

Research Article

CUMULATIVE TRAUMAS AND RISK THRESHOLDS: 12-MONTH PTSD IN THE WORLD MENTAL HEALTH (WMH) SURVEYS

Elie G. Karam, M.D.,¹ Matthew J. Friedman, M.D., Ph.D.,² Eric D. Hill, M.S.P.H.,³ Ronald C. Kessler, Ph.D.,³ Katie A. McLaughlin, Ph.D.,⁴ Maria Petukhova, Ph.D.,³ Laura Sampson, B.A.,³ Victoria Shahly, Ph.D.,³ Matthias C. Angermeyer, M.D.,⁵ Evelyn J. Bromet, Ph.D.,⁶ Giovanni de Girolamo, M.D.,⁷ Ron de Graaf, Ph.D., M.Sc.,⁸ Koen Demyttenaere, M.D., Ph.D.,⁹ Finola Ferry, Ph.D.,¹⁰ Silvia E. Florescu, M.D., Ph.D.,¹¹ Josep Maria Haro, M.D., Ph.D., M.P.H.,¹² Yanling He, M.D., M.H.,¹³ Aimee N. Karam, Ph.D.,¹ Norito Kawakami, M.D., D.M.Sc.,¹⁴ Viviane Kovess-Masfety, M.D., Ph.D.,¹⁵ María Elena Medina-Mora, Ph.D.,¹⁶ Mark A. Oakley Browne, F.R.A.N.Z.C.P., Ph.D.,¹⁷ José A. Posada-Villa, M.D.,¹⁸ Arieh Y. Shalev, M.D.,¹⁹ Dan J. Stein, M.D., Ph.D.,²⁰ Maria Carmen Viana, M.D., Ph.D.,²¹ Zahari Zarkov, M.D.,²² and Karestan C. Koenen, Ph.D.^{23*}

¹Department of Psychiatry and Clinical Psychology, Institute for Development, Research, Advocacy, and Applied Care (IDRAAC), St. George Hospital University Medical Center, Beirut, Lebanon

²U.S. Department of Veterans Affairs, National Center for PTSD, Geisel School of Medicine at Dartmouth, Hanover, New Hampshire

³Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts

⁴Division of General Pediatrics, Children's Hospital Boston, Harvard Medical School, Boston, Massachusetts

⁵Center for Public Mental Health, Gösing am Wagram, Austria

⁶Department of Psychiatry, State University of New York at Stony Brook, Stony Brook, New York

⁷IRCCS Centro S. Giovanni di Dio Fatebenefratelli, Bologna, Italy

⁸Netherlands Institute of Mental Health and Addiction, the Netherlands

⁹Department of Psychiatry, University Hospital Gasthuisberg, University Hospital, Leuven, Belgium

¹⁰MRC Trial Methodology Hub, Bamford Centre for Mental Health and Wellbeing, University of Ulster, Londonderry, United Kingdom

¹¹Public Health Research and Evidence Based Medicine Department, National School of Public Health and Health Services Management, Bucharest, Romania

¹²Parc Sanitari Sant Joan de Déu, CIBERSAM, University of Barcelona, Sant Boi de Llobregat, Barcelona, Spain

¹³Department of Clinical Epidemiology, Shanghai Mental Health Center, School of Medicine, Shanghai Jiao Tong University, Shanghai, People's Republic of China

¹⁴Department of Mental Health, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

¹⁵Department of Epidemiology, EHESP School for Public Health, Université Paris Descartes, Paris, France

¹⁶National Institute of Psychiatry, Mexico City, Mexico

¹⁷Statewide and Mental Health Services, Department of Health and Human Services, Tasmania, Australia

¹⁸Instituto Colombiano del Sistema Nervioso, Bogota, D.C., Colombia

¹⁹Department of Psychiatry, Hadassah University Hospital, Kiriat Hadassah, Jerusalem, Israel

²⁰Department of Psychiatry, University of Cape Town, Cape Town, South Africa

²¹Department of Social Medicine, Federal University of Espírito Santo (UFES), Vitória, Espírito Santo, Brazil

²²Department of Mental Health, National Center of Public Health and Analyses, Sofia, Bulgaria

²³Psychiatric-Neurological Epidemiology Cluster Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, New York

Financial disclosure

Dr. Kessler has been a consultant for Analysis Group, GlaxoSmithKline Inc., Kaiser Permanente, Merck & Co, Inc., Ortho-McNeil Janssen Scientific Affairs, Pfizer Inc., Sanofi-Aventis Groupe, Shire US Inc., SRA International, Inc., Takeda Global Research & Development, Transcept Pharmaceuticals Inc., Wellness and Prevention, Inc., and Wyeth-Ayerst; has served on advisory boards for Eli Lilly & Company, Mindsite, and Wyeth-Ayerst; and has had research support for his epidemiological studies from Analysis Group Inc., Bristol-Myers Squibb, Eli Lilly & Company, EPI-Q, Ortho-McNeil Janssen Scientific Affairs., Pfizer Inc., Sanofi-Aventis Groupe, and Shire US, Inc. He owns stock in Datastat, Inc. Dr. Demyttenaere has served on advisory boards for, speaker bureaus for, and has research grants from Astra Zeneca, Eli Lilly, GSK, Lundbeck, Takeda, Servier. Dr. Haro has been a consultant and served on speaker bureaus for Eli Lilly and Co., has board memberships at Lundbeck and Roche, and has had research support from GlaxoSmithKline. Dr. Kawakami has been a part-time physician at the Riken Institute, a consultant for Junpukai Foundation and the Sekisui Corporation, has served on speaker bureaus for GlaxoSmithKline, Ezai, and Pfizer, received royalties from Fujitsu Software Technologies, Ltd., Chuo-Hoki-Shuppan, Igaku-Shoin, Kyobundo, Life Science, Maruzen, Nanko-do, and Nanzan-do, and has received research support from Fujitsu Software Technologies, Ltd. Dr. Stein has been a consultant for Servier and Biocodex.

*Correspondence to: Karestan C. Koenen, Department of Epidemiology, Mailman School of Public Health, Columbia University, 722 West 168th Street, Room 720G, New York, NY 10032. E-mail: kck5@mail.cumc.columbia.edu

Received for publication 26 November 2012; Revised 03 July 2013; Accepted 13 July 2013

DOI 10.1002/da.22169

Published online in Wiley Online Library (wileyonlinelibrary.com).

Background: Clinical research suggests that posttraumatic stress disorder (PTSD) patients exposed to multiple traumatic events (TEs) rather than a single TE have increased morbidity and dysfunction. Although epidemiological surveys in the United States and Europe also document high rates of multiple TE exposure, no population-based cross-national data have examined this issue. **Methods:** Data were analyzed from 20 population surveys in the World Health Organization World Mental Health Survey Initiative ($n = 51,295$ aged 18+). The Composite International Diagnostic Interview (3.0) assessed 12-month PTSD and other common DSM-IV disorders. Respondents with 12-month PTSD were assessed for single versus multiple TEs implicated in their symptoms. Associations were examined with age of onset (AOO), functional impairment, comorbidity, and PTSD symptom counts. **Results:** 19.8% of respondents with 12-month PTSD reported that their symptoms were associated with multiple TEs. Cases who associated their PTSD with four or more TEs had greater functional impairment, an earlier AOO, longer duration, higher comorbidity with mood and anxiety disorders, elevated hyperarousal symptoms, higher proportional exposures to partner physical abuse and other types of physical assault, and lower proportional exposure to unexpected death of a loved one than cases with fewer associated TEs. **Conclusions:** A risk threshold was observed in this large-scale cross-national database wherein cases who associated their PTSD with four or more TEs presented a more “complex” clinical picture with substantially greater functional impairment and greater morbidity than other cases of PTSD. PTSD cases associated with four or more TEs may merit specific and targeted intervention strategies. *Depression and Anxiety* 00:1–13, 2013. © 2013 Wiley Periodicals, Inc.

Key words: PTSD; functional impairment; comorbidity; World Mental Health Surveys; epidemiology

INTRODUCTION

Although the diagnosis of posttraumatic stress disorder (PTSD) requires exposure to at least one traumatic event (TE), exposure to multiple TEs is common in clinical populations. In accordance with diagnostic criteria, epidemiologic studies typically assess PTSD only in relation to an index TE. However, consistent with clinical experience, more comprehensive surveys find that the majority of respondents with PTSD report exposure to multiple TEs over the life course.^[1–3] The National Comorbidity Survey, for instance, showed that in the United States 64% of the population exposed to TEs were exposed to more than one TE and that 20% of males and 11% of females were exposed to three or more TEs.^[1,4]

There is some suggestion in the literature that cases of PTSD whose symptoms are associated with multiple TEs, including both multiple types of TEs and repeated exposure to the same TE (e.g., chronic childhood abuse), have greater morbidity and dysfunction,^[5–9] although these studies largely involve treatment-seeking samples in which there may be a referral bias.^[10] The few existing community epidemiological studies on this topic have

been limited to mostly adolescent samples in the United States or Europe and have not focused on persons with 12-month PTSD.^[11–14] To our knowledge, no large-scale cross-national population-based survey has yet examined the possibility of added risk of dysfunction associated with multiple versus single types of TEs in adult 12-month PTSD. Such information would have immediate application for targeting prevention and intervention strategies, with particular relevance for economically developing countries in which fiscal constraints may limit mental healthcare access.^[15,16]

The World Health Organization (WHO) World Mental Health (WMH) Surveys are the first population-based epidemiological studies to assess the 12-month prevalence of PTSD in large cross-national samples that have a full range of country income levels and use parallel methods. As part of the survey, respondents in 20 WMH countries who met criteria for PTSD in the past 12 months were asked to specify which of the lifetime TEs they had previously reported were implicated in their current symptoms. We examine the proportion of 12-month PTSD cases that reported multiple types of TEs, the proportion of those cases that attribute their PTSD to multiple types of TEs, and the associations of

such reports with a variety of characteristics of 12-month PTSD.

METHODS AND MATERIALS

SAMPLES

Surveys were administered in 11 countries classified by the World Bank as high income (Belgium, France, Germany, Italy, Israel, Japan, Netherlands, New Zealand, Northern Ireland, Spain, United States) and nine classified as upper-middle income (Sao Paulo in Brazil, Bulgaria, Lebanon, Mexico, Romania, South Africa) or low/lower-middle income (Colombia, Ukraine, Beijing, Shanghai in the People's Republic of China [PRC]). All but six surveys were based on area probability household samples representative of the entire nation. The exceptions were surveys of all urbanized areas in two countries (Colombia, Mexico) and of specific Metropolitan areas in four other countries (Sao Paulo in Brazil; a series of cities in Japan; specific regions in Nigeria; Shenzhen in PRC) (see Table 6). Interviews were conducted face-to-face in respondent homes after obtaining informed consent. Human Subjects Committees monitored the surveys and approved recruitment and consent procedures in each country.

Interviews had two parts. Part I, administered to all respondents, assessed core disorders. All Part I respondents with a lifetime history of any core disorder plus a probability subsample of other respondents were administered Part II, which assessed other disorders and correlates. Part I was completed by 96,842 respondents.

Trauma and PTSD were assessed in Part II ($N = 51,295$). The Part II sample was weighted to adjust for the undersampling of Part I noncases and to adjust for sociodemographic/geographic discrepancies between sample and population based on census data. Part II response rates range from a low of 45.9% in France to 87.7% in Colombia (70.4% weighted average). Further details about WMH sample design are presented elsewhere.^[17]

MEASURES

Translation. The WMH interview schedule was developed in English and translated into other languages using a standardized WHO translation, back-translation, and harmonization protocol described elsewhere.^[18] Consistent interviewer training and quality control monitoring procedures were then used in all surveys to standardize question administration.^[19]

TE Exposure. We assessed lifetime exposure to 29 TEs, including seven related to war and sectarian violence (e.g., combatant, civilian in a war zone), five types of physical assault (e.g., mugged), three types of sexual assault (e.g., rape, sexual assault), six types of trauma involving threats to physical integrity excluding violence (e.g., life-threatening accidents), traumatic death of a loved one, and five types of trauma involving threats to others or network events (e.g., life-threatening illness injury of loved one). Grouping of TEs is presented in Table A1. Respondents were asked to report lifetime exposure to each trauma on a hard copy list and to check off each endorsed event for future reference. Two additional open-ended questions asked about (1) any other TE not included on the list and (2) TE respondents did not wish to describe concretely. These 29 events were combined into 15 broader event categories for analysis (Table A2). This grouping has been published previously.^[17] Positive responses were followed by probes to assess age when each event first occurred. The number of TEs was calculated as the number of different types of TEs endorsed by the respondent.

