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The relation between multiple pains and mental disorders: Results from the World Mental Health Surveys

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Abstract

It is unclear whether differences exist in the prevalence of mood, anxiety and alcohol use disorders among persons with multiple pain conditions compared with those with single pain problems. We conducted population surveys in 17 countries in Europe, the Americas, the Middle East, Africa, Asia, and the South Pacific. Participants were community-dwelling adults ($N = 85{,}088$). Mental disorders were assessed with the Composite International Diagnostic Interview. Pain was assessed by self-report. Both multiple and single site pain problems were associated with mood and anxiety disorders, but not with alcohol abuse or dependence. In general, the prevalence of specific mood and anxiety disorders followed a linear pattern with the lowest rates found among persons with no pain, intermediate rates among those with one pain, and highest rates among those with multi-site pain problems. Relative to persons not reporting pain, the pooled estimates of the age-sex adjusted odds ratios were 1.8 (1.7–2.0) for mood disorders and 1.9 (1.8–2.1) for anxiety disorders for persons with single site pain; 3.7 (3.3–4.1) for mood disorders and 3.6 (3.3–4.0) for anxiety disorders among

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those with multi-site pain. Our results indicate that the presence of multiple pain conditions was strongly and comparably associated with mood and anxiety disorders in diverse cultures. This consistent pattern of associations suggests that diffuse pain and psychiatric disorders are generally associated, rather than diffuse pain representing an idiom for expressing distress that is specific to particular cultural settings or diffuse pain solely representing a form of masked depression.

Keywords: Multiple pains; Depression; Anxiety; Alcohol abuse; Cross national

1. Introduction

Chronic pain is often comorbid with psychiatric disorders, with depression having received the most attention to date (Magni and Moreschi, 1994; Fishbain and Cutler, 1997; Gureje and Von Korff, 1998; McWilliams and Cox, 2003). Understanding the relationship between chronic pain and psychiatric disorders is important. Several studies have suggested that chronic pain patients with coexisting psychiatric disorders have poorer treatment outcomes and increased disability (Gatchel, 1996; Holzberg and Robinson, 1996; Burns and Johnson, 1998; Dersh and Polatin, 2002).

Pain problems at different anatomical sites tend to co-occur (Hestbaek and Leboeuf-Yde, 2003; Von Korff and Crane, 2005) and it has been observed that persons who report multiple pain conditions are more likely to experience depressive illness (Dworkin and Von Korff, 1990; Yap and Chua, 2002). Dworkin et al. found elevated risk of major depression among persons with two or more pains while those with one pain condition were no different from persons with no pain (Dworkin and Von Korff, 1990). In this study, the number of pain sites was a better predictor of the co-occurrence of major depression than was pain severity or pain persistence. They suggested that multiple pain conditions might be a variant of somatization disorder, a syndrome of diverse medically unexplained physical symptoms frequently associated with depression (Barsky, 1979; Katon and Kleinman, 1981). From this perspective, the distinction between persons with pain at single versus multiple anatomical locations is significant in understanding the relationship between chronic pain conditions and psychiatric disorders (Fishbain and Cutler, 1997).

Most previous studies of the association of psychiatric disorders with chronic pain have focused on depression (Bair and Robinson, 2003; Ohayon and Schatzberg, 2003). It is therefore unclear whether the suggestion that chronic pain may be a variant of depression or masked depression (Magni and De Bertolini, 1983; Turk and Salovey, 1984; Ohayon and Schatzberg, 2003) is real or instead reflects a paucity of data in regard to the association of chronic pain with other psychiatric conditions. For example, only a few studies have examined the relationship of pain with anxiety disorders and the results have been inconsistent (Atkinson and Slater, 1991; McWilliams and Cox, 2003; McWilliams and Goodwin, 2004).

Previous studies of the relationship between chronic pain and psychiatric disorders have largely been conducted in Western Europe and North America. Given the suggestion that the association between somatic symptoms, including pain conditions, and psychiatric illness may be influenced by cultural factors (Kleinman and Kleinman, 1985), the generalizability of these findings to non-Western populations is an important question.

