Any anxiety disorder	2.0 (1.5, 2.7)	–	2.4 (1.7, 3.3)
Anxiety (n = 484)			
Age at interview	0.95 (0.92, 0.98)	0.98 (0.94, 1.0)	0.98 (0.94, 1.0)
Age at onset of anxiety disorder	0.98 (0.97, 0.99)	0.98 (0.97, 0.99)	0.98 (0.97, 0.99)
Geographical location growing up			
Large city (reference)	1	1	1
Suburbs	2.4 (1.0, 5.6)	2.6 (1.0, 7.0)	2.6 (1.0, 7.0)
Small city	0.8 (0.34, 1.9)	0.9 (0.4, 2.2)	0.9 (0.4, 2.2)
Town/village	1.2 (0.6, 2.5)	1.6 (0.7, 3.6)	1.6 (0.7, 3.6)
Rural area	0.8 (0.4, 1.7)	0.9 (0.4, 1.9)	0.9 (0.4, 1.9)
Moved around a lot	0.4 (0.1, 1.6)	0.3 (0.03, 3.9)	0.3 (0.03, 3.8)
	x^2 $5df = 40.3$, $(p < 0.0001)$	x^2 $5df = 15.9$, $(p = 0.007)$	x^2 $5df = 15.8$, $(p = 0.008)$
Number of anxiety disorders	2.3 (1.2, 4.5)	2.0 (1.1, 3.7)	2.0 (1.1, 3.6)
Male sex	0.7 (0.5, 1.1)	0.7 (0.5, 1.1)	0.7 (0.5, 1.1)
Civilian in war zone	0.4 (0.3, 0.7)	0.4 (0.2, 0.7)	0.4 (0.2, 0.7)
WMH survey site	x^2 $7df = 41.8$, $(p < 0.0001)$	x^2 $7df = 77.34$, $(p < 0.0001)$	x^2 $7df = 76.4$, $(p < 0.0001)$
Major depressive episode	1.0 (0.7, 1.4)	–	1.2 (0.8, 1.8)

*Significant at $p < 0.05$

Associations of being a WWII civilian in a war zone/region of terror and past year mental disorders

We next examined the relationship between being a civilian in a war zone/region of terror and past-year episodes of major depression among people with lifetime history of MDD having onsets after the beginning of World War II (Table 5). The conditional prevalence of past year MDD among lifetime cases was 34.67%. After controlling for sociodemographic characteristics, being a civilian in a war zone/region of terror was not associated with 12-month MDD (OR 0.6, 95% CI 0.4, 1.1). However, history of a co-occurring anxiety disorder was associated with elevated odds of 12-month MDD among lifetime cases (OR 2.4, 95% CI 1.7, 3.3).

Among respondents with a lifetime history of any anxiety disorder, 60.87% had a 12-month diagnosis. After controlling for sociodemographic characteristics, those with a history of having been a civilian in a war zone/region of terror in World War II were significantly less likely than others to have a prior 12-month anxiety disorder (OR 0.4, 95% CI 0.2, 0.7). After controlling for sociodemographic characteristics, number of lifetime anxiety disorders was independently associated with 12-month diagnosis of any anxiety disorder (OR 2.0, 95% CI 1.1, 3.6). History of a co-occurring MDD was not associated with the outcome (OR 1.2, 95% CI 0.8, 1.8).

Discussion

Being a civilian in a war zone/region of terror was associated with elevated lifetime risk of major depressive disorder and anxiety disorder among people who lived through World War II. There was no such association with onset of individual anxiety or alcohol disorders. The significant associations changed over time. The association with major depression decayed over time, while the association with anxiety disorder increased over time. There was no relationship between war exposure and persistence of major depression but a negative association with persistence of anxiety disorder was present. The gross association of being a civilian in a war zone or region of terror in World War II was not explained by controlling for a number of more concrete types of war-related trauma exposure.

