Place	Day 2 : Oct. 16(Thur.)		
	Main Hall	Second Hall	
9:00			
	❶ 9:30~12:00 English		
10:00			
	Symposium 1 Trauma and Mental Heath:		
11:00	introductory session トラウマとメンタルヘルス:全体セッション		
12:00		**Ⓛ 12:10~13:10** Japanese	
		Luncheon Seminar 2 Supported by Mochida Pharmaceutical Co., Ltd./ Mitsubishi Tanabe Pharma Corporation/Yoshitomiyakuhin Corporation アジア諸国における自殺防止対策とうつ病の変化 Suicide prevention in Asian countries and Symptom changes of Japanese depression	
13:00			**❶ 13:10~14:00** English
			Poster Session 1
14:00	**❶ 14:00~17:00** English	**Ⓛ 14:00~17:00** Japanese	
15:00		シンポジウム2 認知症:疫学から政策、コミュニティ支援、	
	Symposium 2 Natural Disasters: Earthquakes and	社会的包摂まで Dementia: translating epidemiology to	
16:00	tsunami 自然災害:地震と津波	policy and community-based support/ social inclusion	
17:00	**❶ 17:00~18:00** English	**Ⓛ 17:00~18:00** Japanese	
	Lecture 1 Educational Program 教育プログラム Fukushima Project: Nuclear Disaster Stress Relief Project 福島の放射線ストレス支援	Lecture 2 教育プログラム EBMの新しい展開	
18:00			
19:00			
20:00			

※Ⓛ:Organized by Local Committee / ❶:Organized by International Committee

Place	Day 3 : Oct. 17 (Fri.)		
	Main Hall	**Second Hall**	
9:00	**Ⓘ 9:00~12:00** English	**Ⓛ 9:00~10:00** Japanese	
		Lecture 3 子どもから大人への移行と精神保健	
10:00	Symposium 3 Mental Health Consequences of Radiation Disasters 放射線災害のメンタルヘルスへの影響	**Ⓛ 10:00~11:00** Japanese	
		Lecture 4 精神保健分野における疫学の展望	
11:00		**Ⓛ 11:00~12:00** Japanese	
		Lecture 5　わが国のアルコール関連問題の現状・ 治療・対策:アルコール健康障害対策基本法施行に向けて	
12:00		**Ⓛ 12:10~13:10** Japanese	
		Luncheon Seminar 3 Supported by Otsuka Pharmaceutical Co., Ltd. 抗精神病薬多剤大量処方からの安全で現実的な減量法 Safe and practical dose reduction from high-dose polypharmacy of antipsychotics in Japan	
13:00			**Ⓘ 13:10~14:00** English
			Poster Session 2
14:00	**Ⓘ 14:00~17:00** English	**Ⓘ 14:00~17:00** English	
15:00	Free Parallel Session 1	Free Parallel Session 2	
16:00			
17:00	**Ⓘ 17:00~18:30** English	**Ⓛ 17:00~18:30** Japanese	
	WPA section General Assembly WPA疫学公衆衛生セクション総会	Lecture6　教育プログラム 疫学と精神医学のクロストーク ―これからの精神保健疫学研究に求められるもの―	
18:00			**18:30~20:00**
19:00			Get-together (Japanese Garden)
20:00			

※Ⓛ：Organized by Local Committee / Ⓘ：Organized by International Committee

Place	Day 4 : Oct. 18 (Sat.)		
	Main Hall	Second Hall	
9:00	**❶ 9:00~12:00** English	**Ⓛ 9:00~12:00** English	
10:00			
	Symposium 4 Children & adolescents and disasters 児童青年期と災害	Symposium 5 The role of epidemiology for the development of suicide prevention policy 自殺予防における疫学研究の役割	
11:00			
12:00			
		Ⓛ 12:10~13:10 English	
13:00		Luncheon Seminar 4 Supported by Pfizer Japan Inc. Epidemiology of depression and anxiety disorders in psychosomatic medicine 心療内科におけるうつ病と不安障害の疫学	
			❶ 13:10~14:00 English
14:00			Poster Session 3
	❶ 14:00~17:00 English	**Ⓛ 14:00~15:00** Japanese	
		Lecture7　教育プログラム 精神保健疫学研究を始めるために	
15:00	Symposium 6 Refugees and interventions 難民と介入	**Ⓛ 15:00~17:00** Japanese	
16:00		シンポジウム3 地域からこころの医療を考える Mainstreaming mental health into other priority programs in the community	
17:00	**❶ 17:00~17:30** English		
	Closing Remarks and Future Session		
18:00			
19:00			
20:00			

※Ⓛ：Organized by Local Committee / ❶：Organized by International Committee

資料 3　クレジットカードを使用して参加登録を行った参加者数（国別）

Country	Count
Australia	8
Brazil	2
Canada	3
China	41
France	1
Hong Kong SAR, China	3
Iceland	1
Indonesia	1
Iran	1
Israel	1
Italy	1
Japan	101
Kenya	2
Korea, Rep.	1
Lebanon	2
Macao SAR, China	1
Nepal	1
Netherlands	1
New Zealand	7
Norway	1
Other	1
Singapore	2
Switzerland	1
Taiwan	21
Thailand	26
United Kingdom	5
United States	13