In this report, we aim to determine whether: (1) persons with pain at multiple anatomical sites have higher rates of specific mood, anxiety, and alcohol use disorders compared to persons with single site pain or with no pain problems; (2) the strength of association of multiple pain conditions differs for specific anxiety disorders from those observed for mood disorders; and, (3) the pattern of association of number of pain problems and mental disorders differs across diverse populations world-wide, including populations in both developed and developing countries.

2. Methods

2.1. Samples

The World Mental Health Surveys consist of community-based studies conducted in many countries around the world. The present report is based on data obtained from 18 surveys carried out in 17 countries in the Americas (Colombia, Mexico, United States), Europe (Belgium, France, Germany, Italy, Netherlands, Spain, Ukraine), the Middle East/Africa (Israel, Lebanon, Nigeria, South Africa), and Asia and the South Pacific (Japan, separate surveys in Beijing and Shanghai in the People's Republic of China, New Zealand). All surveys were based on multi-stage, clustered area probability household samples. All interviews were carried out face-to-face by trained lay interviewers. Sample sizes range from 2372 (the Netherlands) to 13,229 (New Zealand), with a total of 85,088 participating adults. Response rates ranged from 46% (France) to 88% (Colombia), with a weighted average of 71%.

The questionnaire was composed of two parts: Part 1 consisted of sections that allowed for the diagnostic assessment of a range of mental disorders while Part 2 consisted of sections focusing on antecedents and correlates of mental disorders, including comorbid physical conditions. The assessment of chronic pain conditions was included in Part 2. All respondents completed part 1. All part-1 respondents who met

criteria for any mental disorder and a probability sample of other respondents were administered part 2. Part-2 respondents were weighted by the inverse of their probability of selection for part-2 of the interview to adjust for differential sampling. Analyses in this article were based on the weighted part-2 sample. Additional weights were used to adjust for differential probabilities of selection within households and to match the samples to population socio-demographic distributions. The samples thus reflect the expected population age and social structure of the countries with younger age and lower educational status being more characteristic of the less developed countries.

2.2. Training and field procedures

The central World Mental Health (WMH) staff trained bilingual supervisors in each country. Consistent interviewer training documents and procedures were used across surveys. The WHO translation protocol was used to translate instruments and training materials. Two surveys were carried out in bilingual form (Dutch and French in Belgium; Russian and Ukrainian in Ukraine). Others were carried out exclusively in the country's official language. In Nigeria, interviews were conducted in the four languages (Yoruba, Hausa, Igbo, and Efik) spoken in the regions where the survey was carried out. In South Africa, six different languages were used: English, Afrikaans, Zulu, Xhosa, Northen Soho, and Tswana. Standardized descriptions of the goals and procedures of the study, data uses and protection and the rights of respondents were provided in both written and verbal form to all potentially eligible respondents before obtaining verbal informed consent for participation in the survey. Quality control protocols, described in more detail elsewhere (Kessler and Ustun, 2004), were standardized across countries to check on interviewer accuracy and to specify data cleaning and coding procedures. All surveys were conducted strictly in compliance with procedures approved by the local Institutional Review Board applicable in the respective country.

2.3. Mental disorder status

All surveys used the World Mental Health Survey version of the WHO Composite International Diagnostic Interview (WMH-CIDI; Kessler and Ustun, 2004), a fully structured diagnostic interview, to assess disorders and treatment. Disorders considered in this paper include anxiety disorders (generalized anxiety disorder, panic disorder and/or agoraphobia, posttraumatic stress disorder, and social phobia), mood disorders (dysthymia and major depressive disorder), and substance disorders (alcohol abuse and dependence). Disorders were assessed using the definitions and criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) (American Psychiatric Association, 1994). CIDI organic exclusion rules were applied in making all diagnoses. Methodological evidence collected in the WHO-CIDI Field Trials and later clinical calibration studies showed that all the disorders considered herein were assessed with acceptable reliability and validity both in the original CIDI (Wittchen, 1994) and in the original version of the WMH-CIDI (Kessler and Ustun, 2004).