There are important study limitations to be noted. First, causal inferences cannot be made given the observational design. Second, descriptive associations might be biased due to recall error and sample selection bias. Individuals who reported living in a war zone/region of terror were older than the comparison group and may in part account for the higher prevalence of mental disorders. The possibility of early mortality among individuals with mental disorders compared to those without a disorder may have attenuated the observations associations between war exposure and mental health. There are additional statistical limitations to our analysis. The lack of association between being a civilian in a war zone/region of terror and onset of individual anxiety disorders may be reflective of the lower base rates of these disorders compared to the aggregated disorders. Likewise, the absence of an association between war exposure and alcohol disorder may be due to the lower base rate of the disorder compared to depression and aggregated anxiety disorders. Additionally, the lower number of males in the sample due to earlier mortality than women, along with the possibility of differential mortality in men who may have had alcohol disorders related to World War II, might explain the absence of an association between exposure to war and alcohol disorders. Despite these limitations, our results contribute to understanding of the association between war-related trauma and mental disorders. This is the first study, to our knowledge, that evaluated long-term lifetime risk of a range of mental disorders in a cross-national sample of individuals who were civilians in a war zone/region of terror in World War II.

Alternative explanations are possible for our findings. Experiences common to civilians in a war zone/region of terror that have been found to be associated with adverse mental health outcomes in previous studies include chronic fear of safety, deprivation of food and other basic needs [50, 51], and disruption in family structures [52]. Exposure to the daily stressors associated with war may also have had a cumulative impact on mental health equal to or more important than the effects of major traumatic events [39]. The PTSD section of the CIDI interview asked about only a limited number of more specific war-related traumas. Much more extensive inventories of war exposures exist [53–55]. The broad question in the WMH surveys about being a civilian in a war zone/region of terror might have been a marker for these unmeasured traumas, with the experience of being a civilian in the war itself relatively unimportant. We have no way to evaluate this possibility directly due to the fact that so few questions were asked in the WMH surveys about explicit types of war-related exposures. However, our failure to document a significant dose–response relationship between number of these exposures and the mental health outcomes raises the possibility suggested in the introduction that general adversities associated with living in a war zone were more important than particular component trauma exposures in accounting for the associations documented here. If so, then this would argue against clinical interventions emphasizing trauma-focused therapies. It is important to recognize, though, that the situation might be very different among survivors of more recent conflicts, many of which have had a more sectarian focus than in World War II.

Our results partially align with WMH survey research that has examined the relationship between war traumas experienced in a national-level conflict and mental disorders. Specific to the Lebanon Civil War, Karem et al. [56] found that being a civilian in a war zone was associated with higher odds of lifetime onset of mood disorders, and being a civilian in a region of terror was associated with higher odds of lifetime onset of any anxiety disorder, even after controlling for other war traumas. Contrary to our results, though, witnessing death or injury was associated with lifetime mood disorders in the Lebanon study, although, as in our analysis, displacement and witnessing atrocities were not associated with lifetime onset of either mood or anxiety disorders [56].

Other studies of the relationship between war traumas and mental disorders focused almost exclusively on current mental disorders. Research on community samples after the war in the Balkans (1991–2001) found that witnessing violence during the war was associated with depression [54, 57] and being kidnapped, witnessing violence, and engaging in combat with PTSD [57]. These results differ from the WMH finding that being a civilian itself was the key predictor of anxiety-mood disorders in long-term survivors of World War II.

Our failure to find that war exposure was not related to persistence of depression and was inversely related to persistence of anxiety might seem to be inconsistent with the studies noted in the introduction documenting that the war-related

mental disorders of long-term survivors of World War II are often persistent. However, those studies did not compare persistence of war-related mental disorders with persistence of mental disorders among people not exposed to World War II. Anxiety and mood disorders are highly persistent no matter how they come about [58]. It is plausible that the cases that occurred in response to resolved traumas might be more likely to recover than other cases, although a long-term study by Bramsen and van der Ploeg [59] found that being a civilian in a war zone in World War II in the Netherlands was associated with a current diagnosis of PTSD.