Ⅲ．研究成果の刊行に関する一覧表

雑誌

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Stickley A, Koyanagi A, Kawakami N; WHO World Mental Health Japan Survey Group.	Childhood adversities and adult-onset chronic pain: Results from the World Mental Health Survey, Japan.	Eur J Pain.	印刷中	doi: 10.1002/ ejp.672.	2015
Kanehara A, Umeda M, Kawakami N; the World Mental Health Japan Survey Group.	Barriers to mental health care in Japan: Results from the World Mental Health Japan Survey.	Psychiatry Clin Neurosci.	印刷中	doi: 10.1111/ pcn.122 67.	2014
Scott KM, Al-Hamzawi AO, Andrade LH, Borges G, Caldas-de-Almeida JM, Fiestas F, Gureje O, Hu C, Karam EG, Kawakami N, Lee S, Levinson D, Lim CC, Navarro-Mateu F, Okoliyski M, Posada-Villa J, Torres Y, Williams DR, Zakhozha V, Kessler RC.	Associations between subjective social status and DSM-IV mental disorders: results from the World Mental Health surveys.	JAMA Psychiatry.	71(12)	1400-8. doi: 10.1001/ jamapsy chiatry.2 014.133 7.	2014
Kessler RC, Rose S, Koenen KC, Karam EG, Stang PE, Stein DJ, Heeringa SG, Hill ED, Liberzon I, McLaughlin KA, McLean SA, Pennell BE, Petukhova M, Rosellini AJ, Ruscio AM, Shahly V, Shalev AY, Silove D, Zaslavsky AM, Angermeyer MC, Bromet EJ, de Almeida JM, de Girolamo G, de Jonge P, Demyttenaere K, Florescu SE, Gureje O, Haro JM, Hinkov H, Kawakami N, Kovess-Masfety V, Lee S, Medina-Mora ME, Murphy SD, Navarro-Mateu F, Piazza M, Posada-Villa J, Scott K, Torres Y, Carmen Viana M.	How well can post-traumatic stress disorder be predicted from pre-trauma risk factors? An exploratory study in the WHO World Mental Health Surveys.	World Psychiatry.	13(3)	265-74. doi: 10.1002/ wps.201 50.	2014

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Stein DJ, McLaughlin KA, Koenen KC, Atwoli L, Friedman MJ, Hill ED, Maercker A, Petukhova M, Shahly V, van Ommeren M, Alonso J, Borges G, de Girolamo G, de Jonge P, Demyttenaere K, Florescu S, Karam EG, Kawakami N, Matschinger H, Okoliyski M, Posada-Villa J, Scott KM, Viana MC, Kessler RC.	DSM-5 and ICD-11 definitions of posttraumatic stress disorder: investigating "narrow" and "broad" approaches.	Depress Anxiety.	31(6)	494-505. doi: 10.1002/ da.2227 9.	2014
assebaum NJ, Bertozzi-Villa A, Coggeshall MS, et al.	Global, regional, and national levels and causes of maternal mortality during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013.	Lancet.	384(99 47)	980-100 4. doi: 10.1016/ S0140-6 736(14)6 0696-6.	2014
Ochi M, Fujiwara T, Mizuki R, Kawakami N; World Mental Health Japan Survey Group.	Association of socioeconomic status in childhood with major depression and generalized anxiety disorder: results from the World Mental Health Japan survey 2002-2006.	BMC Public Health.	14	359. doi: 10.1186/ 1471-24 58-14-35 9.	2014

Ⅳ．研究成果の刊行物・別刷

ORIGINAL ARTICLE

Childhood adversities and adult-onset chronic pain: Results from the World Mental Health Survey, Japan

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Conflicts of Interest
None declared.

Abstract

Background: Childhood adversities (CAs) have been associated with adult-onset chronic pain. However, to date, most single country studies on this association have been undertaken in Western countries. This study examined the association in Japan where information is scarce.
Methods: Data were drawn from the World Mental Health Survey Japan, a population-based cross-sectional survey undertaken in 11 areas of Japan in 2002–2006. We analyzed data from adults aged ≥20 years who provided information on CAs occurring before age 18 years and chronic pain (n = 1740). Cox proportional hazard models were used to estimate the risk for different forms of adult-onset chronic pain (arthritis/rheumatism, neck/back pain, headache and any pain) as a function of the presence of 11 different types of CA and the number of CAs.
Results: In the adjusted models, significant associations were observed between: physical abuse and neck/back pain (HR 2.55) and any pain (HR 1.88); sexual abuse and any pain (HR 2.84). Significant dose-dependent relationships were also observed between a greater number of CAs and some adult-onset chronic pain conditions (neck/back and any pain).
Conclusions: The results of this study suggest that in Japan, some forms of CA may be associated with certain types of adult-onset chronic pain, in particular neck/back pain.

1. Background

Childhood adversities (CAs) have been associated with an increased risk for different forms of adult-onset chronic pain. Studies using both clinical and community samples have linked CAs to back pain (Kopec et al., 2004), arthritis (Goodwin and Stein, 2004; Von Korff et al., 2009), headache/migraine (Sumanen et al., 2007; Lee et al., 2009) and other chronic pain conditions including fibromyalgia (Goldberg et al., 1999; Imbierowicz and Egle, 2003; Jones et al., 2009). Although the underlying mechanism of this association is yet to be elucidated, CAs may cause mental disorders (Kessler et al., 2010), changes in stress response (Carpenter et al., 2011) and health risk behaviours (Ramiro et al., 2010), which have all been linked to various forms of chronic pain.

To date, most studies on CAs and adult chronic pain have taken place in North America (e.g. Sachs-Ericsson et al., 2007), Europe (e.g. Jones et al., 2009) or have reported pooled results from multiple countries (e.g. Scott et al., 2011). Thus, single country studies from non-Western contexts are lacking. This may be an important omission as the impact of CAs on later health outcomes might be conditioned, e.g. by the

social, economic and cultural environment in which they occur (Lee et al., 2009). In addition, the prevalence of pain (Tsang and Lee, 2009) and the way it is conceptualized (Fujii et al., 2013) also varies between countries, which might further affect the association between CA and adult-onset chronic pain.