Mental Disorders. Mental disorders were assessed with the WHO Composite International Diagnostic Interview (CIDI),^[18] a fully structured interview designed to generate diagnoses of com-

mon DSM-IV and ICD-10 mental disorders. DSM-IV criteria, including organic exclusions and diagnostic hierarchy rules, are used here. In addition to PTSD, we consider 12-month prevalences of five anxiety disorders (separation anxiety disorder, panic disorder and/or agoraphobia, generalized anxiety disorder (GAD), specific phobia, social phobia), two mood disorders (major depressive disorder (MDD)/dysthymia, bipolar disorder), four disruptive behavior disorders (attention-deficit/hyperactivity disorder (ADHD), oppositional-defiant disorder (ODD), conduct disorder, intermittent explosive disorder (IED) and two substance disorders (alcohol and drug abuse with/without dependence).

As detailed elsewhere,^[19] generally good concordance was found between diagnoses based on DSM-IV/CIDI and blinded SCID^[20] clinical reappraisal interviews. Concordance for PTSD was in the moderate range,^[21] with κ of 0.49 and area under the receiver operating characteristic curve (AUC) of 0.69. The two components of AUC, sensitivity and specificity, were 38.3 and 99.1, respectively, resulting in an LR+ of 42, which is well above the 10 threshold typically used to define screening scale diagnoses as definitive.^[22] Consistent with the high LR+, positive predictive value (the proportion of CIDI cases confirmed by the SCID) of DSM-IV/CIDI PTSD was 86.1%, suggesting that the vast majority CIDI cases would independently be judged to have PTSD by trained clinicians.

PTSD was assessed twice in the DSM-IV/CIDI: once for symptoms associated with the respondent's self-selected *worst* lifetime trauma and a second time for symptoms associated with one other lifetime trauma selected using a random number generator from the respondent's lifetime traumas. Occurrence of the 17 DSM-IV criterion B-D PTSD symptoms was assessed for the month after each trauma when the respondent experienced the largest number of symptoms. (Respondents who reported only one lifetime trauma were, of course, assessed only once.) Respondents who reported any lifetime criterion B-D symptoms of PTSD associated with either the worst or random trauma were then asked if they had three or more such symptoms in the 12 months before interview associated with any lifetime trauma. Respondents who answered affirmatively were then evaluated for 12-month PTSD and asked which lifetime events caused these 12-month symptoms. Twelve-month PTSD was defined as meeting full lifetime DSM-IV/CIDI criteria and continuing to have at least some symptoms in the 12 months before the interview.

PTSD age of onset (AOO) for respondents with one TE was defined as the age in which TE occurred. AOO was assessed using special probing techniques shown experimentally to improve recall accuracy.^[23] We know the AOO of PTSD for respondents with one event of a particular type (e.g., if a respondent reported PTSD associated with a car accident and only had one car accident, the AOO would be the age of that one car accident). For multiple events of the same type, we have the AOO for the first event, but we do not know if the PTSD is related to that first event or to a subsequent event. To address this issue, we used regression-based imputation. Regression-based imputation was used rather than mean imputation or imputation of random values to provide an estimate that makes use of other patterns in the data. For respondents with one type of TE (e.g., car accident) but multiple instances of that TE, the AOO was imputed using a regression-based imputation that predicts an age based on the data as well as the respondent's sex and current age. If an age of event was imputed to an age less than the original first age that was given, the age was reset to the original age. For respondents with more than one type of event, the second lowest age was taken to be their AOO. If the respondent had less than two "known" ages, an age was imputed for each of their unknown events, using the same regression described above. Then, the second lowest age was taken from their ages of events. All ages were restricted to a minimum of 8. While we consider this combination of empirical and rational imputation strategies the most reasonable

approach to deal with missing AOO data, we recognize that any imputation method will necessarily be imperfect and results regarding the effects of AOO should be interpreted with caution.

Role Functioning. Role functioning was assessed with the disorder-specific Sheehan Disability Scale (SDS)^[24], which asks respondents to rate how much a given 12-month disorder interfered with their functioning in each of four role domains (home management, ability to work, social life, and close relationships) using a 0–10 response scale with labels of *None* (0), *Mild* (1–3), *Moderate* (4–6), *Severe* (7–9), and *Very Severe* interference. A global SDS score was also created by assigning each respondent the highest SDS domain score reported across the four domains.

ANALYSIS METHODS

The associations between number of associated TE types and other characteristics of 12-month PTSD related were examined using cross-tabulations and logistic regression analysis.^[25] A hierarchy of logistic regression models was considered. The first model examined the association between number of associated TE types and severe functional impairment controlling for age, sex, country, AOO, and duration (defined as time since AOO) of the current episode of PTSD. The second model then added information about TE type and the third model added information about prior lifetime DSM-IV/CIDI disorders to determine whether these variables explained the observed association between number of associated TE types and the outcome.

Further analyses compared 12-month PTSD associated with 1–3 versus 4 or more event types in relation to demographic factors, AOO, duration, trauma types, comorbid mental disorders, and PTSD symptom clusters. The logistic regression coefficients and their standard errors were exponentiated and are reported here as odds ratios (ORs) with 95% confidence intervals. To adjust for the weighting and clustering of the WMH data, standard errors were estimated using the Taylor series method^[26] implemented in the SUDAAN software system.^[27] Multivariate significance was evaluated with Wald χ^2 tests based on design-corrected coefficient variance-covariance matrices. Statistical significance was consistently evaluated using .05 level two-sided tests.

RESULTS

PREVALENCE

Twelve-month prevalence (standard error) of DSM-IV/CIDI PTSD in the total sample is 1.1% (see Table 1). The three highest country-specific prevalence estimates are in Northern Ireland (3.8%), the United States (2.5%), and New Zealand (2.1%), whereas the lowest are in Beijing and Shanghai in the PRC (0.2%), Colombia (0.3%), and Mexico (0.3%). Prevalence varies significantly across the total subsamples of respondents in low/lower-middle (0.8%), upper-middle (0.7%), and high (1.5%) income countries ($\chi^2_2 = 53.7, P < .001$).

DISTRIBUTION AND FUNCTIONAL IMPAIRMENT ASSOCIATED WITH NUMBER OF ASSOCIATED TE TYPES

Symptoms associated with more than one TE type have been reported by 19.8% of respondents with 12-month PTSD. Severe role impairment associated with PTSD in at least one of the four SDS role domains was reported by 42% of respondents with 12-month PTSD, including 23.2% who reported severe impairment in the domain of work, 24.2% in home maintenance, 26.8%

TABLE 1. Overall prevalence of 12-month DSM-IV/CIDI PTSD in each WMH survey

	%	(SE)	(n_1) ^a	(n_2) ^b
Low/lower-middle income				
Colombia	0.3	(0.1)	(10)	(2,381)
People's Republic of China (Beijing, Shanghai)	0.2	(0.1)	(7)	(1,628)
Ukraine	2.0	(0.4)	(69)	(1,719)
Total lower-middle income	0.8	(0.2)	(86)	(5,728)
Upper-middle income				
Brazil (Sao Paulo)	1.0	(0.2)	(52)	(2,942)
Bulgaria	0.9	(0.2)	(35)	(2,233)
Lebanon	1.6	(0.6)	(22)	(1,031)
Mexico	0.3	(0.1)	(19)	(2,362)
Romania	0.4	(0.2)	(11)	(2,357)
South Africa	0.4	(0.1)	(21)	(4,315)
Total upper-middle income	0.7	(0.1)	(159)	(15,240)
High income				
Belgium	0.6	(0.1)	(16)	(1,043)
France	1.4	(0.3)	(33)	(1,436)
Germany	0.5	(0.2)	(19)	(1,323)
Italy	0.4	(0.1)	(17)	(1,779)
Israel	0.4	(0.1)	(15)	(4,859)
Japan	0.4	(0.2)	(9)	(1,682)
Netherlands	1.2	(0.3)	(31)	(1,094)
New Zealand	2.1	(0.2)	(304)	(7,312)
Northern Ireland	3.8	(0.5)	(96)	(1,986)
Spain	0.4	(0.1)	(29)	(2,121)
United States	2.5	(0.2)	(227)	(5,692)
Total high income	1.5	0.1	797	30,327
Total	1.1	(0.0)	(1,042)	(51,295)
Chi-square 2 df (difference between country groups)	53.7*			
Chi-square 19 df (difference between countries)	354.6*			

^a n_1 is the number of respondents with 12-month DSM-IV/CIDI PTSD. ^b n_2 is the total sample size of the survey. * $p < 0.05$.

in close relationships, and 28.9% in social life (see Table A3). Functional impairment in work (OR = 5.2), home maintenance (OR = 2.6), close relationships (OR = 7.6), social life (OR = 4.2), and overall (OR = 6.0) is elevated among respondents with 12-month PTSD associated with four or more TE types compared to respondents with 12-month PTSD associated with one TE type, controlling for sex, country, AOO, and duration. No significant differences in functional impairment are observed for respondents with 12-month PTSD associated with two or three versus one TE type. Odds of severe functional impairment in work (OR = 4.7), close relationships (OR = 7.4), and overall functioning (OR = 6.2) remain significantly elevated among respondents with 12-month PTSD associated with four or more TE types controlling for type of index TE and other 12-month mental disorders (detailed results of trauma type and comorbidity analysis are available on request).

The critical distinction observed in functional impairment was between cases related to four or more versus three or fewer TE types (see Table A3). Of note, 69% of respondents with 12-month PTSD reported four or

TABLE 2. The associations (odds ratios) between number of TEs implicated in PTSD and severe functional impairment in four domains of role functioning among respondents with 12-month DSM-IV/CIDI PTSD based on three different models ($n = 1,042$)

Role domain/ number of TEs	Predictors					
	Number of TEs		Number and type of TEs		Number and type of TEs and comorbidity	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
I. Work						
2 TEs	1.3	(0.7–2.4)	1.3	(0.7–2.3)	1.3	(0.7–2.6)
3 TEs	1.4	(0.6–3.7)	1.3	(0.5–2.9)	1.2	(0.5–2.8)
4+ TEs	5.2*	(2.3–11.4)	5.1*	(1.6–15.8)	4.7*	(1.4–16.0)
χ^2_3	17.4*		8.3*		6.8	
II. Home maintenance						
2 TEs	0.6	(0.3–1.1)	0.6	(0.3–1.1)	0.6	(0.3–1.1)
3 TEs	0.7	(0.2–1.9)	0.6	(0.2–1.7)	0.6	(0.2–1.9)
4+ TEs	2.6*	(1.2–5.7)	1.8	(0.6–5.7)	1.8	(0.5–5.8)
χ^2_3	9.6*		6.1		4.4	
III. Close relationships						
2 TEs	1.0	(0.6–1.9)	0.9	(0.4–1.7)	0.8	(0.4–1.8)
3 TEs	1.2	(0.6–2.5)	0.9	(0.4–2.2)	0.9	(0.4–2.0)
4+ TEs	7.6*	(3.1–18.3)	8.8*	(2.7–28.9)	7.4*	(2.1–26.7)
χ^2_3	20.8*		16.0*		11.2*	
IV. Social life						
2 TEs	1.0	(0.5–1.2)	1.0	(0.5–1.7)	1.0	(0.5–1.9)
3 TEs	1.6	(0.4–2.9)	1.2	(0.5–2.8)	1.2	(0.5–2.7)
4+ TEs	4.2*	(2.5–14.9)	3.8*	(1.3–11.3)	3.2	(0.9–10.7)
χ^2_3	14.3*		6.3		3.7	
V. Global						
2 TEs	0.7	(0.5–1.2)	0.7	(0.4–1.2)	0.6	(0.3–1.2)
3 TEs	1.1	(0.4–2.9)	0.9	(0.4–2.2)	0.8	(0.3–1.9)
4+ TEs	6.0*	(2.5–14.9)	7.3*	(2.2–24.2)	6.2*	(1.9–20.0)
χ^2_3	16.4*		14.9*		12.0*	

Note: All models include controls for sex, country, age of onset, and duration (defined as time since age of onset). They are run on the subset of respondents with 12-month PTSD. Comorbidity is defined by dummies for other 12-month DSM-IV/CIDI disorders including MDE/dysthymia, bipolar, panic disorder or agoraphobia, GAD, adult separation anxiety social phobia, specific phobia, IED, conduct disorder, ODD, ADHD, alcohol abuse, alcohol dependence, drug abuse, drug dependence. Coefficients of disorders are not shown but available on request. * $p < 0.05$.

more lifetime TE types, but only 4.8% ($n = 51$) of such respondents reported their symptoms were associated with four or more TE types (see Table 2). For the remainder of this manuscript, we will refer to 12-month PTSD associated with four or more TE types as 4+/PTSD and 12-month PTSD associated with three or fewer TE types as 3-/PTSD.