Our findings that exposure to war is a predictor of first onset of mental disorders decades after the end of conflict indicates that a focus on short-term mental health service provision is extremely important, but not sufficient, to address the needs of individuals exposed to war and political unrest. Older individuals who lived through wars earlier in the 20th century may be a particularly at-risk population for mental health problems [37, 60, 61]. Although this study focuses on World War II, findings are potentially relevant for contemporary wars and conflicts. Prioritizing mental health care for individuals forcibly displaced from their homes and living in refugee camps or third country resettlement is extremely important; in conjunction with this, our results suggest that we need to engage in proactive, strategic planning of mental health policies and programs that will serve to address the long-term mental health needs of war-affected populations in post-conflict settings.

Conclusion

There are currently a record number of people worldwide affected by conflict, the most since World War II [2]. Understanding the epidemiology of onset of mental disorders and long-term trajectories of the mental health of war-affected populations is important for developing mental health policies and programs that can prevent and ameliorate the burden of psychiatric disorders among civilians who have lived through war and political unrest. Future research should be done on the long-term mental health outcomes of survivors of other conflicts in the 20th century to identify if our findings are replicated elsewhere.

Compliance with ethical standards

Appendix

See Table 6.

Table 6 Changes over time in the multivariate associations of being a civilian in a war zone/region of terror and war traumas with subsequent first onset of major depression and anxiety disorders among people who were alive during WWII

	Major depression OR (95% CI)	Anxiety disorders OR (95% CI)
Person-year at risk		
Age 1–20 (ref)	1	
Age 21–30	2.0 (1.6, 2.5)	Age 1–30: 1
Age 31–40	2.4 (1.9, 3.0)	Age 31+: 0.5 (0.4, 0.5)
Age 41–50	3.0 (2.5, 3.7)	
Age 51+	3.5 (2.9, 4.2)	
	x^2 4df = 49.3, ($p < 0.0001$)	x^2 1df = 25.8, ($p < 0.0001$)
Age at start of war	0.9 (0.9, 1.0)	0.9 (0.9, 1.0)
Geographical location growing up		
Large city (ref)	1	1
Suburbs	1.4 (0.8, 2.6)	1.5 (0.6, 3.7)
Small city	1.0 (0.7, 1.5)	1.2 (0.7, 2.1)
Town/village	1.1 (0.8, 1.5)	1.2 (0.8, 2.0)
Rural area	1.2 (0.9, 1.8)	1.2 (0.7, 1.9)
Moved around a lot	1.7 (0.5, 5.5)	1.2 (0.3, 4.6)
	x^2 5df = 4.5, ($p = 0.48$)	x^2 5df = 1.2, ($p = 1.0$)
Male sex	0.5 (0.4, 0.6)	0.4 (0.3, 0.6)
WMH country		
Japan (ref)	1	1
Belgium	2.2 (1.4, 3.4)	1.5 (0.7, 2.9)
Germany	1.5 (0.9, 2.4)	2.1 (1.3, 3.6)
Italy	2.3 (1.5, 3.3)	2.1 (1.2, 3.6)
The Netherlands	2.5 (1.6, 3.8)	2.3 (1.3, 4.3)
France	5.0 (3.4, 7.4)	3.6 (2.2, 5.9)
Ukraine	5.0 (3.4, 7.4)	2.9 (1.9, 4.6)
Romania	0.9 (0.5, 1.4)	0.7 (0.4, 1.4)
	x^2 7df = 147.9, ($p < 0.0001$)	x^2 7df = 49.0, ($p < 0.0001$)
Any war trauma	1.5 (1.1, 2.2)*	–
Stalked	–	8.2 (2.6, 25.3)*
Person-year at risk × civilian in a war zone		
Age 1–20	2.4 (1.5, 3.9)*	Ages 1–30: 1.1 (0.7, 1.7)
Age 21–30	1.9 (1.2, 3.0)*	Ages 31+: 1.8 (1.2, 2.6)*
Age 31–40	1.7 (0.9, 3.1)	
Age 41–50	1.3 (0.7, 2.4)	
Age 51+	0.9 (0.6, 1.3)	