Given this, the current study aimed to examine the association between CAs and adult-onset chronic pain in Japan. Exploring this association in a Japanese context is important for several reasons. Firstly, the prevalence of one of the most widely studied forms of CA, child abuse, is relatively high in Japan (Fujiwara and Kawakami, 2011) and has risen alarmingly in recent years (Lah, 2011). Whether this increase is real or due to better detection and reporting is uncertain, but if abuse is growing it may in part, reflect the fact that corporal punishment of children continues to be widely accepted as a method of discipline (Kozu, 1999; Fujiwara and Kawakami, 2011) legitimizing the idea that violence is permissible against children. Child abuse has also been linked to another CA in this setting – problematic parental alcohol use (Borovoy, 2005). It is thus possible that a high prevalence and/ or co-occurrence of CAs may be especially detrimental for future health outcomes in Japan. Secondly, although several studies have indicated that the prevalence of adult chronic pain in Japan is comparatively low (Lee et al., 2009; Tsang and Lee, 2009), it has nevertheless been reported to interfere with the daily activities of a large number of people (Suka and Yoshida, 2005). Moreover, given the rapid ageing of the Japanese population, the health burden from chronic pain is projected to increase in the coming years (Suka and Yoshida, 2009).

The aim of this exploratory study was thus two-fold: (1) to examine the association between 11 different types of CA and various adult-onset chronic pain conditions (arthritis/rheumatism, neck/back pain, headache); and (2) to assess whether the coexistence of multiple CAs is associated with a higher risk for chronic pain in adulthood. This exploratory analysis is an important step and precursor of any future longitudinal studies to test specific hypotheses concerning these potential associations.

2. Methods

2.1 Study design

Data from the World Mental Health Survey, Japan (WMH Japan) were analyzed. WMH Japan was part of the World Health Organization's World Mental Health Survey Initiative (Demyttenaere et al., 2004). Details of this survey are provided elsewhere (Kawakami et al., 2005; Fujiwara and Kawakami, 2011). Briefly, the WMH Japan was a household survey conducted in 11 communities in Japan including three urban cities and eight rural municipalities (Kagoshima [Ichiki; Higashi-ichiki; Kushikino; Fukiage]; Okayama; Nagasaki; Tamano; Tochigi; Tendo; Kaminoya; Yokohama) in 2002–2006. These areas were selected based on geographical diversity, the availability of site investigators and cooperation of the local government. Participants were randomly selected from residents aged ≥20 years by using a voter registration list or a resident registry. In total, 4134 face-to-face interviews were conducted. The final response rate was 55.1% across the sites.

The interview consisted of two parts to reduce the participants' burden and study costs. Part I included core diagnostic assessments of mental disorders, while Part II included questions on correlates of mental disorders including CAs and chronic physical conditions. All respondents completed Part I. Those who met the criteria for any lifetime mental disorder completed Part II, along with a probability subsample of respondents without any mental disorders. This sampling methodology was not markedly different from that of World Mental Health Surveys conducted elsewhere (Demyttenaere et al., 2004). Analytical weights were calculated to adjust for different selection probabilities and the difference in distributions of the population on the cross-classification for sex and age between the sample and the population census. The weight also incorporated the probability of being selected into Part II so as to adjust for the differential sampling of cases (those with any lifetime mental disorder) and non-cases (Kawakami

et al., 2005). The analytical sample for this study consisted of those from the weighted part II subsample (n = 1740).

2.2 Ethical permission

Written informed consent was obtained from all participants prior to the interview. Ethical approval to conduct this survey was obtained from the Human Subjects Committees of Okayama University Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences; the Japan National Centre 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.

2.3 Measures

2.3.1. Childhood adversities

We focused on 11 different types of childhood adversities (CAs): parental death, parental divorce, other parental loss, parental mental disorder, parental substance disorder, parental criminal behaviour, family violence, physical abuse, sexual abuse, neglect and economic adversity. These variables were dichotomized and coded "yes" if the adversity occurred before age 18 years. Details of these variables and their coding are provided elsewhere (Von Korff et al., 2009). These CAs refer to those that mainly occur in the family context. It was expected that in theoretical terms, exposure to such adversity would be sustained for a long enough period of time to exert a potential effect on subsequent chronic health conditions.

2.3.2. Chronic pain

The presence of four types of chronic pain was assessed by whether the respondent ever had any of the following: (1) arthritis or rheumatism; (2) chronic back or neck problems; (3) frequent or severe headaches; and (4) other chronic pain. Information on the age at onset of these conditions was also obtained. Any chronic pain referred to having at least one of the four types of pain with its age of onset being the earliest age in case of multiple types of pain occurring in the same individual. Other chronic pain was not analyzed as a separate category, but information on this condition was used together with information on the other three forms of pain to categorize individuals into those with and without any chronic pain.

2.3.3. Control variables

Age at interview was categorized as $\leq$34, 35–49, 50–64 and $\geq$65 years. Education was categorized as $\leq$9, 10–12 and $\geq$13 years. Early mental disorder was considered a potential confounder as previous studies using data from the World Mental Health Surveys have demonstrated that it is associated with various types of chronic physical disorders (Scott et al., 2011). Diagnoses of mental disorders were based on the Japanese-translated WHO Composite International Diagnostic Interview (WHO-CIDI) Version 3.0, which was a structured interview, designed to be administered by trained lay interviewers to generate DSM-IV diagnoses (Kessler and Ustun, 2004). Lifetime DSM-IV diagnoses of anxiety (generalized anxiety disorder, agoraphobia with/without a history of panic disorder, post-traumatic stress disorder [PTSD] and social phobia) and depression (major depressive disorder) were generated by WHO-CIDI. Organic exclusion rules were applied. The age of onset of these disorders was retrospectively assessed. To minimize recall bias, a special question sequence was used to improve accuracy of recall by assessing the age of onset in relation to certain life events (Fujiwara and Kawakami, 2011). The presence of early mental disorders was defined as having had any anxiety disorders or depression before age 21 years (Lee et al., 2009).

2.4 Analysis

Cox proportional hazard models were constructed to estimate the risk for chronic pain in adulthood as a function of the presence of CAs, and the number of CAs. The time to age of onset of four different chronic pain conditions was assessed: (1) arthritis or rheumatism; (2) chronic back or neck problems; (3) frequent or severe headaches; and (4) any chronic pain. The start of the risk period for the chronic pain conditions was set at 21 years of age (Bruffaerts and Demyttenaere, 2009). Those who reported having had the condition before age 21 were deleted from the analysis. In addition, those who claimed to never have had the condition were censored at their current age.