SOCIODEMOGRAPHIC CORRELATES

In multivariable models, odds of 4+/PTSD are significantly elevated among people who are not married or cohabitating (OR = 2.5) and not employed (OR = 2.5). Women have increased odds of 4+/PTSD (OR = 2.2, 95% CI 0.7–6.9), but the difference is not statistically significant. Education is unrelated to having 4+/PTSD.

TRAUMA TYPES

As one would expect, each of the 15 TE types considered here is more likely to be implicated in the cases of 4+/PTSD than 3-/PTSD. More interestingly, though, 9 of the 15 TE types have significantly higher on a *proportional* basis than among cases of 4+/PTSD than

3-/PTSD. Physical abuse in childhood, physical abuse by a spouse or partner, physical assault, sexual assault, automobile accidents, traumatic death of a loved one, other trauma to a loved one, witnessing family violence as a child, and witnessing a traumatic injury or death are all significantly more common among respondents with 4+/PTSD than 3-/PTSD.

Physical abuse by a spouse or partner and physical assault comprise a larger proportion of all events for respondents with 4+/PTSD. In contrast, sudden unexpected death of a loved one and network events comprise a larger proportion of all events for respondents with 3-/PTSD (see Table 3).

AOO AND DURATION OF PTSD

Respondents with 4+/PTSD have a significantly younger AOO and longer duration controlling for demographic factors (detailed results of the models are available on request). This substantially younger AOO for 4+/PTSD is illustrated by the cumulative probability curve shown in Fig. 1.

TABLE 3. Distributions of types of TEs implicated in cases of DSM-IV/CIDI PTSD associated with 1–3 versus 4+ TEs

	% of people with each event among respondents with 3–/PTSD		% of people with each event among respondents with 4+/PTSD		% of events among respondents with 3–/PTSD		% of events among respondents with 4+/PTSD	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)
I. War related								
Combat experience	0.8	(0.3)	6.0	(4.7)	0.6	(0.3)	1.1	(0.8)
Other war experience	2.5	(0.9)	16.8	(6.7)	2.0	(0.8)	3.0	(1.2)
II. Physical violence								
Physically abused as a child	5.6*	(0.9)	44.0	(8.3)	4.6	(0.8)	7.9	(1.6)
Physically abused by spouse/partner	5.6*	(0.8)	56.2	(8.2)	4.6*	(0.7)	10.1	(1.4)
Physically assaulted or threatened	9.0*	(1.0)	67.5	(7.9)	7.3*	(0.8)	12.1	(1.4)
III. Sexual violence								
Sexually assaulted	13.5*	(1.2)	78.4	(6.6)	11.1	(1.0)	14.1	(1.3)
IV. Accidents								
Automobile accident	6.7*	(1.2)	28.7	(7.4)	5.5	(1.0)	5.2	(1.2)
Other life-threatening accident	3.9	(0.8)	11.6	(4.0)	3.2	(0.7)	2.1	(0.7)
Natural disaster	0.7	(0.3)	9.2	(4.4)	0.6	(0.2)	1.7	(0.8)
Life-threatening illness	8.5	(1.2)	21.9	(7.4)	7.0	(1.0)	4.0	(1.3)
V. Death								
Traumatic death of a loved one	31.6*	(2.2)	68.4	(8.5)	25.9*	(1.8)	12.3	(1.6)
VI. Network/witnessing								
Other TE to a loved one	15.1*	(1.9)	39.1	(7.4)	12.4*	(1.5)	7.0	(1.3)
Witnessed family violence as a child	1.3*	(0.4)	41.8	(8.1)	1.1*	(0.3)	7.5	(1.4)
Witnessed a traumatic injury or death	3.8*	(0.8)	35.6	(8.0)	3.1*	(0.6)	6.4	(1.3)
VII. Other								
Other	13.6	(1.6)	30.7	(7.9)	11.2*	(1.2)	5.5	(1.3)
(<i>n</i>)	(991)		(51)		(991)		(51)	

* $p < 0.05$.

The median AOO is 11 for 4+/PTSD versus 29 for 3–/PTSD. The mean AOO of 4+/PTSD is significantly younger [Mean = 16.2 (SE = 1.5)] compared to that for 3–/PTSD [Mean = 31.7 (SE = 0.7); $\chi^2 = 45.59$, $P < .00001$].

The duration of 4+/PTSD is also significantly longer than that related to 3–/PTSD. The median duration is 263 months for 4+/PTSD versus 93 for 3–/PTSD. The mean duration of 4+/PTSD is significantly longer [Mean = 284.0 (SE = 25.7)] compared to that for 3–/PTSD [Mean = 147.1 (SE = 5.4); $\chi^2 = 45.59$, $P < .00001$].

OTHER 12-MONTH DSM-IV/CIDI MENTAL DISORDERS

Five of 15 individual 12-month mental disorders are more common among respondents with 4+/PTSD, controlling for age, sex, and country. Elevated odds of bipolar disorder (OR = 2.6), GAD (OR = 2.9), adult separation anxiety (OR = 3.6), social phobia (OR = 2.4), and specific phobia (OR = 2.1) are observed for 4+/PTSD. Prevalence of MDD/dysthymia, IED, ODD, ADHD,

and alcohol abuse and dependence is higher for respondents with 4+/PTSD. However, these differences are not statistically significant. Prevalence of conduct disorder, drug abuse, and drug dependence is higher among respondents with 3–/PTSD, but the differences are not statistically significant (see Table 4).

PTSD SYMPTOM PROFILES

The mean number of total lifetime PTSD symptoms is significantly higher for respondents with 4+/PTSD. This difference is driven by significantly higher symptoms in the hyperarousal cluster; one standard deviation increase in hyperarousal symptoms is associated with elevated odds (OR = 1.4) of 4+/PTSD (see Table 5).

DISCUSSION

Interpretation of these results is subject to several study limitations. The first limitation is that the number of respondents with 4+/PTSD was too small for country-specific analyses. The total number of respondents with 12-month PTSD across all surveys was only

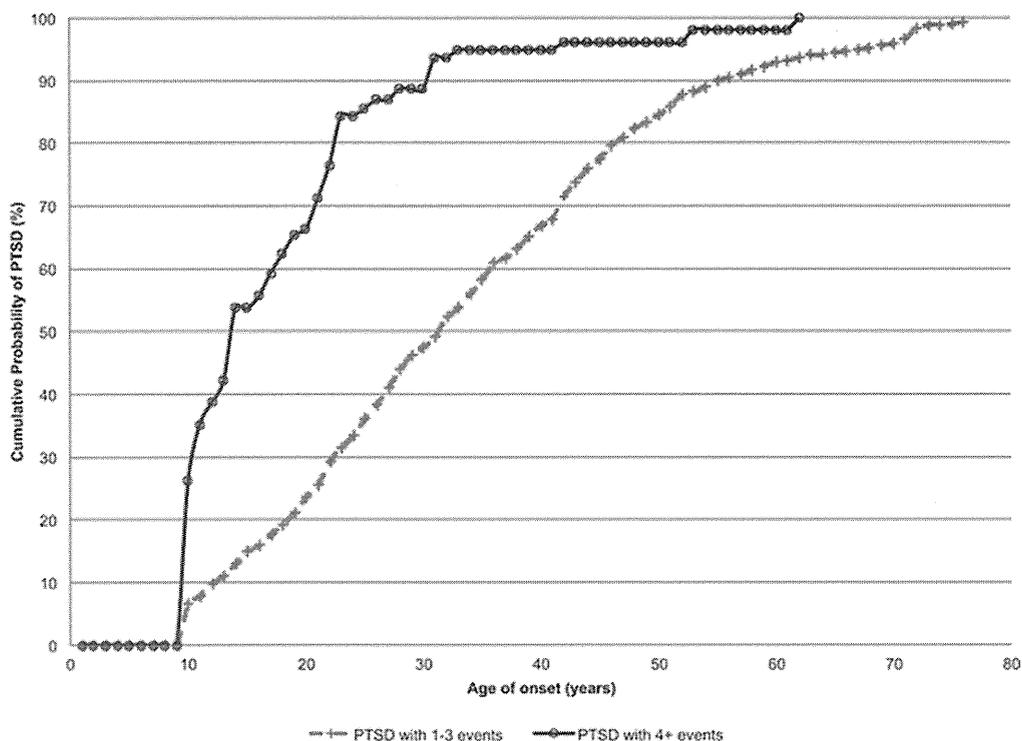


Figure 1. Cumulative probability of 4+/PTSD versus 3-/PTSD by age of onset in the World Mental Health Surveys.

1,042, with 3.3% reporting 4+/PTSD. Although larger than most treatment-seeking samples, the small number of respondents with 4+/PTSD limited power to detect effects and led to large standard errors in some cases. Another limitation is that lifetime PTSD was asked in relation to an index trauma. This may be problematic, especially in the setting of multiple traumas and a disorder characterized by re-experiencing and avoidance of symptoms. In fact, majority of respondents exposed to at least one TE are exposed to multiple TEs^[1,4] and the prevalence of PTSD is increased when the disorder is assessed in relation to all TEs,^[28] suggesting some respondents with PTSD may have been classified as non-cases. A third limitation is data were available only for the number of different types of TEs associated with 12-month PTSD. Debate exists as to whether PTSD related to chronic exposure to a TE, such as often occurs with partner violence or childhood abuse, is more “complex” than from PTSD related to a single incident TE.^[5,7,29] The results presented here do not speak directly to this debate. A fourth limitation is that although existing evidence supports the cross-national validity of the CIDI, its reliability and validity have not yet been established for all translated versions used here. A fifth limitation is the results presented here apply specifically to 12-month PTSD. Findings related to 12-month PTSD may not be representative of all PTSD cases. Prevalent cases of PTSD are more likely to be chronic and will not include cases of lifetime PTSD who recovered from the disorder. It is possible that the findings observed here are more characteristic of chronic PTSD than of PTSD that re-

mits. Further research is needed to examine whether the relation of multiple events to 12-month PTSD observed here generalizes to lifetime PTSD. A sixth limitation is that pretrauma vulnerability factors may contribute to differences observed between 4+ and 3-/PTSD and were not examined here. Finally, the WMH research design is cross-sectional, limiting conclusions about the complex causal pathways between PTSD, psychopathology, and functional impairment.

Notwithstanding the above limitations, these WMH results offer the first cross-national population-based epidemiological data on the prevalence of 12-month PTSD across high-, middle-, and low-income countries. The prevalence of 12-month PTSD varies significantly from a high of 3.8% in Northern Ireland to a low of 0.2% in China. These are also the first cross-national epidemiologic data of which we are aware on the differential correlates of 12-month PTSD associated with 4+/PTSD versus 3-/PTSD.