*Significant at $p < 0.05$

References

1. The World Bank (2011) World Development Report 2011: conflict, security and development. The International Bank for Reconstruction and Development/The World Bank, Washington DC
2. United Nations High Commissioner for Refugees (2016) Global trends: forced displacement in 2015. http://www.unhcr.org/576408cd7.pdf
3. Galea S, Wortman K (2006) The population health argument against war. World J Psychiatry 5(1):31–32
4. Karam E, Ghosn MB (2003) Psychosocial consequences of war among civilian populations. Curr Opin Psychiatry 16(4):413–419
5. Steel Z, Chey T, Silove D, Marnane C, Bryant RA, van Ommeren M (2009) Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. JAMA 302(5):537–549
6. Murthy RS, Lakshminarayana R (2006) Mental health consequences of war: a brief review of research findings. World J Psychiatry 5(1):25–30
7. Fazel M, Wheeler J, Danesh J (2005) Prevalence of serious mental disorder in 7000 refugees resettled in western countries: a systematic review. The Lancet 365(9467):1309–1314
8. Bronstein I, Montgomery P (2011) Psychological distress in refugee children: a systematic review. Clin Child Fam Psychol Rev 14(1):44–56
9. Roberts B, Browne J (2011) A systematic review of factors influencing the psychological health of conflict-affected populations in low-and middle-income countries. Glob Public Health 6(8):814–829

10. Porter M, Haslam N (2005) Predisplacement and postdisplacement factors associated with mental health of refugees and internally displaced persons: a meta-analysis. JAMA 294(5):602–612

11. Eytan A, Numyandamutsa N, Nkubamugisha P, Gex-Fabry M (2014) Long-term mental health outcome in post-conflict settings: similarities and differences between Kosovo and Rwanda. Int J Soc Psychiatry 61(4):363–372. doi:10.1177/0020763014547062

12. Mugisha J, Muyinda H, Malamba S, Kinyanda E (2015) Major depressive disorder seven years after the conflict in northern Uganda: burden, risk factors and impact on outcomes (The Wayo-Nero Study). BMC Psychiatry 15(48). doi:10.1186/s12888-015-0423-z

13. Priebe S, Bogic M, Ajdukovic D, Franciskovic T, Galeazzi GM, Kucukalic A, Schützwohl M (2010) Mental disorders following war in the Balkans: a study in 5 countries. Arch Gen Psychiatry 67(5):518–528

14. Farhead L, Dimassi H, Strauss N (2013) Understanding post-conflict mental health: assessment of PTSD, depression, general health and life events in civilian population one year after the 2006 war in South Lebanon. J Trauma Stress Disord Treat 2(2). doi:10.4172/2324-8947.1000103

15. Lecic-Tosevski D, Pejuskovic B, Miladinovic T, Toskovic O, Priebe S (2013) Posttraumatic stress disorder in a Serbian community: seven years after trauma exposure. J Nerv Ment Dis 201(12):1040–1044

16. Ayazi T, Lien L, Eide A, Ruom M, Hauff E (2012) What are the risk factors for the comorbidity of posttraumatic stress disorder and depression in a war-affected population? A cross-sectional community study in South Sudan. BMC Psychiatry 12(175). doi:10.1186/1471-244X-12-175

17. Hourani LL, Armenian H, Zurayk H, Afifi L (1986) A population-based survey of loss and psychological distress during war. Soc Sci Med 23(3):269–275

18. Cardozo BL, Vergara A, Agani F, Gotway CA (2000) Mental health, social functioning, and attitudes of Kosovar Albanians following the war in Kosovo. JAMA 284(5):569–577

19. de Jong JT, Komproe IH, Van Ommeren M, El Masri M, Araya M, Khaled N, Somasundaram D (2001) Lifetime events and posttraumatic stress disorder in 4 postconflict settings. JAMA 286(5):555–562

20. Rousseau C, Drapeau A (2003) Are refugee children an at-risk group? A longitudinal study of Cambodian adolescents. J Refug Stud 16(1):67–81

21. Montgomery E (2010) Trauma and resilience in young refugees: a 9-year follow-up study. Dev Psychopathol 22(02):477–489

22. Hjern A, Angel B (2000) Organized violence and mental health of refugee children in exile: a six-year follow-up. Acta Paediatr 89(6):722–727

23. Mollica RF, Sarajlic N, Chernoff M, Lavelle J, Vukovic IS, Massaglik MP (2001) Longitudinal study of psychiatric symptoms, disability, mortality, and emigration among Bosnian refugees. JAMA 286(5):546–554