The associations between each of the 11 different types of CA and the four chronic pain conditions were assessed by separate univariable and multivariable Cox models adjusted for current age, sex (Scott et al., 2011), education, early mental disorders and number of CAs. Two models for each of the 11 CAs (univariable and multivariable) and for the four

different chronic pain outcomes were constructed, provided there were at least five events in the childhood adversity category to obtain stable estimates. The number of CAs (control variable) was categorized as 0–1 and ≥2 for this part of the analysis. This variable was included in the model in an attempt to avoid the overestimation of the effect of a specific CA as CAs often co-occur (Kessler et al., 2010). The 0 and 1 categories were merged to avoid collinearity with the variable on the specific type of CA (e.g. parental divorce).

Similarly, the risk for chronic pain outcomes as a function of the number of CAs (0, 1–2 or ≥3) was also estimated with univariable and multivariable Cox models adjusting for current age, sex, education and early mental disorders, resulting in a total of eight models (i.e. two models [univariable and multivariable] for the four different chronic pain outcomes with number of CAs as the exposure variable). A Kaplan–Meier survival curve was drawn to graphically display the non-adjusted cumulative proportion for each chronic pain condition by the number of CAs. For all Cox proportional hazard models, time-dependent interaction terms between the childhood adversity or the number of childhood adversities and the logarithm of the follow-up period were tested to assess whether the proportional hazard assumption was met.

Hazard ratios and their 95% confidence intervals (CIs) are reported. The level of statistical significance was set at $p < 0.05$. All analyses employed sample weights. Data were analyzed with the Stata statistical software package (version 12.1) (Stata Corp, College Station, TX, USA).

3. Results

3.1 Sample characteristics

The mean age of the respondents was 51.2 years. The characteristics of the study sample by the number of childhood adversities are provided in Table 1. The lifetime prevalence of the different chronic pain conditions was as follows: arthritis/rheumatism (9.2%); chronic back/neck problems (25.7%); frequent/severe headache (11.1%); and any chronic pain (38.9%).

3.2 Prevalence of childhood adversities

The prevalence of CAs is presented in Table S1. The most common CA was parental death (12.9%), followed by family violence (9.7%) and physical abuse

(7.3%). At least one CA was experienced by 31.0% of the respondents.

3.3 CAs and adult-onset pain

Details of the association between CAs and the chronic pain conditions are presented in Table 2. Parental substance disorder, family violence, physical abuse and sexual abuse were significantly associated with chronic neck/back pain in the univariable analysis, but after adjustment only physical abuse (HR: 2.55; 95% CI: 1.64–3.98) remained significant. For any chronic pain, a 1.88 and 2.84 times significantly higher risk was observed for those exposed to physical and sexual abuse, respectively, after adjustment. No statistically significant associations were found between CA and arthritis/rheumatism or frequent/severe headache.

3.4 Multiple CAs and adult-onset pain

The association between the number of CAs and chronic pain conditions are demonstrated in Figure S1 and Table 3. Dose-dependent relationships were observed between the number of CAs and chronic neck/back pain and any chronic pain. Compared to those with no CAs, those with 1–2 (HR: 1.41; 95% CI: 1.04–1.93) and ≥3 (HR: 2.86; 95% CI: 1.66–4.94) CAs had a higher risk for chronic neck/back pain in the adjusted model. Having ≥3 CAs was associated with a 2.83 times significantly higher risk for any chronic pain compared to no CAs after adjustment.

Table 1 Characteristics of the study sample by number of childhood adversities.

| Characteristic | Category | Number of childhood adversities | | | p-value[a] |
		0	1–2	≥3	
Age (years)	20–34	76.2	22.6	1.2	0.0207
	35–49	68.5	28.4	3.1	
	50–64	67.9	28.6	3.5	
	≥65	64.2	34.5	1.3	
Sex	Male	65.6	31.6	2.8	0.0506
	Female	72.0	26.2	1.8	
Education (years)	≤9	60.3	37.3	2.3	0.0236
	10–12	68.6	29.3	2.2	
	≥13	72.5	24.8	2.7	
Early mental disorder[b]	No	69.6	28.4	2.0	<0.001
	Yes	52.8	36.6	10.6	

Data are % based on weighted sample.
[a]p-value calculated by chi-square tests.
[b]Early mental disorder referred to the onset of either anxiety (generalized anxiety disorder, agoraphobia with/without a history of panic disorder, post-traumatic stress disorder [PTSD] and social phobia) or depression (major depressive disorder) before age 21 years.

Table 2 Univariable and multivariable Cox proportional hazard models for different types of chronic pain by childhood adversity.