Four findings are noteworthy. First, although the majority of 12-month PTSD cases reported experiencing four or more TE types over their life course, only about 19% associated their 12-month PTSD with more than one TE type. Although prior epidemiologic studies have shown that exposure to multiple TEs is associated with increased risk of PTSD,^[2,30-32] this is the first epidemiologic study of which we are aware that has reported on the proportion of PTSD cases who associate their disorder with multiple versus single event types. Further research is needed to understand why some respondents with multiple TEs attribute their PTSD to

TABLE 4. Odds ratios for association between 12-month DSM-V/CIDI disorders and PTSD associated with 1–3 events versus 4+ events ($n = 1,042$)

	% of respondents with each disorder among 3–/PTSD		% of respondents with each disorder among 4+/PTSD		Respondents with 4+ events versus those with 1–3 events	
	%	(SE)	%	(SE)	OR ^a	(95% CI)
I. Mood disorders						
MDE/dysthymia	40.9	(2.1)	60.8	(8.5)	2.1	(1.0–4.7)
Bipolar	8.2	(1.0)	26.2	(7.2)	2.6*	(1.1–6.2)
Any mood	42.6	(2.1)	68.8	(8.3)	2.7*	(1.2–6.3)
II. Anxiety disorders						
Panic disorder or agoraphobia	15.5	(1.4)	32.1	(7.9)	2.0	(0.9–4.2)
GAD	18.2	(1.4)	42.7	(8.9)	2.9*	(1.4–5.9)
Adult separation anxiety	3.8	(0.5)	16.6	(6)	3.6*	(1.4–9.3)
Social phobia	17.5	(1.3)	41.7	(8.1)	2.4*	(1.3–4.7)
Specific phobia	25	(1.7)	49.9	(8.6)	2.1*	(1.1–4.1)
Any anxiety	46.2	(2.1)	85.8	(5.6)	5.2*	(2.2–12.5)
III. Disruptive behavior disorders						
IED	5.6	(0.8)	14.1	(5.9)	2.3	(0.7–7.8)
Conduct disorder ^b	2.3	(0.9)	1.2	(1.2)	0.5	(0.1–4.0)
ODD ^b	4.0	(0.9)	4.3	(3.1)	0.6	(0.1–3.4)
ADHD ^b	6.5	(1.6)	18.3	(8.6)	3.6	(0.7–17.9)
Any impulse	14.5	(2.1)	18.3	(8.6)	1.1	(0.3–4.8)
IV. Substance disorders						
Alcohol abuse	6.3	(1.0)	11.2	(4.9)	1.7	(0.6–5.0)
Alcohol dependence	5	(0.8)	10.3	(4.8)	2.4	(0.8–6.9)
Drug abuse	2.3	(0.5)	1.7	(1.7)	0.7	(0.1–5.6)
Drug dependence	1.9	(0.5)	1.7	(1.7)	0.8	(0.1–6.3)
Any substance	7.7	(1.1)	14.1	(5.3)	1.8	(0.7–4.9)
Chi-square 15 df (significance of all ORs)					69.2*	(<0.001)
Chi-square 14 df (significant difference between ORs)					23.2	(0.06)

^aBased on a logistic regression model controlling for country, age, and sex.

^bAmong the 1,042 individuals with 12-month PTSD, this represents a subgroup of 540 individuals who were no more than 44 years old at the time of interview.

* $p < 0.05$.

multiple event types and others, with similar levels of TEs, do not. For example, persons with PTSD may be more likely to attribute the disorder to multiple event types if their intrusive memories are about multiple event types. We were unable to test this hypothesis in our data. Moreover, the question of how such attributions

contribute to differences in functioning among persons with PTSD also merits investigation.

Second, 4+/PTSD is associated with more severe functional impairment across all domains than 3–/PTSD. This suggests the presence of a risk threshold of four or more event types beyond which the

TABLE 5. Odds ratios predicting 12-month 4+/PTSD: multivariate symptom profile associations (no controls)

	3–/PTSD		4+/PTSD		OR	(95% CI)
	Mean	(SE)	Mean	(SE)		
Symptom counts						
Re-experiencing	–0.01	(0.04)	0.34	(0.18)	1.1	(0.8–1.5)
Avoidance	0.0	(0.04)	–0.16	(0.18)	0.9	(0.7–1.1)
Numbing	–0.02	(0.05)	0.47	(0.18)	1.3	(0.9–1.8)
Hyperarousal	–0.02	(0.05)	0.61	(0.14)	1.5*	(1.1–2.1)
Total	–0.02	(0.05)	0.52	(0.19)	1.4*	(1.1–1.9)
χ^2_4					2.4* (0.050)	
χ^2_3					2.7* (0.047)	

Note: Means are expressed in standard deviation units.

* $p < 0.05$.

Depression and Anxiety

impact of trauma on functioning worsens. An intriguing WMH finding is that more severe functional impairment in work and close relationship domains observed in respondents with 4+/PTSD is not explained by differences in TE types or comorbid disorders. Future research on epidemiologic studies should collect the data necessary to examine alternative hypotheses for why persons with 4+/PTSD have more severe functional impairment.

Third, the types of TEs associated with 4+/PTSD versus 3-/PTSD differed. Unsurprisingly, respondents with 4+/PTSD had higher rates for a range of TEs. However, witnessing parental violence, physical abuse by a spouse or partner, and other physical assault comprised a significantly higher proportion of TEs among 4+/PTSD. Unexpected death of a close friend or relative and network events comprised a higher proportion of TEs for 3-/PTSD. Because type of event, particularly interpersonal violence, tracked closely with number of TEs, we cannot determine from our data whether there are differences among those with 4+/PTSD according to trauma type. However, it is noteworthy that the 4+/PTSD was associated with greater proportion of physical violence events. Physical and sexual assault in childhood and adolescence are risk factors for revictimization, including partner violence, in adulthood.^[33,34] Revictimization may lead some persons to be exposed to multiple types of violence and contribute to the higher proportion of these events among respondents with 4+/PTSD.

Finally, 4+/PTSD had an earlier AOO, longer duration, higher comorbidity with mood and anxiety disorders, and elevated hyperarousal symptoms. These data are consistent with research in clinical samples that suggest exposure to cumulative trauma is associated with a more “complex” presentation of PTSD.^[5,7,35] They are also consistent with our previous report that number and type of trauma was associated with a dissociative subtype of PTSD.^[36] However, the proposed diagnosis of “complex PTSD” includes characteristics such as emotion regulation deficits, identity disturbances, and interpersonal problems not systematically assessed in the WHO DSM-IV/CIDI, leaving it for future investigators to investigate the relation between multiple TEs and complex PTSD in epidemiologic samples.

Our data on 12-month PTSD provide a snapshot of the public health burden of PTSD in over 20 countries. Over 1% of the population of these countries suffers from PTSD in a 12-month period, highlighting that PTSD is a global public health problem meriting international attention. Among persons with 12-month PTSD, 4+/PTSD cases reported greater functional impairment and morbidity. These findings have three practical implications. First, among persons with 12-month PTSD, 4+/PTSD cases are in greatest need and may require disproportionate resources from the healthcare system. Second, treatment providers should assess whether persons presenting with PTSD attribute their diagnosis to multiple events. Such attri-

bution may be a marker of a more complicated clinical presentation that merits attention.

Third, clinical research is needed to determine whether patients with 4+/PTSD require different or additional intervention strategies from persons who attribute their PTSD to fewer events. Trauma-focused cognitive-behavioral therapies, including prolonged exposure^[37,38] and cognitive processing therapy^[39], are effective for approximately 70% of persons with PTSD. Recently published expert consensus treatment guidelines for “complex PTSD” indicate that many practitioners believe patients with PTSD related to multiple and particularly chronic trauma exposure require therapy that includes skills training in areas such as interpersonal relationships and emotion regulation in order to effectively engage in trauma-focused work.^[7] Finally, when considering the Dissociative Subtype of PTSD, which is associated with a greater number of TEs, it has also been shown that, in comparison with individuals with PTSD alone, those with PTSD and dissociative symptoms benefit more from different therapeutic approaches.^[40] Specifically, individuals with the DSM-5 Dissociative Subtype exhibit great therapeutic outcomes when prolonged exposure therapy is augmented by a course of skills training in affective and interpersonal regulation (STAIR)^[41] and from cognitive processing therapy that includes both exposure and cognitive components, in contrast to patients with low levels of dissociation who do better with cognitive therapy, alone.^[42] Further research is needed to determine whether persons with 4+/PTSD are less responsive to treatment or if such guidelines apply to the subset of PTSD cases identified here.

Acknowledgments. The World Health Organization World Mental Health (WMH) Survey Initiative was supported by the National Institute of Mental Health (NIMH; R01 MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, R01 DA016558, and R01-MH093612), the Fogarty International Center (FIRCA R03-TW006481), the Pan American Health Organization, Eli Lilly and Company, Ortho-McNeil Pharmaceutical, GlaxoSmithKline, and Bristol-Myers Squibb. We thank the staff of the WMH Data Collection and Data Analysis Coordination Centres for assistance with instrumentation, fieldwork, and consultation on data analysis. None of the funders had any role in the design, analysis, interpretation of results, or preparation of this paper. A complete list of all within-country and cross-national WMH publications can be found at <http://www.hcp.med.harvard.edu/wmh/>. The São Paulo Megacity Mental Health Survey is supported by the State of São Paulo Research Foundation (FAPESP) Thematic Project Grant 03/00204-3. The Bulgarian

Epidemiological Study of common mental disorders EPIBUL is supported by the Ministry of Health and the National Center for Public Health Protection. The Beijing, People's Republic of China World Mental Health Survey Initiative is supported by the Pfizer Foundation. The Colombian National Study of Mental Health (NSMH) is supported by the Ministry of Social Protection. The ESEMeD project is funded by the European Commission (Contracts QLG5-1999-01042; SANCO 2004123), the Piedmont Region (Italy), Fondo de Investigación Sanitaria, Instituto de Salud Carlos III, Spain (FIS 00/0028), Ministerio de Ciencia y Tecnología, Spain (SAF 2000-158-CE), Departament de Salut, Generalitat de Catalunya, Spain, Instituto de Salud Carlos III (CIBER CB06/02/0046, RETICS RD06/0011 REM-TAP), and other local agencies and by an unrestricted educational grant from GlaxoSmithKline. The Israel National Health Survey is funded by the Ministry of Health with support from the Israel National Institute for Health Policy and Health Services Research and the National Insurance Institute of Israel. The World Mental Health Japan (WMHJ) Survey is supported by the Grant for Research on Psychiatric and Neurological Diseases and Mental Health (H13-SHOGAI-023, H14-TOKUBETSU-026, H16-KOKORO-013) from the Japan Ministry of Health, Labour and Welfare. The Lebanese National Mental Health Survey (LEBANON) is supported by the Lebanese Ministry of Public Health, the WHO (Lebanon), National Institute of Health/Fogarty International Center (R03 TW006481-01), Sheikh Hamdan Bin Rashid Al Maktoum Award for Medical Sciences, anonymous private donations to IDRAAC, Lebanon, and unrestricted grants from AstraZeneca, Eli Lilly, GlaxoSmithKline, Hikma Pharm, Janssen Cilag, Pfizer, Roche, Sanofi-Aventis, Servier, and Novartis. The Mexican National Comorbidity Survey (MNCS) is supported by The National Institute of Psychiatry Ramon de la Fuente (INPREMDIES 4280) and by the National Council on Science and Technology (CONACyT-G30544-H), with supplemental support from the PanAmerican Health Organization (PAHO). Te Rau Hinengaro: The New Zealand Mental Health Survey (NZMHS) is supported by the New Zealand Ministry of Health, Alcohol Advisory Council, and the Health Research Council. The Northern Ireland Study of Mental Health was funded by the Health & Social Care Research & Development Division of the Public Health Agency. The Romania WMH study projects "Policies in Mental Health Area" and "National Study regarding Mental Health and Services Use" were carried out by National School of Public Health & Health Services Management (former National Institute for Research & Development in Health), with technical support of

Metro Media Transilvania, the National Institute of Statistics-National Centre for Training in Statistics, SC. Cheyenne Services SRL, Statistics Netherlands and were funded by Ministry of Public Health (former Ministry of Health) with supplemental support of Eli Lilly Romania SRL. The South Africa Stress and Health Study (SASH) is supported by the US National Institute of Mental Health (R01-MH059575) and National Institute of Drug Abuse with supplemental funding from the South African Department of Health and the University of Michigan. The Ukraine Comorbid Mental Disorders during Periods of Social Disruption (CMDPSD) study is funded by the US National Institute of Mental Health (R01-MH61905). The US National Comorbidity Survey Replication (NCS-R) is supported by the National Institute of Mental Health (U01-MH60220) with supplemental support from the National Institute of Drug Abuse (NIDA), the Substance Abuse and Mental Health Services Administration (SAMHSA), the Robert Wood Johnson Foundation (RWJF; Grant 044708), and the John W. Alden Trust. These surveys were carried out in conjunction with the World Health Organization WMH Survey Initiative. We thank the WMH staff for assistance with instrumentation, fieldwork, and data analysis. A complete list of WMH publications can be found at www.hcp.med.harvard.edu/wmh