24. Beiser M, Hou F (2001) Language acquisition, unemployment and depressive disorder among Southeast Asian refugees: a 10-year study. Soc Sci Med 53(10):1321–1334

25. Hunt N, Robbins I (2001) The long-term consequences of war: the experience of World War II. Aging Ment Health 5(2):183–190

26. Cook JM, Riggs DS, Thompson R, Coyne JC, Sheikh JI (2004) Posttraumatic stress disorder and current relationship functioning among World War II ex-prisoners of war. J Fam Psychol 18(1):36–45

27. Lee KA, Vaillant GE, Torrey WC, Elder GH (1995) A 50-year prospective study of the psychological sequelae of World War II combat. Am J Psychiatry 152(4):516–522

28. Sutker PB, Allain AN, Winstean DK (1993) Psychopathology and psychiatric diagnoses of World War II Pacific theater prisoner of war survivors and combat veterans. Am J Psychiatry 150:240–245

29. Lis-Turlejska M, Luczczynska A, Plichta A, Benight C (2008) Jewish and non-Jewish World War II child and adolescent survivors at 60 years after war: effects of parental loss and age at exposure on well-being. Am J Orthopsychiatr 78(3):369–377

30. Sharon A, Levav I, Brodsky J, Shemesh A, Kohn R (2009) Psychiatric disorders and other health dimensions among Holocaust survivors 6 decades later. Br J Psychiatry 195(4):331–335

31. Shmotkin D, Lomranz J (1998) Subjective well-being among Holocaust survivors: an examination of overlooked differentiations. J Pers Soc Psychol 75(1):141–155

32. Räikkönen K, Lahti M, Heinonen K, Pesonen AK, Wahlbeck K, Kajantie E, Eriksson JG (2011) Risk of severe mental disorders in adults separated temporarily from their parents in childhood: The Helsinki birth cohort study. J Psychiatr Res 45(3):332–338

33. Pesonen A, Raikkonen K, Heinonen K, Kajantie E, Forsen T, Eriksson J (2007) Depressive symptoms in adults separated from their parents as children: a natural experiment during World War II. Am J Epidemiol 166(10):1126–1133

34. Foster D, Davies S, Steele H (2003) The evacuation of British children during World War II: a preliminary investigation into the long-term psychological effects. Aging Ment Health 7(5):398–408

35. Freitag S, Braehler E, Schmidt S, Glaesmer H (2013) The impact of forced displacement in World War II on mental health disorders and health-related quality of life in late life—a German population-based study. Int Psychogeriatr 25(2):310–319

36. Kuwert P, Braehler E, Freyberger H, Glaesmer H (2012) More than 60 years later: The mediating role of trauma and posttraumatic stress disorder for the association of forced displacement in World War II with somatization in old age. J Nerv Ment Dis 200(10):911–914

37. Glaesmer H, Gunzelmann T, Braehler E, Forstmeier S, Maercker A (2010) Traumatic experiences and post-traumatic stress disorder among elderly Germans: results of a representative population-based survey. Int Psychogeriatr 22(4):661–670

38. Miller KE, Rasmussen A (2010) War exposure, daily stressors, and mental health in conflict and post-conflict setting: bridging the divide between trauma-focused and psychosocial frameworks. Soc Sci Med 70(1):7–16

39. Miller KE, Rasmussen A (2014) War experiences, daily stressors and mental health five years on: elaborations and future directions. Intervention 12(S1):33–42

40. Kessler RC, Aguilar-Gaxiola S, Alonso J, Chatterji S, Lee S, Ormel J, Ustun T, Wang P (2009) The global burden of mental disorders: an update from the WHO World Mental Health (WMH) surveys. Epidemiol Psichiatr Soc 18(01):23–33

41. Kessler R, McLaughlin K, Green J, Gruber M et al (2010) Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. B J Psychiatry 197(5):378–385

42. Kessler RC, Angermeyer M, Anthony JC, de Graaf R, Demyttenaere K, Gasquet I, Üstün TB (2007) Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative. World J Psychiatry 6(3):168–176