Childhood adversity		Arthritis/rheumatism N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	Chronic neck/back pain N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	Frequent/severe headache N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	Any chronic pain N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)
Parental death	No	1389	114			1292	318			1223	105			1201	427		
	Yes	210	29	1.40 (0.83–2.36)	1.59 (0.90–2.80)	201	55	1.03^d (0.72–1.49)	1.16^d (0.76–1.77)	193	14	0.97 (0.43–2.19)	1.54 (0.63–3.77)	189	81	1.06 (0.78–1.45)	1.24 (0.87–1.77)
Parental divorce	No	1575	142			1474	368			1401	116			1375	501		
	Yes	24	1	NA^e	NA^e	19	5	1.28 (0.45–3.62)	0.78 (0.27–2.31)	15	3	NA^e	NA^e	15	7	1.87 (0.69–5.09)	1.28 (0.48–3.40)
Other parental loss	No	1538	136			1436	355			1361	112			1336	486		
	Yes	61	7	0.68 (0.26–1.82)	0.82 (0.33–2.05)	57	18	0.61 (0.29–1.26)	0.64 (0.30–1.37)	55	7	0.53 (0.22–1.31)	1.17 (0.45–3.10)	54	22	0.59 (0.31–1.12)	0.66 (0.34–1.26)
Parental mental disorder	No	1544	135			1444	352			1371	110			1347	486		
	Yes	55	8	1.37 (0.48–3.90)	1.24^d (0.45–3.37)	49	21	2.00 (0.99–4.02)	1.43 (0.71–2.90)	45	9	1.68 (0.67–4.22)	1.30 (0.47–3.59)	43	22	1.62 (0.80–3.31)	1.32 (0.67–2.59)
Parental substance disorder	No	1576	142			1470	364			1396	118			1370	500		
	Yes	23	1	NA^e	NA^e	23	9	2.69** (1.36–5.34)	1.87 (0.85–4.13)	20	1	NA^e	NA^e	20	8	2.01* (1.06–3.81)	1.39 (0.65–2.98)
Parental criminal behaviour	No	1581	143			1478	368			1402	118			1376	501		
	Yes	18	0	NA^e	NA^e	15	5	2.50 (0.82–7.66)	1.59 (0.52–4.86)	14	1	NA^e	NA^e	14	7	2.62 (0.96–7.13)	1.84 (0.70–4.84)
Family violence	No	1408	127			1323	314			1257	101			1237	441		
	Yes	191	16	0.97 (0.50–1.90)	0.93 (0.48–1.81)	170	59	1.62* (1.08–2.42)	1.23 (0.77–1.96)	159	18	1.36 (0.72–2.57)	1.24 (0.55–2.81)	153	67	1.48* (1.02–2.16)	1.21 (0.79–1.87)
Physical abuse	No	1460	132			1375	323			1304	107			1281	456		
	Yes	139	11	0.71^d (0.32–1.58)	0.73^d (0.33–1.65)	118	50	2.59*** (1.79–3.74)	2.55*** (1.64–3.98)	112	12	1.32 (0.64–2.74)	1.58 (0.71–3.49)	109	52	1.82** (1.28–2.58)	1.88** (1.24–2.86)
Sexual abuse	No	1585	141			1479	367			1405	117			1379	500		
	Yes	14	2	NA^e	NA^e	14	6	3.22* (1.16–8.94)	1.77 (0.58–5.45)	11	2	NA^e	NA^e	11	8	4.50** (1.69–12.00)	2.84* (1.01–8.01)

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Table 2 (*Continued*)

Childhood adversity		Arthritis/rheumatism				Chronic neck/back pain				Frequent/severe headache				Any chronic pain			
		N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)
Neglect	No	1563	140	NA^e	NA^e	1463	361	1.68 (0.75–3.75)	1.44 (0.58–3.57)	1388	118	NA^e	NA^e	1363	496	1.57 (0.78–3.17)	1.56 (0.72–3.38)
	Yes	36	3	2.49 (0.99–6.24)	3.13 (0.90–10.93)	30	12			28	1			27	12		
Economic adversity	No	1541	136			1443	356	1.49 (0.75–2.95)	1.07 (0.49–2.35)	1371	112	1.84 (0.67–5.02)	1.71 (0.55–5.29)	1346	487	1.48 (0.82–2.66)	1.14 (0.55–2.36)
	Yes	58	7			50	17			45	7			44	21		

HR, hazard rate; CI, confidence interval.
*p < 0.05.
**p < 0.01.
***p < 0.001.
^{a}Adjusted for age, sex, education, early mental disorders and number of childhood adversities.
^{b}Unweighted number of individuals in that childhood adversity group.
^{c}Unweighted number of individuals in that childhood adversity group who had the event.
^{d}p < 0.05 for time-dependent interaction term between the childhood adversity and the logarithm of the follow-up period.
^{e}Results are not available due to the small number of events among those with that childhood adversity.

4. Discussion

To the best of our knowledge, this is the first study to focus solely on the relationship between CAs and adult-onset chronic pain in Japan. Physical abuse was associated with an increased risk for chronic neck/back pain and any chronic pain. Sexual abuse was a significant risk factor for any chronic pain. Furthermore, those who experienced ≥3 CAs had a significantly increased risk for chronic neck/back and any chronic pain in adulthood compared to those with no CAs.

In this study, CAs were associated with adult-onset chronic back/neck and any pain, but not with arthritis/rheumatism and headache. The finding that chronic neck/back pain is associated with CAs has been seen in a number of previous studies from single country settings (Kopec and Sayre, 2005; Ramiro et al., 2010) and also accords with the results of a pooled analysis of World Mental Health Survey data from 10 countries (Bruffaerts and Demyttenaere, 2009). This latter study also linked physical abuse to spinal pain (Bruffaerts and Demyttenaere, 2009), while another study suggested that the relation between physical abuse and chronic pain (back pain/headache) may be especially strong (Gonzalez et al., 2012). Similarly, the association we observed between the two types of CA (physical abuse and sexual abuse) and any chronic pain also accords with the finding from an earlier meta-analytic review study, where childhood abuse (Davis et al., 2005) was linked to adult chronic pain. The relationship found between childhood sexual abuse and any chronic pain in the current study corresponds with the results from earlier studies which have highlighted that chronic pain patients are more likely to report a history of childhood sexual abuse (Goldberg and Goldstein, 2000) and that women who have been sexually abused in childhood report a greater number of chronic pain conditions (Finestone et al., 2000), although not all studies have found an association between early sexual abuse and chronic pain (Walsh et al., 2007).

The non-significant results observed for rheumatism/arthritis and headache differ from findings from pooled analyses of the World Mental Health Survey that included data from 10 countries which linked numerous CAs to arthritis (Von Korff et al., 2009) and headache (Lee et al., 2009). This may have been due to our small sample size with less statistical power compared to the pooled analysis. However, other research has suggested that these associations might vary between settings. For example, an earlier

Table 3 Univariable and multivariable Cox proportional hazard models for different types of chronic pain by number of childhood adversities.

