



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



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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.

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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; Matsuoaka 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.

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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 Ustun, 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, $\chi^2 = 140.8$, $p < 0.001$. For individual events, $\chi^2_{17} = 268.7$, $p < 0.001$.

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 (%) ^b	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 3Associations 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

younger respondents had a significantly greater risk of PTSD. After we limited the respondents to those who experienced at least one lifetime trauma event and adjusted for exposure to traumatic events, women had a significantly elevated risk of lifetime PTSD, which is consistent with previous findings in the US (Breslau et al., 1998; Kessler et al., 1995). On the other hand, younger age seems to be associated with PTSD, partly mediated by trauma exposure. Count of prior events, particularly prior network events, was associated with lifetime PTSD, as indicated by a previous study (Breslau et al., 1999).

4.4. Limitations

Several limitations should be considered in the interpretation of the data. First, our response rate was not high. The prevalence of trauma and PTSD may be over- or underestimated. Second, respondents may have not reported specific traumas due to fear of stigma or embarrassment associated with these ones (Dussich, 2001). Third, we did not consider comorbid mental disorders in analyzing the association between traumas and PTSD. Future studies may need to address impact of traumas on other mental disorders, such as depressive disorders. Fourth, our assessment of traumas and PTSD was based on self-reported retrospective data. Respondents may have not been able to recall their experience correctly, e.g., attributing a PTSD episode to a different trauma. Fifth, we combined PTSD associated with a worst event and that associated with a random event to increase PTSD cases, which was different from a previous study that used only a worst event (Kessler et al., 1995) and one which used only a random event (Breslau et al., 1998). The worst event approach is commonly used in epidemiological surveys but it makes it impossible to draw inferences about PTSD risk associated with *typical* traumas because *worst* traumas are atypical and associated with risk of PTSD presumably higher than for more typical traumas (Breslau et al., 1998; Kessler et al., 1995; Norris et al., 2003). With appropriate weighting of responses to random events, we were able to estimate the population prevalence and distribution of lifetime PTSD associated with the wide range of traumas assessed in the survey. However, the use of different methods makes comparisons to prior publications difficult. Diagnoses, preparation of indicators, and analyses should be done in a standard way in future studies.

Despite of these limitations, the present community-based study confirmed that trauma exposures were prevalent in Japan as in other countries, but with a smaller risk of PTSD associated with these exposures. The lower prevalence of PTSD in Japan seems mainly attributable to lower conditional risks of PTSD following these events. The greater impact of events that occurred to loved ones rather than to oneself and that of “private events” on PTSD may reflect a Japanese cultural context in regard to family values and stigma and embarrassment associated with some traumatic events. The findings warrant further research of cross-cultural assessment of trauma exposure and cultural heterogeneity in the trauma-PTSD relationship.

Conflict of interests

Although there seems to be no actual conflict of interest, the potential conflict of interest is to be addressed as follows. N. Kawakami has been a consultant for Sekisui Chemical, Co., Ltd., Junpukai Health Care, Ds's Mental Health Labo, Ltd., and Riken Institute. He has had research support for his epidemiological studies from Fujitsu Infosoftware Technologies, Ltd., Tak, Ltd., and NEC Soft, Ltd. R. Kessler has been a consultant for AstraZeneca, Analysis Group, Bristol-Myers Squibb, Cerner-Galt Associates, Eli Lilly & Company, GlaxoSmithKline Inc., HealthCore Inc., Health Dialog,

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Contributors

N. Kawakami designed the study, collected data, conducted the literature review and wrote the first draft of the manuscript. M. Tsuchiya conducted statistical analysis. M. Umeda conducted literature search. K. Koenen designed the study. R. Kessler designed the study and conducted statistical analysis. All author collected data, and contributed to and have approved the final manuscript.

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