REFERENCES

1. Kessler RC. Posttraumatic stress disorder: the burden to the individual and to society. *J Clin Psychiatry* 2000;61:4-14.
2. Bromet E, Sonnega A, Kessler RC. Risk factors for DSM-III-R posttraumatic stress disorder: findings from the National Comorbidity Survey. *Am J Epidemiol* 1998;147(4):353-361.
3. Breslau N, Chilcoat HD, Kessler RC, Davis GC. Previous exposure to trauma and PTSD effects of subsequent trauma: results from the Detroit Area Survey of Trauma. *Am J Psychiatry* 1999;156(6):902-907.
4. Kessler RC, Sonnega A, Bromet E, et al. Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry* 1995;52(12):1048.
5. Cloitre M, Stolbach BC, Herman JL, et al. A developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *J Trauma Stress* 2009;22(5):399-408.
6. Herman JL. Complex PTSD: A syndrome in survivors of prolonged and repeated trauma. *J Trauma Stress* 1992;5(3):377-391.
7. Cloitre M, Courtois CA, Charuvastra A, et al. Treatment of complex PTSD: Results of the ISTSS expert clinician survey on best practices. *J Trauma Stress* 2011;24(6):615-627.
8. Cloitre M, Stovall-McClough KC, Nooner K, et al. Treatment for PTSD related to childhood abuse: A randomized controlled trial. *Am J Psychiatry* 2010;167(8):915-924.
9. Cloitre M, Koenen KC, Cohen LR, Han H. Skills training in affective and interpersonal regulation followed by exposure: A phase-based treatment for PTSD related to childhood abuse. *J Consult Clin Psychol* 2002;70(5):1067.
10. Cohen P, Cohen J. The clinician's illusion. *Arch Gen Psychiatry* 1984;41(12):1178.

11. McLaughlin KA, Fairbank JA, Gruber MJ, et al. Trends in serious emotional disturbance among youths exposed to Hurricane Katrina. *J Am Acad Child Adolesc Psychiatry* 2010;49(10):990–1000. e2.
12. Turner HA, Finkelhor D, Ormrod R. Poly-victimization in a national sample of children and youth. *Am J Preventive Med* 2010;38(3):323–330.
13. Suliman S, Mkabile SG, Fincham DS, et al. Cumulative effect of multiple trauma on symptoms of posttraumatic stress disorder, anxiety, and depression in adolescents. *Compr Psychiatry* 2009;50(2):121–127.
14. Follette VM, Polusny MA, Bechtle AE, Naugle AE. Cumulative trauma: The impact of child sexual abuse, adult sexual assault, and spouse abuse. *J Trauma Stress* 1996;9(1):25–35.
15. Wang PS, Aguilar-Gaxiola S, Alonso J, et al. Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys. *Lancet* 2007;370(9590):841–850.
16. Kohn R, Saxena S, Levav I, Saraceno B. The treatment gap in mental health care. *Bull World Health Organ* 2004;82(11):858–866.
17. Heeringa SG, Wells EJ, Hubbard F, Mneimneh ZN, Chiu WT, Sampson NA, et al. Sample designs and sampling procedures. In: Kessler RC, Üstün TB, editors. *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. New York, NY: Cambridge University Press; 2008:14–32.
18. Kessler RC, Üstün TB. The world mental health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). *Int J Methods Psychiatr Res* 2004;13(2):93–121.
19. Haro JM, Arbabzadeh-Bouchez S, Brugha TS, et al. 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* 2006;15(4):167–180.
20. First M, Spitzer R, Gibbon M, Williams J. *Structured clinical interview for DSM-IV-TR axis I disorders, research version, non-patient edition (SCID-I/NP)*. New York: Biometrics Research, New York State Psychiatric Institute; 2002.
21. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977:159–174.
22. Altman D, Machin D, Bryant T, Gardner S. *Statistics with confidence: confidence interval and statistical guidelines*. Bristol: BMJ Books; 2000.
23. Knäuper B, Cannell CF, Schwarz N, et al. Improving accuracy of major depression age-of-onset reports in the US National Comorbidity Survey. *Int J Methods Psychiatr Res* 1999;8(1):39–48.
24. Leon AC, Olsson M, Portera L, Farber L, Sheehan DV. Assessing psychiatric impairment in primary care with the Sheehan Disability Scale. *Int J Psychiatr Med* 1997;27:93–105.
25. Hosmer DW, Lemeshow S. *Applied Logistic Regression*, 2nd ed. New York, NY: Wiley & Son; 2001.
26. Wolter KM. *Introduction to Variance Estimation*, 2nd ed. New York, NY: Springer; 2007.
27. Research Triangle Institute. SUDAAN (Release 10.0.1) [Computer Software]. Research Triangle Park, NC: Research Triangle Institute; 2009.
28. Simpson TL, Anne Comtois K, Moore SA, Kaysen D. Comparing the diagnosis of PTSD when assessing worst versus multiple traumatic events in a chronically mentally ill sample. *J Trauma Stress* 2011;24(3):361–364.
29. Resick PA, Bovin MJ, Calloway AL, et al. A critical evaluation of the complex PTSD literature: Implications for DSM-5. *J Trauma Stress* 2012;25(3):241–251.
30. Roberts AL, Austin SB, Corliss HL, et al. Pervasive trauma exposure among US sexual orientation minority adults and risk of posttraumatic stress disorder. *Am J Public Health* 2010;100(12).
31. Darves-Bornoz JM, Alonso J, de Girolamo G, et al. Main traumatic events in Europe: PTSD in the European study of the epidemiology of mental disorders survey. *J Trauma Stress* 2008;21(5):455–462.
32. Nelson C, Cyr KS, Corbett B, et al. Predictors of posttraumatic stress disorder, depression, and suicidal ideation among Canadian Forces personnel in a National Canadian Military Health Survey. *J Psychiatr Res* 2011;45(11):1483–1488.
33. Smith PH, White JW, Holland LJ. A longitudinal perspective on dating violence among adolescent and college-age women. *Am J Public Health* 2003;93(7):1104–1109.
34. Arata CM. From child victim to adult victim: A model for predicting sexual revictimization. *Child Maltreat* 2000;5(1):28–38.
35. Briere J, Kaltman S, Green BL. Accumulated childhood trauma and symptom complexity. *J Trauma Stress* 2008;21(2):223–226.
36. Stein DJ, Koenen KC, Friedman MJ, et al. Dissociation in posttraumatic stress disorder: evidence from the world mental health surveys. *Biol Psychiatry*. 2013;73:302–312
37. Foa EB, Hembree EA, Cahill SP, et al. Randomized trial of prolonged exposure for posttraumatic stress disorder with and without cognitive restructuring: outcome at academic and community clinics. *J Consult Clin Psychol* 2005;73(5):953.
38. Schnurr PP, Friedman MJ, Engel CC, et al. Cognitive behavioral therapy for posttraumatic stress disorder in women: a randomized controlled trial. *JAMA* 2007;297(8):820–830.
39. Resick PA, Nishith P, Weaver TL, et al. A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims. *J Consult Clin Psychol* 2002;70(4):867.
40. Lanius RA, Vermetten E, Loewenstein RJ, et al. Emotion modulation in PTSD: clinical and neurobiological evidence for a dissociative subtype. *Am J Psychiatry* 2010;167(6):640.
41. Cloitre M, Petkova E, Wang J. An examination of the influence of a sequential treatment on the course and impact of dissociation among women with PTSD related to childhood abuse. *Depress Anxiety* 2012;29(8):709–717.
42. Resick PA, Suvak MK, Johnides BD, et al. The impact of dissociation on PTSD treatment with cognitive processing therapy. *Depress Anxiety* 2012;29(8):718–730.

APPENDIX

TABLE A1. WMH sample characteristics by World Bank income categories^a

Country by income category	Survey ^b	Sample characteristics ^c	Field dates	Age range	Sample size		Response ^d rate ^d
					Part 1	Part 2	
I. Low- and lower-middle income countries							
Colombia	NSMH	All urban areas of the country (approximately 73% of the total national population).	2003	18–65	4,426	2,381	87.7
PRC ^e —Beijing/ Shanghai	B-WMH S-WMH	Beijing and Shanghai metropolitan areas.	2002–3	18–70	5,201	1,628	74.7
Ukraine ^f	CMDPSD	Nationally representative.	2002	18–91	4,724	1,719	78.3
Total					14,351	5,728	
II. Upper-middle income countries							
Brazil—São Paulo	São Paulo Megacity	São Paulo metropolitan area.	2005–7	18–93	5,037	2,942	81.3
Bulgaria	NSHS	Nationally representative.	2003–7	18–98	5,318	2,233	72.0
Lebanon	LEBANON	Nationally representative.	2002–3	18–94	2,857	1,031	70.0
Mexico	M-NCS	All urban areas of the country (approximately 75% of the total national population).	2001–2	18–65	5,782	2,362	76.6
Romania	RMHS	Nationally representative.	2005–6	18–96	2,357	2,357	70.9
South Africa ^f	SASH	Nationally representative.	2003–4	18–92	4,315	4,315	87.1
Total					25,666	15,240	
III. High-income countries							
Belgium	ESEMeD	Nationally representative. The sample was selected from a national register of Belgium residents	2001–2	18–95	2,419	1,043	50.6
France	ESEMeD	Nationally representative. The sample was selected from a national list of households with listed telephone numbers.	2001–2	18–97	2,894	1,436	45.9
Germany	ESEMeD	Nationally representative.	2002–3	18–95	3,555	1,323	57.8
Israel	NHS	Nationally representative.	2002–4	21–98	4,859	4,859	72.6
Italy	ESEMeD	Nationally representative. The sample was selected from municipality resident registries.	2001–2	18–100	4,712	1,779	71.3
Japan	WMHJ2002–2006	Eleven metropolitan areas.	2002–6	20–98	4,129	1,682	55.1
Netherlands	ESEMeD	Nationally representative. The sample was selected from municipal postal registries.	2002–3	18–95	2,372	1,094	56.4
New Zealand ^f	NZMHS	Nationally representative.	2003–4	18–98	12,790	7,312	73.3
Northern Ireland	NISHS	Nationally representative.	2004–7	18–97	4,340	1,986	68.4
Spain	ESEMeD	Nationally representative.	2001–2	18–98	5,473	2,121	78.6
United States	NCS-R	Nationally representative.	2002–3	18–99	9,282	5,692	70.9
Total					56,825	30,327	
IV. Total					96,842	51,295	70.4

^aThe World Bank. (2008). Data and Statistics. Accessed May 12, 2009 at: <http://go.worldbank.org/D7SN0B8YU0>

^bNSMH, The Colombian National Study of Mental Health; B-WMH, The Beijing World Mental Health Survey; S-WMH, The Shanghai World Mental Health Survey; CMDPSD, Comorbid Mental Disorders during Periods of Social Disruption; NSHS, Bulgaria National Survey of Health and Stress; LEBANON, Lebanese Evaluation of the Burden of Ailments and Needs of the Nation; M-NCS, The Mexico National Comorbidity Survey; RMHS, Romania Mental Health Survey; SASH, South Africa Health Survey; ESEMeD, The European Study of the Epidemiology of Mental Disorders; NHS, Israel National Health Survey; WMHJ2002–2006, World Mental Health Japan Survey; NZMHS, New Zealand Mental Health Survey; NISHS, Northern Ireland Study of Health and Stress; NCS-R, The US National Comorbidity Survey Replication.

^cMost WMH surveys are based on stratified multistage clustered area probability household samples in which samples of areas equivalent to counties or municipalities in the United States were selected in the first stage followed by one or more subsequent stages of geographic sampling (e.g., towns within counties, blocks within towns, households within blocks) to arrive at a sample of households, in each of which a listing of household members was created and one or two people were selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. These household samples were selected from census area data in all countries other than France (where telephone directories were used to select households) and the Netherlands (where postal registries were used to select households). Several WMH surveys (Belgium, Germany, Italy) used municipal resident registries to select respondents without listing households. The Japanese sample is the only totally unclustered sample, with households randomly selected in each of the 11 metropolitan areas and one random respondent selected in each sample household. Fifteen of the 20 surveys are based on nationally representative household samples.