Number of childhood adversities	Arthritis/rheumatism				Chronic neck/back pain			
	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)
0	1036	85			974	209		
1–2	505	53	1.09 (0.68–1.73)	1.21 (0.75–1.93)	472	141	1.33 (0.99–1.79)	1.41* (1.04–1.93)
≥3	58	5	1.28 (0.44–3.72)	1.19 (0.41–3.45)	47	23	3.24** (2.01–5.23)	2.86** (1.66–4.94)

Number of childhood adversities	Frequent/severe headache				Any chronic pain			
	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)	N^b	n^c	HR (95% CI)	Adj. HR^a (95% CI)
0	927	67			911	299		
1–2	447	46	1.20 (0.71–2.04)	1.53 (0.91–2.57)	439	187	1.21 (0.93–1.56)	1.33* (1.02–1.73)
≥3	42	6	1.79 (0.62–5.16)	2.02 (0.63–6.45)	40	22	2.65** (1.69–4.16)	2.83** (1.77–4.53)

HR, hazard rate; CI, confidence interval.
*$p < 0.05$.
**$p < 0.001$.
[a]Adjusted for age, sex, education and early mental disorders.
[b]Unweighted number of individuals in that childhood adversity group.
[c]Unweighted number of individuals in that childhood adversity group who had the event.

study also failed to find a relation between traumatic experiences in childhood and arthritis (Sachs-Ericsson et al., 2007), while another indicated that the relation between childhood trauma and arthritis was observed primarily for one gender (Spitzer et al., 2013). Kopec and Sayre (2004) have further suggested that traumatic experiences in childhood may have only a moderate effect in terms of increasing the likelihood of arthritis developing subsequently. For headache, a previous systematic review and meta-analysis of sexual abuse and lifetime diagnosis of somatic disorders found that there was no association between a history of sexual abuse and headache (Paras et al., 2009), while other research has linked (migraine) headaches to frequent rather than any abuse (Goodwin et al., 2003).

Several hypotheses regarding the link between traumatic childhood experience and chronic pain later in life have been proposed. First, the association may be mediated by mental disorders such as depression and anxiety. These are common among adults who experience CA (Kessler et al., 2010), and might precede the manifestation of various forms of chronic pain (Bruffaerts and Demyttenaere, 2009). Secondly, CAs may have an effect on the developing brain. Specifically, childhood exposure to high and/or prolonged stress, i.e. 'toxic' stress (Shonkoff et al., 2012), as a result of CA, has been linked to changes in the nervous, endocrine and immune systems. This can be seen, e.g. in the dysfunction of the hypothalamic–pituitary–adrenal (HPA) axis (endocrine system) (Danese and McEwen, 2012) which has been associated with changes in stress reactivity in adult-

hood. Both blunted (Carpenter et al., 2011) and elevated (Heim et al., 2000; Nicolson, 2004) cortisol levels have been linked to different CAs, with the former having been associated with chronic pain conditions such as fibromyalgia, headache and chronic pelvic pain (Tietjen and Peterlin, 2011). In addition, CAs in both developed and developing country settings have also been linked to a wide range of subsequent health risk behaviours (Ramiro et al., 2010) and outcomes, including physical inactivity and obesity (Felitti et al., 1998; Anda et al., 2006). This might be important, at least partially, for the findings from the present study, as in Japan, both central obesity (Toda et al., 2000) and being overweight (Nakamura et al., 2014) have been associated with an increased risk of low back pain and chronic musculoskeletal pain, respectively. In particular, a common neck and shoulder pain condition termed 'Katakori', which is specific to Japan, has also been linked to a lack of exercise (Fujii et al., 2013). Finally, CA may be a marker for future negative events. Childhood abuse has been associated, e.g. with an increased risk of abuse in adulthood, leading to greater stress and worse mental and physical health (Smith et al., 2010), with qualitative research from Japan highlighting the occurrence of abuse across the life course in this setting (Hatashita et al., 2006).

The dose–response relation which this and other studies (Lee et al., 2009; Von Korff et al., 2009; Scott et al., 2011) have observed between a greater number of CAs and an increased risk of chronic pain in adulthood might also relate to the notion that CAs

can leave a strong biological imprint. In particular, it is possible that the continued and additive stress that results from the combined effects of numerous CAs might exert an even stronger detrimental effect on the developing brain (Dube et al., 2009) which may impact negatively on future well-being.

There are a number of limitations that should be borne in mind when considering this research. The data on CAs were obtained from retrospective reports. Much debate has centred on the validity of such reports as it has been claimed that there is differential recall of childhood events by adults suffering from pain (McBeth et al., 2001) and that self-reported abuse is more likely to be associated with pain than abuse that is actually documented (Brown et al., 2005). In addition, if some CAs were more easily recalled than others, it might have affected our findings. It has also been argued, however, that despite their imperfection, retrospective studies of CA nevertheless serve an important function (Hardt and Rutter, 2004; Kendall-Tackett and Becker-Blease, 2004). This is because validated cases of child maltreatment will miss many cases (Anda et al., 2010), while prospective research may require up to three decades for adult-onset pain to emerge (Von Korff et al., 2009). Moreover, a review on the relationship between childhood abuse and adult pain has indicated that reporting bias, while not unimportant, is not sufficient to fully negate the association (Raphael, 2005). Similarly, we also collected information on the experience of pain from self-reports that were not validated by medical records. While this may have led to some bias, previous research suggests that the prevalence of reported pain is not affected by the data collection method (Verhaak et al., 1998). In addition, we had no information on important factors such as the severity of the CAs, when they occurred, how long they lasted, whether there were interventions or if the respondent was experiencing abuse in their current relationship. All of these factors might have affected the nature of the relation between CA and adult-onset chronic pain (Davis et al., 2005). In terms of the analysis, in some models, the estimates were based on small numbers, or the proportional hazards assumption may have not been met. However, this latter factor may not have been a major problem as the estimates can be considered as the average strength of the impact of the covariate on the hazard rate according to some authors (e.g. Allison, 1995). Finally, we cannot discount the possibility that a type 1 error may have occurred due to multiple testing, although the significant associations we observed have been seen in earlier studies, in other contexts, which gives us some confidence that our findings are likely to be genuine.