43. Heeringa SG, Wells JE, Hubbard F, Mneimneh ZN, WaiTat C, Sampson NA, Üstün TB (2008) Sample designs and sampling procedures. The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders, pp 14–32

44. Kawakami N, Takeshima T, Ono Y, Uda H, Hata Y, Nakane Y, …Kikkawa T (2005) Twelve-month prevalence, severity, and treatment of common mental disorders in communities in Japan: preliminary finding from the World Mental Health Japan Survey 2002–2003. Psychiatry Clin Neurosci 59(4):441–452

45. Kessler RC, Ustun TB (2004) The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int J Methods Psychiatr Res 13(2):93–121

46. Haro JM, Arbabzadeh-Bouchez S, Brugha TS, De Girolamo G, Guyer ME, Jin R, Kessler RC (2006) Concordance of the Composite International Diagnostic Interview Version 3.0 (CIDI 3.0) with standardized clinical assessments in the WHO World Mental Health Surveys. Int J Methods Psychiatr Res 15(4):167–180

47. Knäuper B, Cannell CF, Schwarz N, Bruce ML, Kessler RC (1999) Improving accuracy of major depression age-of-onset reports in the US National Comorbidity Survey. Int J Methods Psychiatr Res 8(1):39–48

48. Singer JD, Willett JB (1993) It's about time: using discrete-time survival analysis to study duration and the timing of events. J Educ Stat 18(2):155–195

49. Wolter KM (1985) Introduction to Variance Estimation. Springer-Verlag, New York

50. Rasmussen A, Nguyen L, Wilkinson J, Vundla S, Raghavan S, Miller KE, Keller AS (2010) Rates and impact of trauma and current stressors among Darfuri refugees in Eastern Chad. Am J Orthopsychiatry 80(2):227–236

51. Fernando GA, Miller KE, Berger DE (2010) Growing pains: the impact of disaster-related and daily stressors on the psychological and psychosocial functioning of youth in Sri Lanka. Child Dev 81(4):1192–1210

52. Fazel M, Reed RV, Panter-Brick C, Stein A (2012) Mental health of displaced and refugee children resettled in high-income countries: risk and protective factors. Lancet 379(9812):266–282

53. Betancourt TS, Borisova II, De la Soudiere M, Williamson J (2011) Sierra Leone's child soldiers: war exposures and mental health problems by gender. J Adolesc Health 49(1):21–28

54. Layne CM, Olsen JA, Baker A, Legerski JP, Isakson B, Pašalić A., Saltzman WR (2010) Unpacking trauma exposure risk factors and differential pathways of influence: predicting postwar mental distress in Bosnian adolescents. Child Dev 81(4):1053–1076

55. Macksoud MS, Aber JL (1996) The war experiences and psychosocial development of children in Lebanon. Child Dev 67(1):70–88

56. Karam EG, Mneimneh ZN, Dimassi H, Fayyad JA, Karam AN, Nasser SC, Chatterji S, Kessler RC (2008) Lifetime prevalence of mental disorders in Lebanon: first onset, treatment, and exposure to war. PLoS Med 5:e61. doi:10.1371/journal.pmed.0050061

57. Priebe S, Bogic M, Ashcroft R, Franciskovic T, Galeazzi GM, Kucukalic A, Adjukovic D (2010) Experience of human rights violations and subsequent mental disorders—a study following the war in the Balkans. Soc Sci Med 71(12):2170–2177. doi:10.1016/j.socscimed.2010.09.029

58. Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine J, Polidori G (2004) Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. JAMA 291(21):2581–2590

59. Bramsen I, van der Ploeg HM (1999) Fifty years later: the long-term psychological adjustment of ageing World War II survivors. Acta Psychiatr Scand 100(5):350–358

60. Kuwert P, Braehler E, Glaesmer H, Freyberger H, Decker O (2009) Impact of forced displacement during World War II on the present-day mental health of the elderly: a population-based study. Int Psychogeriatr 21(4):748–753

61. Strauss K, Dapp U, Anders J. von Rentein-Kruse W, Schmidt S (2011) Range and specificity of war-related trauma to post-traumatic stress; depression and general health perception: displaced former World War II children in late life. J Affect Disord 128(3):267–276