^dThe response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known not to be eligible either because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey. The weighted average response rate is 70.4%.

^ePeople's Republic of China.

^fFor the purposes of cross-national comparisons we limit the sample to those 18+.

TABLE A2. Original 29 events clustered into 15 events and seven groups

New 15 events (grouped into seven groups)	Original 29 events
I. War related	
Combat experience	Combat experience, purposely injured, tortured, or killed someone
Other war experience	Relief worker in war zone, civilian in war zone, civilian in region of terror, refugee, saw atrocities
II. Physical violence	
Physically abused as a child	Beaten up by caregiver
Physically abused by spouse/partner	Beaten up by spouse or romantic partner
Physically assaulted or threatened	Kidnapped, beaten up by someone, mugged or threatened with a weapon, stalked
III. Sexual violence	
Sexually assaulted	Raped, sexually assaulted
IV. Accidents	
Automobile accident	Automobile accident
Other life-threatening accident	Toxic chemical exposure, other life-threatening accident, man-made disaster, accidentally caused serious injury or death
Natural disaster	Natural disaster
Life-threatening illness	Life-threatening illness
V. Death	
Traumatic death of a loved one	Unexpected death of a loved one
VI. Network/witnessing	
Other PLE to a loved one	Child with serious illness, traumatic event to a loved one
Witnessed family violence as a child	Witnessed family fight at home
Witnessed a traumatic injury or death	Witnessed death or dead body or saw someone seriously hurt
VII. Other	
Other	Other event, private event

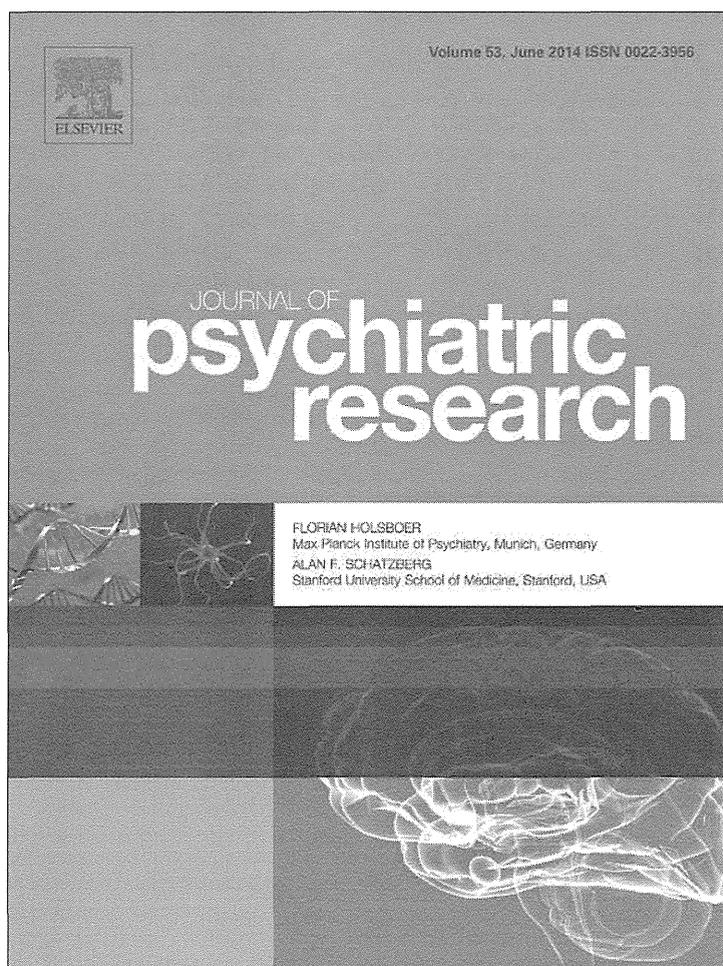
TABLE A3. Functional impairment and 12-month PTSD associated with four or more versus three or fewer events

Severe impairment ^a	Total		3-/PTSD		4+/PTSD		Chi-square statistic ^b	P-value
	Severe (%)	(SE)	Severe (%)	(SE)	Severe (%)	(SE)		
Work	23.20	(2.0)	22.12	(1.83)	54.78	(8.58)	13.79	.0002
Home	24.18	(2.0)	23.50	(1.76)	44.10	(8.56)	5.83	.0158
Close relationships	26.80	(2.0)	25.14	(1.95)	75.20	(7.78)	22.16	.0000
Social life	28.91	(2.0)	27.74	(2.06)	63.21	(8.78)	12.93	.0003
Global	41.95	(2.0)	40.63	(2.13)	80.67	(6.80)	13.97	.0002

^aSevere impairment is defined by having a score of 7–10 on the Sheehan impairment scale.

^bBased on a logistic regression controlling for age, sex, and country.

Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.



This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/authorsrights>



Contents lists available at ScienceDirect

Journal of Psychiatric Research

journal homepage: www.elsevier.com/locate/psychires

Trauma and posttraumatic stress disorder in Japan: Results from the World Mental Health Japan Survey



Norito Kawakami^{a,*}, Masao Tsuchiya^b, Maki Umeda^a, Karestan C. Koenen^c, Ronald C. Kessler^d, on behalf of The World Mental Health Survey Japan

^a Department of Mental Health, School of Public Health, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

^b Health Administration and Psychosocial Factor Research Group, National Institute of Occupational Safety and Health, Japan

^c Department of Epidemiology, Mailman School of Public Health, Columbia University, USA

^d Department of Health Care Policy, Harvard Medical School, USA

ARTICLE INFO

Article history:

Received 15 March 2013

Received in revised form

8 January 2014

Accepted 20 January 2014

Keywords:

Traumatic event

PTSD

12-Month and lifetime prevalence

Conditional risk

Gender

ABSTRACT

The purpose of the study was to report the prevalence of trauma exposure and PTSD, conditional risk of PTSD associated with each trauma exposure in the community population in Japan. An interview survey was conducted of a random sample of adult residents in 11 communities of Japan. Among 4134 respondents (response rate, 55%), data from those who completed the part 2 interview ($n = 1682$) were analyzed with a weight for this subsample. Lifetime experiences of 27 trauma events and PTSD were assessed using the WHO-Composite International Diagnostic Interview version 3.0. Sixty percent of the part 2 sample reported exposure to at least one lifetime traumatic event. Lifetime and 12-month PTSD prevalences were 1.3% and 0.7%, respectively. Percentage of all months lived with PTSD in the population was predominantly accounted for by physical/sexual assaults and having a child with serious illness, and unexpected death of loved one. Ten percent of respondents reported “private events”, for which respondents did not have to describe the content, which accounted for 19% of months with PTSD. The lower prevalence of PTSD in Japan seems attributable to lower conditional risks of PTSD following these events, as well as different distributions of the events. The greater impact of events that occurred to loved ones rather than to oneself and “private events” on PTSD in Japan warrants further research of cross-cultural assessment of trauma exposure and cultural heterogeneity in the trauma-PTSD relationship.

Crown Copyright © 2014 Published by Elsevier Ltd. All rights reserved.

1. Introduction

Posttraumatic stress disorder (PTSD) occurs after exposure to traumatic events and is characterized by symptoms of re-experiencing, numbing and hyperarousal. Lifetime exposure to traumatic events is very common ranging from 50% to 80% in community samples (Atwoli et al., 2013; Kessler et al., 1995; Mills et al., 2011; Norris et al., 2003; Seedat et al., 2009) and a primary care sample (Bruce et al., 2001). However, the vast majority of persons exposed to a traumatic event do not develop PTSD. The prevalence of PTSD varies widely across countries (Karam et al., 2014; Kessler et al., 2007; Matsuoka et al., 2010). For instance, the World Health Organization (WHO) World Mental Health

Surveys reported that mean 12-month prevalence of PTSD was 1.1%, but the prevalence ranged from 0.4% to 3.8%, among 20 participating countries (Karam et al., 2014). The 12 month prevalence of PTSD was high (3–6%) in Western countries, such as the US (Kessler et al., 2005a; Kessler et al., 2005b; Kessler and Wang, 2008; Pietrzak et al., 2011), Australia (Chapman et al., 2012; Mills et al., 2011) and New Zealand (Oakley Browne et al., 2006; Wells et al., 2006), and was low among Asian countries (0.7% in Korea and 0.2% in China)(Cho et al., 2007; Shen et al., 2006). This cross-national variation in prevalence of PTSD could be explained by differential prevalences of traumatic exposures and/or a conditional risk of PTSD by the type of trauma exposure (Breslau et al., 1998; Bruce et al., 2001; Kessler et al., 1995; Norris et al., 2003; Pietrzak et al., 2011; Zlotnick et al., 2006), both of which could vary among countries depending on the social and cultural background. However, information of the trauma exposure patterns and the conditional risk of PTSD following exposure to trauma in low prevalence countries, such as Asia, is still lacking.

* Corresponding author. Tel.: +81 3 5841 3521; fax: +81 3 3841 3392.

E-mail addresses: kawakami@m.u-tokyo.ac.jp (N. Kawakami), m-tsuchi@umin.ac.jp (M. Tsuchiya), makiumedatky@umin.ac.jp (M. Umeda), kck5@columbia.edu (K.C. Koenen), kessler@hcp.med.harvard.edu (R.C. Kessler).

In Japan, 12-month prevalence of PTSD was reported as 0.4% (Kawakami et al., 2005), which is lower than ones reported in the US (Kessler et al., 2005a, 2005b) and New Zealand (Oakley Browne et al., 2006; Wells et al., 2006); it was close to those in Korea and China (Cho et al., 2007; Shen et al., 2006). While traumatic events were reported to be quite common (80%) among women in a primary care sample (Mizuta et al., 2005), traumatic events related to crime and violence are less frequent in Japan (OECD., 2009). On the other hand, Japan is at a higher risk of natural disaster (United Nations University Institute for Environment and Human Security, 2012), which may contribute to the increased risk for psychological distress and PTSD in Japan (Fukuda et al., 2000; Goto et al., 2002; Kato and Iwai, 2000; Kuwabara et al., 2008; Suzuki et al., 2011). Motor vehicle accident (Hamanaka et al., 2006; Matsuoka et al., 2008; Nishi et al., 2013), the illness of one's own (Akechi et al., 2004) or families (Nagata et al., 2008), bereavement (Shirai et al., 2005), terrorism attack (Kawana et al., 2001; Ohtani et al., 2004), and being atomic bomb survivors (Ohta, 2002) were also reported to be associated with PTSD in Japan. However, these studies are methodologically weak, of samples only exposed to traumas, often using a symptom checklist to identify PTSD cases, and none was based on a whole community population. It would be interesting to know how a unique pattern of the exposure to traumatic events and the conditional risk of PTSD associated with such events in Japan contribute to the lower prevalence of PTSD in this country, and to know if there is a particular trauma which has a greater impact on PTSD in Japan than in Western countries. However, there is no previous study which has provided such an overall picture of trauma exposure and PTSD in the whole community population of Japan, using comparative methodology with previous surveys in the US and Europe.

For demographic correlates of PTSD, previous research has reported that female gender (Creamer et al., 2001; Kessler et al., 1995; Pietrzak et al., 2011), younger age (Creamer et al., 2001) or middle-age (Pietrzak et al., 2011) and being previously married or single (Atwoli et al., 2013; Creamer et al., 2001; Kessler et al., 1995; Pietrzak et al., 2011) and poor socioeconomic position (Carey et al., 2003; Pietrzak et al., 2011) were associated with PTSD. Women were at higher risk of PTSD than men, even after controlling for type of trauma (Breslau et al., 1999; Kessler et al., 1995); so were women being previously married (Kessler et al., 1995). Previous exposure to trauma signaled a greater risk of PTSD from subsequent trauma (Breslau et al., 1999). There is still limited research on the demographic-trauma exposure-PTSD associations outside Western countries.

The purpose of the study was three-fold. First, the study reports 12-month and lifetime prevalences of PTSD in the community population in Japan, based on the World Mental Health Survey Japan (WMH-J). While we already reported a 12-month prevalence based on part of the sample in this survey done in 2002 and 2003 (Kawakami et al., 2005), the study updates the prevalences using a larger final sample collected between 2002 and 2006. Second, the study reports lifetime prevalences of trauma exposure, conditional risk of PTSD associated with trauma exposure, and proportion of PTSD cases attributable to each trauma exposure. Third, the study reports demographic correlates of lifetime PTSD.