In summary, this study has shown that CAs may be associated with an increased risk for experiencing adult-onset chronic pain in Japan, but that not all CAs are associated with chronic pain, and not all forms of chronic pain are associated with CA. Specifically, physical and sexual abuse in childhood was associated with an increased risk of adult-onset pain. Furthermore, dysfunctional family environments where multiple CAs co-occur may also be an important precursor of some forms of chronic pain in adulthood. If these exploratory findings are confirmed by future prospective studies, then educating medical and other professionals who come into contact with children, to detect childhood maltreatment (Henry et al., 2003), may be an especially important means of reducing the future burden of adult-onset chronic pain in Japan.

Acknowledgements

Author contributions

A.S. wrote the main text; A.K. had the study idea, conducted the statistical analysis and contributed to the drafting of the text; N.K. conducted the survey and contributed to the drafting of the text.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. Members of the World Mental Health Japan Survey Group.

Figure S1. Kaplan–Meier survival curves for the cumulative proportion of those reporting different types of chronic pain by number of childhood adversities (0, 1–2, or 3+). (a) Cumulative proportion of arthritis/rheumatism; (b) Cumulative proportion of chronic neck/back pain; (c) Cumulative proportion of frequent/severe headache; and (d) Cumulative proportion of any chronic pain.

Table S1. Prevalence of childhood adversities.

Regular Article

Barriers to mental health care in Japan: Results from the World Mental Health Japan Survey

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Aims: The reasons for accessing and maintaining access to mental health services in Japan may be different to those in other countries. Using the World Health Organization World Mental Health Japan survey data, this study investigated the prevalence of sociodemographic correlates of barriers for the use of, reasons for delayed access to, and reasons for dropping out from mental health care in a Japanese community-based sample.

Methods: An interview survey was conducted with a random sample of residents living in 11 communities across Japan during the years 2002–2006. Data from 4130 participants were analyzed.

Results: The most frequently reported reason for not seeking mental health care was a low perceived need (63.9%). The most common reason for delaying access to help was the wish to handle the problem on one's own (68.8%), while the most common reason

for dropping out of care was also a low perceived need (54.2%). Being a woman and of younger age were key sociodemographic barriers to the use of mental health services.

Conclusions: Low perceived need was a major reason for not seeking, delay in using, and dropout from mental health services in Japan. In addition, low perceived need and structural barriers were more frequently reported than attitudinal barriers, with the exception of a desire to handle the problem on one's own. These findings suggest that improving therapist–patient communication and quality of mental health care, as well as mental health literacy education in the community, might improve access to care in Japan.

Key words: barriers to mental health care, epidemiologic study, mental health service use, sociodemographic correlates, stigma.

ALTHOUGH MENTAL DISORDERS are common,[1] many people with mental illness remain untreated,[2] which may result in poor outcomes. Extended periods of untreated illness[3] and ceasing treatment early[4,5] are particularly associated with worse outcomes in people with mental illness. In addition to poor health outcomes, untreated mental conditions are also associated with societal economic loss.[6]

There are three types of reasons for not seeking professional help, as reported previously[7]: (i) low perceived need (e.g. not feeling a need for help); (ii) structural barriers (e.g. unavailable or inaccessible treatments, personnel or transportation or the presence of other inconveniences); and (iii) attitudinal barriers (e.g. perceived stigma, low perceived efficacy of treatments, or the desire to handle the problem on one's own) (Table S1). Of these, the attitudinal bar-

riers related to negative health beliefs and stigmas toward treatment are the most commonly reported in studies conducted in developed Western countries.[8,9] Reports also indicate that a lack of perceived need for treatment results in less access to physical and mental health care globally.[7,8] Furthermore, treatment dropout rates tend to be high, owing to a lack of satisfaction with the services in addition to financial barriers.[10]

The majority of research that has been conducted relating to barriers to mental health care access originates in Western high-income countries, and it is not known if the results can be generalized to Japan. It has been previously reported that the proportion of those who received treatment among people who had mental disorders in Japan was less than half compared with other high-income countries, despite the fact that the Japanese national health insurance provides universal coverage and patients are free to select a medical institution of their choice.[2] Stigmatizing attitudes towards mental disorders were reported to be more prevalent in the Japanese than in the Australian public.[11] Such stigma could affect their help-seeking behaviors, and also their reasons for not seeking, delaying access to, and dropping out from mental health service.[12,13] For instance, as stigma may be caused by ignorance about mental disorders, low perceived need may be the most frequent reason for these treatment gaps in Japan. Stigmatized attitude toward mental disorders in Japan may also come from a history of mental health care dominated by the long-term hospital care[14] and polypharmacy[15] in this country. People may perceive that mental health treatment is ineffective or even detrimental. If this is the case, attitude barriers may be more frequently reported. It would be useful to address a country-specific pattern of reasons for not seeking treatment, delay in seeking treatment, and dropping out in a context of mental health care in each country, particularly in Japan, which has such a unique background.

To the best of our knowledge, there has only been one study to examine the sociodemographic determinants of attitudinal barriers for the use of mental health services in Japan.[16] The results were inconsistent with those in previous studies conducted in Western countries;[17–19] men tended to have a greater willingness to seek professional help and felt more comfortable talking with a professional than women did. Therefore, the reasons for not seeking treatment, delaying treatment, and dropping out of treatment may be country-specific. Information regarding these

reasons in Japan would be useful for improving the availability and accessibility of mental health services.

Using data from the World Mental Health Japan (WMHJ) surveys,[20] this study investigated the patterns of barriers to mental health care access among Japanese community residents and their relations with sociodemographic characteristics in a Japanese community-based sample.