2. Methods

2.1. Sample

Analysis was conducted on the data collected by WMH-J from 2002 until 2006 (Kawakami et al., 2005), which was a part of the cross-national World Mental Health surveys (WMH) (Kessler et al., 2006). Survey participants were community residents aged 20

years or older and were randomly selected from voter registration lists or resident registries at 11 collaborating survey sites.

2.2. Data collection

Participants were interviewed face-to-face using a computer-assisted personal-interview. The instrument used in this study was the Japanese translation of the World Health Organization Composite International Diagnostic Interview (WHO-CIDI), version 3.0 (Kessler and Üstun, 2004), a fully structured diagnostic interview that was developed to make an adequate diagnosis in a research setting, which is conducted by trained lay interviewers. All participants were administered part 1 of the interview for core diagnostic assessment ($n = 4,134$, response rate = 55.1%). To decrease respondents' burden of the interview, part 2 of the interview was only administered to a random sample ($n = 1682$) of respondents to the part 1 interview. This internal sampling was done so that all respondents with a history of mental disorders based on the part 1 interview and a probability sample (9% for three sites, and 20% for the remaining sites) of respondents without the history were interviewed in the part 2. The current study used the subset of the part 2 sample, which enquired about traumatic events and PTSD.

The participation in this study was completely voluntary, and anonymity and confidentiality were assured. Written consent was obtained from each respondent. The human subject committees of Okayama University Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences; Japan National Center of Neurology and Psychiatry; Nagasaki University Graduate School of Biomedical Sciences; Yamagata University Graduate School of Medical Science; and Juntendo University Graduate School of Medicine approved the recruitment, consent, and field procedures.

2.3. Measures

2.3.1. Trauma exposure

The PTSD module of the WHO-CIDI assessed the lifetime experience of 27 traumatic events. Traumatic events were categorized into 6 event classes as follows: (1) war events (seven events), (2) physical violence (five events), (3) sexual violence events (three events), (4) accidents (six events), (5) death (unexpected death of a loved one only), (6) network events (five events) (see Table 1 for the detailed list). An additional question inquired about other traumatic events not included in this list. Positive responses to this question were followed further detailed probing, and the results were reviewed by a trained clinical rater to determine whether the events qualified as trauma. A final open-ended question obtained information about qualifying events that respondents did not report because of embarrassment, and this event was coded as 'private events'.

2.3.2. PTSD assessment

Lifetime PTSD was assessed based on the respondents' self-reported worst lifetime trauma and on one randomly selected trauma from all those reported by the respondent as ever having occurred to him/her. Weights were applied to the randomly-selected traumatic events to adjust for the fact that they represent only a sample of the respondent's lifetime traumas. This produced a weighted dataset in which each trauma was represented in the proportion it occurred in the population. The remaining criteria for PTSD were assessed for each worst and each random event. Criterion A2 was considered met if the respondent endorsed any of three questions about whether, at the time of the traumatic event, he/she felt terrified or very frightened, helpless, shocked, or horrified. The remaining criteria were then assessed whether or not A2

Table 1
Prevalence of trauma exposure in the World Mental Health Japan Surveys (part 2 sample, $n = 1682$).

Event type	% Of respondents with event	SE	Mean number of occurrences among respondents with any ^a	SE
No events	39.3	1.66		
<i>War events</i>	8.7	0.9	1.3	0.12
Combat experience	2.0	0.55	1	0
Relief worker in war zone	0.1	0.06	1	0
Civilian in war zone	5.2	0.63	1	0
Civilian in region of terror	0.2	0.1	1	0
Refugee	0.5	0.13	1	0
Purposely injured, tortured, or killed someone	0.4	0.21	4.3	0.65
Saw atrocities	1.2	0.34	1.7	0.49
<i>Physical violence</i>	16.5	1.15	2.1	0.15
Kidnapped	0.7	0.24	1	0
Beaten up by caregiver	6.9	0.82	1	0
Beaten up by spouse or romantic partner	4.4	0.54	1	0
Beaten up by someone else	7.3	0.72	2.6	0.15
Mugged or threatened with a weapon	2.1	0.4	2	0.36
<i>Sexual violence</i>	4.3	0.64	2.7	0.27
Raped	0.6	0.17	1.6	0.17
Sexually assaulted	1.7	0.4	2.4	0.38
Stalked	2.7	0.46	2.3	0.31
<i>Accident</i>	22.8	1.53	1.8	0.13
Toxic chemical exposure	0.8	0.31	2.3	0.62
Automobile accident	6.5	0.79	1.4	0.09
Other life threatening accident	4.1	0.66	1.7	0.29
Natural disaster	5.4	0.73	1.3	0.07
Man-made disaster	1.7	0.38	1.3	0.18
Life-threatening illness	10.3	1.07	1.3	0.09
<i>Death</i>	23.7	1.43	1.6	0.1
Unexpected death of loved one	23.7	1.43	1.6	0.1
Network events	30.2	1.48	2	0.12
Child with serious illness	6.1	0.94	1.2	0.05
Traumatic event to loved one	1.1	0.32	2.2	0.64
Witnessed death/dead body, or saw someone seriously hurt	18.0	1.06	2.1	0.16
Accidentally caused serious injury or death	1.4	0.34	1.5	0.27
Witnessed physical fight at home	10.6	0.95	1	0
<i>Other</i>	13.7	1.26	1.1	0.02
Some other event	4.7	0.79	1	0
Private event	10.3	1.07	1	0
Total with any event	60.7	1.66	3.5	0.2

^a Mean number of occurrences among respondents with any event. For six event classes, $\chi_7 = 140.8$, $p < 0.001$. For individual events, $\chi_{17} = 268.7$, $p < 0.001$.

was endorsed with structured questions about reexperiencing (criterion B), avoidance-numbing (criterion C), arousal (criterion D), duration (criterion E), and clinically significant distress or impairment (criterion F). A retrospective question also asked respondents how many months each of symptoms defined in criteria B, C, and D lasted. The longest duration of any of the symptoms was used to define the duration of PTSD and residual symptoms in this study, which may be longer than the duration of full-symptom PTSD.

2.3.3. Socio-demographic variables

Five socio-demographic variables were included in the analysis: gender, age (18–29 years, 30–44 years, 45–59 years, and 60 years or older), marital status (married, previously married and never married), years of education (0–9 years, 10–12 years, 13–15 years, 16 or more years), and employment status (employed, homemaker, retired and others including unemployed and students). Socio-demographic variables with multiple categories were dummy coded for analytic purposes (reference groups include age 60+, married, 16 or more years of education, and employed).

2.3.4. Statistical analysis

Prevalences of trauma exposure and conditional risk of PTSD were examined using cross-tabulations. The relative burden of PTSD was also calculated which refers to the percentage of all months (or years) lived with PTSD (or residual symptoms) in the population due to episodes associated with each class of events. The relative burden is a combination of three factors: the prevalence of the PTE, the conditional risk of PTSD following the PTE and the PTSD symptom duration.

A series of four logistic regression models (Hosmer and Lemeshow, 2000) were used to examine predictors of trauma events and lifetime PTSD. Model 1 examined sociodemographic predictors of traumatic events. Model 2 tested whether sociodemographics were associated with lifetime PTSD. Model 3 evaluated the extent to which the coefficients in model 2 changed when we focused only on respondents who were exposed to one or more traumas. Model 4 evaluated additional changes in coefficients when we also adjusted for the classes of traumas and prior lifetime trauma exposure.

To adjust for the weighting for non-response and part 2 sampling, standard errors were estimated using the Taylor series method (Wolter, 1985) implemented in the SUDAAN software system (SUDAAN, 2005). Multivariate significance was evaluated with Wald χ^2 tests based on design-corrected coefficient variance–covariance matrices. Statistical significance was consistently evaluated using 0.05 level two-sided tests.

3. Results

3.1. Trauma exposure

Approximately sixty percent of the respondents ($n = 1138$) reported exposure to at least one traumatic event in their lifetime. A total of 1207 events (either random or worst events) were reported in the sample. The left column of Table 1 shows prevalences of traumatic events. Among the six traumatic event classes, network events (30.2%) was the most prevalent followed by unexpected death of a loved one (23.7%) and accidents (22.8%). The right column of Table 1 shows the mean number of each event class or individual event occurred to a respondent who had that traumatic

event. Respondents who had any traumatic event experienced an event 3.5 times on average.

3.2. Prevalence of PTSD

Out of the total respondents ($n = 1682$), 38 fulfilled the criteria of lifetime PTSD, and 19 did 12-month PTSD. The lifetime prevalence (SE) of PTSD was 1.3 (0.2)%; 12-month prevalence of PTSD was 0.7 (0.2)%.

3.3. Impact of traumatic events on PTSD

The first column of Table 2 shows the conditional risk of PTSD among respondents with a traumatic event class/individual event. The highest conditional risk was observed for physical violence (3.4%) and “other events” (7.5%), as an event class. For individual events, a higher conditional risk of PTSD was observed for being beaten up by someone else (5.7%), raped (5.6%), and having child with serious illness (4.4%). In addition, respondents who reported some other event (9.6%) and private event (6.5%) had higher conditional risk of PTSD. Mean duration of PTSD among the lifetime cases was about 60 months (the second column of Table 3).

Table 2
Conditional risks of lifetime PTSD, PTSD duration, and proportion of PTSD months in the population accounted for by specific events in the World Mental Health Japan Surveys (part 2 sample, $n = 1682$).

Event type	Conditional risk of PTSD among respondents with an event (%) ^a	SE	Mean duration of PTSD episode in month ^c	SE	% Of PTSD months in the population accounted for by an event ^d	SE
<i>War events^a</i>						
<i>Physical violence</i>	3.4	2.5	26.0	13.5	34.4	15.7
Kidnapped	0	0				
Beaten up by caregiver	0.3	0.2	309.8	109.4	0.6	0.5
Beaten up by spouse or romantic partner	1.7	1.1	80.2	40.2	2.2	1.5
Beaten up by someone else	5.7	4.1	16.6	6.1	31.6	16.3
Mugged or threatened with a weapon	0	0				
<i>Sexual violence</i>	0.7	0.4	28.1	17.1	2.3	1.7
Raped	5.6	4.6	33.7	13.0	1.7	1.4
Sexually assaulted	0	0				
Stalked	0.3	0.3	12.0	0	0.6	0.6
<i>Accident</i>	0.1	<0.1	36.0	0	1.5	0.5
Toxic chemical exposure	0	0				
Automobile accident	0	0				
Other life threatening accident	0	0				
Natural disaster	0	0				
Man-made disaster	0	0				
Life-threatening illness	0.4	0.4	36.0	0	1.5	0.5
<i>Death</i>	1.5	0.6	34.0	14.4	16.4	7.0
Unexpected death of loved one	1.5	0.6	34.0	11.7	16.4	7.0
<i>Network events</i>	0.8	0.6	63.6	38.3	13.3	9.6
Child with serious illness	4.4	4.2	45.6	3.2	9.1	8.9
Traumatic event to loved one	1.1	1.4	12.0	0	0.7	0.8
Witnessed death/dead body, or saw someone seriously hurt	0	0				
Accidentally caused serious injury or death	5	6.6	36.0	0	2.9	1.7
Witnessed physical fight at home	0.2	0.2	588.0	0	0.5	0.2
<i>Other</i>	7.5	2.8	101.1	60.2	32.2	11.5
Some other event	9.6	4.3	9.6	3.5	13.0	6.4
Private event	6.5	3.7	166.1	86.1	19.2	10.4
<i>Total with any event</i>	1.6	1.0	57.3	52.3	100	0

^a No PTSD case was observed with any war event.
^b Probability of PTSD among events of this class ($\chi_6 = 2.1, p = 0.074$) or individual type of trauma ($\chi_{27} = 10.2, p < 0.001$).
^c Mean duration of PTSD episode (or residual symptoms, in months) for episodes associated with events in this class ($\chi_4 = 3.4, p = 0.496$) or individual type of trauma ($\chi_7 = 111.1, p < 0.001$).
^d Percentage of all months lived with PTSD associated with events in this class or individual type of trauma.

Table 3

Associations of socio-demographic factors with lifetime PTSD in the World Mental Health Japan Surveys (part 2 sample, $n = 1682$).

	Model 1: Predict exposure to any traumatic event in the total sample		Model 2: Predict lifetime PTSD in total sample		Model 3: Predict lifetime PTSD among respondents with events		Model 4: Predict lifetime PTSD among respondents with events, control for events	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<i>Gender</i>								
Male	1.00		1.00		1.00		1.00	
Female	0.82	(0.58, –1.18)	4.93	(1.34, –18.10)	2.65	(0.43, –16.43)	5.78	(1.84, –18.14)
Chi-square, p -value, DF	1.20	$p = 0.27$, DF = 1	6.08	$p = 0.01$, DF = 1	1.16	$p = 0.28$, DF = 1	9.50	$p < 0.01$, DF = 1
<i>Age at survey (years)</i>								
18–29	0.69	(0.35, –1.35)	5.22	(1.51, –18.06)	4.26	(1.38, –13.12)	2.22	(0.45, –11.02)
30–44	0.90	(0.57, –1.43)	3.32	(1.13, –9.77)	2.89	(0.64, –13.06)	2.49	(0.64, –9.67)
45–59	0.75	(0.48, –1.18)	1.51	(0.40, –5.68)	3.52	(0.85, –14.62)	2.74	(0.72, –10.48)
60+	1.00		1.00		1.00		1.00	
Chi-square, p -value, DF	2.38	$p = 0.50$, DF = 3	13.17	$p < 0.01$, DF = 3	9.24	$p = 0.03$, DF = 3	3.61	$p = 0.31$, DF = 3
<i>Marital status</i>								
Married	1.00		1.00		1.00		1.00	
Previously married	1.55	(1.03, –2.33)	1.19	(0.37, –3.83)	0.51	(0.17, –1.57)	0.35	(0.07, –1.75)
Never married	0.99	(0.57, –1.71)	1.61	(0.58, –4.45)	1.17	(0.33, –4.13)	1.66	(0.31, –8.82)
Chi-square, p -value, DF	5.19	$p = 0.08$, DF = 2	1.61	$p = 0.45$, DF = 2	1.65	$p = 0.44$, DF = 2	2.18	$p = 0.34$, DF = 2
<i>Education</i>								
Low	1.17	(0.69, –1.98)	0.98	(0.14, –6.94)	1.09	(0.14, –8.36)	0.55	(0.05, –5.67)
Low-average	1.19	(0.77, –1.85)	0.60	(0.18, –1.99)	1.29	(0.15, –11.51)	1.54	(0.24, –10.03)
High-average	1.02	(0.64, –1.62)	0.72	(0.20, –2.58)	1.34	(0.28, –6.38)	1.56	(0.30, –8.22)
High	1.00		1.00		1.00		1.00	
Chi-square, p -value, DF	0.84	$p = 0.84$, DF = 3	1.21	$p = 0.75$, DF = 3	0.22	$p = 0.98$, DF = 3	1.51	$p = 0.68$, DF = 3
<i>Employment</i>								
Working	1.00		1.00		1.00		1.00	
Student	0.90	(0.18, –4.46)	0.34	(0.03, –4.21)	0.24	(0.03, –2.11)	0.42	(0.03, –5.19)
Homemaker	0.75	(0.47, –1.19)	0.94	(0.27, –3.25)	0.69	(0.10, –4.64)	1.18	(0.17, –8.43)
Retired	1.37	(0.84, –2.23)	2.29	(0.68, –7.67)	1.27	(0.29, –5.48)	1.49	(0.32, –6.92)
Other incl unemployed	1.96	(1.11, –3.45)	1.03	(0.20, –5.30)	0.45	(0.10, –1.99)	0.53	(0.12, –2.36)
Chi-square, p -value, DF	11.06	$p = 0.03$, DF = 4	3.10	$p = 0.54$, DF = 4	3.76	$p = 0.44$, DF = 4	1.47	$p = 0.83$, DF = 4
<i>Type of random or worst event that was assessed for PTSD</i>								
Physical violence							6.69	(1.16, –38.69)
Sexual violence							0.20	(0.03, –1.58)
Death							1.00	
Network events							0.56	(0.17, –1.86)
Other or private incl war events & accidents							1.74	(0.35, –8.70)
Chi-square, p -value, DF							7.90	$p = 0.10$, DF = 4
<i>Count of prior events</i>								
Prior physical violence							1.20	(0.86, –1.67)
Prior sexual violence							1.62	(0.90, –2.91)
Prior deaths							0.75	(0.28, –2.00)
Prior network events							1.66	(1.10, –2.50)
Prior other events incl war events & accidents							0.77	(0.44, –1.34)
Chi-square, p -value, DF							23.02	$p < 0.01$, DF = 5

Network events and “other events” were associated with longer mean duration of PTSD (63.6 and 101.1 months, respectively). For individual events, witnessing physical fight at home and beaten up by caregiver were associated with longer mean duration of PTSD (309.0 and 588.0 months, respectively), followed by private event (166.1 months).

The third column of Table 2 shows the proportion of PTSD months in the population accounted for by a traumatic event class/individual event, which was calculated based on the prevalence of each traumatic event, the conditional risk of PTSD associated for that event, and the duration (months) of PTSD symptoms. Physical violence and “other event” accounted for the largest proportions (34.4% and 32.2%, respectively) of PTSD months, followed by death (16.4%) and network events (13.3%). For individual events, being

beaten up by someone else accounted the largest proportion (31.6%), followed by private event (19.2%) and unexpected death of loved one (16.4%). The proportion of PTSD months accounted for by rape was only 1.7%. No PTSD cases were reported associated with automobile accidents or natural disaster.

3.4. Socio-demographic predictors of lifetime PTSD

The model 1 in Table 3 shows predictors of any traumatic event. Those who previously married (compared with those currently married) and those with other employment status (compared with those currently working) had a significantly greater risk of having a traumatic event. The models 2–4 in Table 3 shows predictors of lifetime PTSD. Women (compared with men) and younger

respondents (compared with respondents aged 65 or older) had a significantly greater risk of PTSD (model 2). When we limited respondents to those who experienced at least one lifetime traumatic event, the youngest respondents still had a significantly higher risk of lifetime PTSD (OR = 4.3) (model 3). Additionally controlling for exposure to classes of traumatic events, women had a significantly elevated risk (OR = 5.8), while age was no longer significantly associated. Physical violence and the count of prior network events were significantly associated with PTSD (OR = 6.7 and 1.7, respectively) after adjusting for all other covariates (model 4).

4. Discussion

4.1. Prevalences of trauma exposure and PTSD in Japan

Approximately sixty percent of the respondents reported exposure to at least one traumatic event in their lifetime. This is comparable to the proportion of people who experienced traumatic events in the lifetime (51–83%) in US (Kessler et al., 1995), Mexico (Norris et al., 2003), Australia (Mills et al., 2011), New Zealand (Mills et al., 2011), and South Africa (Atwoli et al., 2013; Seedat et al., 2009). Like these previous studies, witnessing physical fight and life-threatening illness were relatively prevalent in this Japanese sample. However, reported frequencies of these events were lower in this sample, which may be partly attributable to lower crime rates in Japan (OECD., 2009). Unexpected death of loved one was reported relatively frequently in this sample, which is a similar pattern to that observed in other countries (Atwoli et al., 2013; Mills et al., 2011; Norris et al., 2003; Pietrzak et al., 2011).

In this sample, the 12-month prevalence was almost double compared to one which we previously reported using a part of the sample (Kawakami et al., 2005). This may be attributable to the fact that we include PTSD associated with a random event in this study. The lifetime and 12-month prevalences of PTSD were very comparable with ones reported from Korea and China (Cho et al., 2007; Shen et al., 2006), but was much lower than in the US (Kessler et al., 2005b), Mexico (Norris et al., 2003), Australia (Chapman et al., 2012; Creamer et al., 2001), New Zealand (Oakley Browne et al., 2006; Wells et al., 2006), and South Africa (Atwoli et al., 2013; Seedat et al., 2009). This lower prevalence may be largely explained by a lower conditional risk of lifetime PTSD among respondents with any traumatic event (1.6%) than other countries (Atwoli et al., 2013; Breslau et al., 1998; Kessler et al., 1995; Norris et al., 2003; Roberts et al., 2011), as well as the differential distribution of traumatic events noted above to some extent.

4.2. Event-specific conditional risk of PTSD

A higher event-specific conditional risk of PTSD (3.4–5.7%) was observed for physical violence compared to the other event classes, which accounted for 34% of all PTSD months. The pattern is consistent with previous reports, but the conditional risk itself was lower than previous studies (Atwoli et al., 2013; Breslau et al., 1998; Kessler et al., 1995; Norris et al., 2003). On the other hand, having a child with serious illness was associated with a higher conditional risk of 4.4% and accounted for 16% of PTSD months in this study, showing a greater impact of this event than that reported in other countries (Atwoli et al., 2013; Breslau et al., 1998; Norris et al., 2003). This is consistent with a greater probability of PTSD for this event reported among Japanese (Nagata et al., 2008). Firm adherence of Japanese couple to one's role as a parent and a closer relationship between parents, especially mothers, and a child in Japan may explain this pattern (Fogel et al., 1992; Rothbaum et al., 2002).

One tenth of respondents reported “private events” for which they were not required to report a specific description. The prevalence was higher than those in other countries such as Australia and South Africa (4–5%) (Atwoli et al., 2013; Mills et al., 2011). On the other hand, the private events were associated with a higher conditional risk (6.5%) of PTSD and accounted for 19% of PTSD months in this study, which are far greater than in studies in South Africa (Atwoli et al., 2013). A similar pattern was observed for the “other events”. There is a possibility of underreporting of some events because of stigma and embarrassment (Dussich, 2001). Some of the traumatic events not reported using the list of trauma exposure, possibly severe and more stigmatized events, may have been instead reported as private events. This may explain the relatively high prevalence of reporting of private or other events and the high conditional risk of PTSD associated with these events. The present finding suggests an importance of including the “private event” category in asking trauma exposure in a cross-country survey to capture an important, but culturally underreported, traumatic event and its impact on PTSD.

Rape was associated with a higher probability of PTSD in this study, but the conditional risk was far lower than those in other countries (Atwoli et al., 2013; Breslau et al., 1998; Kessler et al., 1995; Norris et al., 2003). As noted earlier, the lifetime prevalence of rape was very low in this sample. As a result, rape accounted for only 2% of PTSD cases. While victims of rape are still an important target of treatment of PTSD, its impact on the population burden of PTSD may be limited in a country like Japan, where the rate of sexual violence is low. However, given that rape is highly a stigmatized experience in Japan, it may have been underreported, or have been reported as a “private event” (Dussich, 2001). No PTSD cases were reported associated with automobile accidents, while automobile accidents have been reported to be associated with PTSD in Japan (Hamanaka et al., 2006; Matsuoka et al., 2008; Nishi et al., 2013). This is probably because the severity of automobile accidents is highly variable and severe automobile accidents may be less prevalent in Japan. Despite 5.4% of the sample reporting natural disaster, there was no PTSD case associated with natural disaster. This is again in contrast to previous findings in Japan (Fukuda et al., 2000; Goto et al., 2002; Kato et al., 2000; Kuwabara et al., 2008), while one study reported no PTSD case following an earthquake (Suzuki et al., 2011). The prevalence of natural disaster in this sample was almost one third of the prevalence reported in the US (Breslau et al., 1998; Kessler et al., 1995). This study was done before the Great East Japan Earthquake in March, 2011, and the survey areas did not include areas affected by other recent major earthquakes. The prevalence of natural disaster and a probability of PTSD associated with this event may be underestimated in this study. A future study of a national representative sample of Japan, considering the severity and contextual effects of automobile accidents and natural disasters is warranted.

The mean duration of PTSD in this study was 57 months, which is similar to a median duration (60 months) reported from the US (Kessler et al., 1995), but shorter than one (14 years) from Australia (Chapman et al., 2012). The duration was substantially longer for witnessing physical fight at home and being beaten up by caregiver, which contributed to increased relative PTSD burden (percentage of PTSD months) associated with these events. Given these events occurred in early life, victims may receive greater influence by the events or suffer from PTSD for a longer period.

4.3. Socio-demographic predictors of lifetime and 12-month PTSD

In this study, those who previously married and those with other employment status including unemployment had a significantly greater risk of having traumatic exposure. Women and