METHODS

Participants

The WMHJ survey was an epidemiological survey of Japanese-speaking community residents aged ≥20 years and part of the global cross-national World Health Organization (WHO) World Mental Health (WMH) survey.[21] In Japan, the data were collected at 11 sites in six prefectures, including three urban cities and nine rural municipalities from 2002 to 2006. These sites were selected on the basis of geographic variation, availability of site investigators, and cooperation of the local government. Subjects for the WMHJ survey were randomly selected from voter registration lists or resident registries at each site. After a letter of invitation was sent, trained lay interviewers contacted the subjects and used a standardized instrument to interview those who agreed to participate in the survey. This survey was composed of two parts: Part 1 of the interview contained a core diagnostic assessment and basic sociodemographic data; and Part 2 collected data about potential correlates and disorders of additional interest. All respondents who consented to participate completed Part 1 of the interview ($n = 4134$, response rate = 55.1%). In the present study, we analyzed data from 4130 participants who had no missing values in the questions relating to reluctance and expectations in the use of mental health services (Fig. 1).

The ethics committees of Okayama University, the National Institute of Mental Health Japan, and Nagasaki University approved the recruitment, consent, and field procedures. Written informed consent was obtained from each respondent. More details of the study procedures have been reported previously.[20]

Measures

Sociodemographic predictor variables

Sociodemographic variables included sex, age, and education. Age was categorized into 20–49 years and
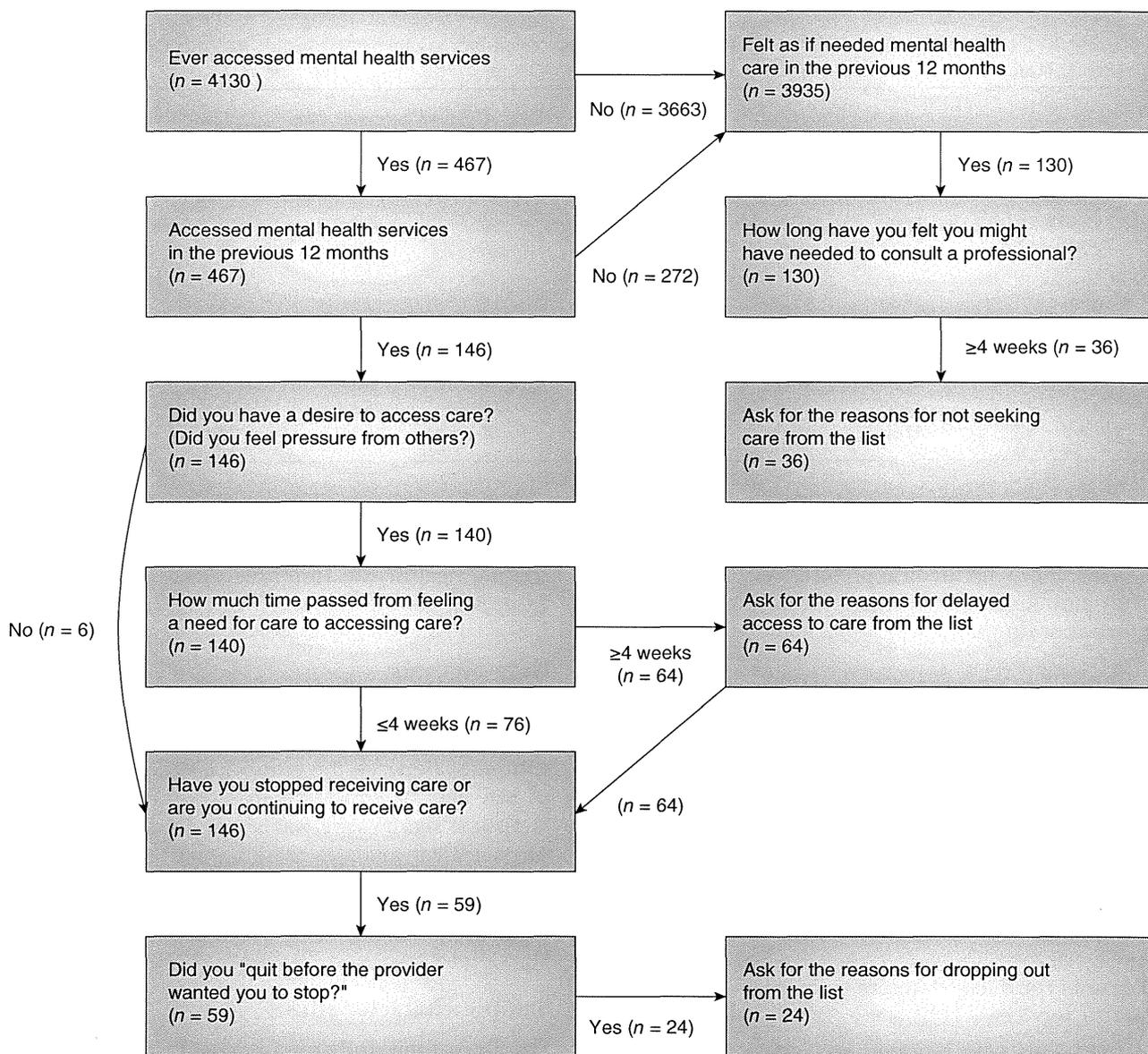
Figure 1. Flow of interview questions regarding reasons for not seeking, delayed access to, and dropping out from mental health services in the World Mental Health Japan Survey.

≥50 years. Education was categorized into 0–12 years and ≥13 years.

Barriers for the use of mental health services

The flow of the questions regarding the reasons for not seeking, delayed access to, and dropping out from mental health services is illustrated in Figure 1. First, the use of mental health care services during the previous 12 months was assessed by asking all respondents if they had consulted any of a list of professionals for problems with emotions, nerves, mental health, or the use of alcohol or drugs. The list of professionals included mental health professionals (e.g. psychiatrist, psychologist), general medical professionals (e.g. general practitioner, occupational therapist), religious counselors, and traditional healers. In this study, 'mental health service use' was