2.4. Pain

Each survey asked about the presence of chronic physical conditions using an adaptation of the questions in the U.S Health Interview Survey [Nation Center for Health Statistics, 1994]. Included were questions about chronic pains. We inquired about four chronic pain conditions as well as 15 chronic medical conditions. In regard to the pain conditions, each respondent was asked about whether they experienced chronic back or neck problems, arthritis or rheumatism, frequent or severe headaches, or any other pain problem in the prior 12 months. (For example, for back and neck pains: "Have you had chronic back or neck problems in the past 12 months"?) The question about arthritis was asked in two different forms depending on country. In Nigeria, Lebanon, Beijing, Shanghai and the Ukraine, respondents were asked whether they had experienced "arthritis or rheumatism" in the prior 12 months. In the remaining surveys, respondents were asked if they had ever had "arthritis or rheumatism", with the assumption made that arthritis that has been present in the past will also be present in the prior year. ("Have you ever in your lifetime experienced arthritis or rheumatism?") The number of pain sites was determined by counting the number of pain problems (with a possible total of 4: back/neck pain, headaches, arthritis, other pain) present in the prior 12 months.

2.5. Analysis methods

This paper reports 12-month prevalence rates for specific mental disorders among persons with 1 and those with 2 or more pain conditions during the prior year. Logistic regression was used to assess the association of number of pain conditions with mental disorder status after adjusting for age and sex. In the analyses for specific mental disorders, number of pain conditions was entered as a continuous variable due to sparse cell sizes for some mental disorders. For each survey and specific mental disorder, a *t*-test was used to assess whether the beta coefficient for number of pain conditions was significantly greater than zero. The regression models were estimated using the Taylor Series method (Wolter, 1985) with SUDAAN software (SUDAAN 2002) which take into account the complex survey design. There were wide variations in mental disorder prevalence rates, and in prevalence rates of the pain conditions, across the surveys. For this reason, this report does not include pooled estimates of mental disorder or chronic pain prevalence rates.

We estimated adjusted odds ratios to assess the association of any mood disorder (major depressive disorder or dysthymia) and of any anxiety disorder (generalized anxiety disorders, panic/agoraphobia, social phobia, or post-traumatic stress disorder) with one and with multiple pain conditions, respectively. A pooled estimate of these odds ratios across surveys was also estimated. These odds ratios, and the pooled estimate and its confidence intervals, are displayed for each survey using a funnel graph (Bird and Cox, 2005). This graph plots the odds ratio for each survey on a log scale (y-axis) against the precision of the estimate of each odds ratio (x-axis). Precision is the reciprocal of the standard error of the odds ratio estimate. Precision increases as the standard error of the estimate becomes smaller. The "funnel" in these graphs shows

the 95% confidence interval band for a survey estimate that would include the pooled estimate of the odds ratio at varying levels of precision. Each survey's estimate was plotted on the funnel graph, showing whether the 95% confidence interval of each estimate includes the pooled estimate of the odds ratio, given the estimated precision of that survey's estimate. On this graph, the less precise estimates are to the left (where the funnel is wider), and the more precise estimates are to the right (where the funnel is narrower). The association of the presence of any mood disorder and of any anxiety disorder with one or multiple pain conditions was tested using odds ratio. We assessed whether the heterogeneity of the estimates of the odds ratio across surveys was greater than expected by chance (DerSimonian and Laird, 1986). If the heterogeneity of the odds ratios is greater than expected by chance, then pooled estimates have large degrees of imprecision. We found this to be the case for three of the possible four combinations, the exception being the association between any mood and multiple pain conditions. These pooled estimates are therefore only indicative and should be interpreted with caution. We did not estimate odds ratios or do funnel plots for any alcohol abuse/dependence due to small cell sizes.

3. Results

Table 1 shows the sample characteristics and the prevalence rates of single and multiple pains across the surveys. Table 2 presents the prevalence of mood disorders (major depression and dysthymia) among persons with no pain, one pain, and those with pain at 2 or more sites. Typically, the prevalence of major depressive disorder was lowest among persons with no pain, intermediate among those with one pain, and highest among those with 2 or more pains. This trend was statistically significant in all 18 surveys. A similar pattern was observed for dysthymia. (Dysthymia was not assessed in the South African survey). The trend was significant for 16 of the 17 other surveys.

Fig. 1a and b are funnel graphs depicting the odds ratios for any mood disorder (major depression or dysthymia) for persons with one pain (Fig. 1a) and two or more pains (Fig. 1b) versus those with no pain. These graphs show that the pooled estimate of the odds ratio of having a mood disorder for those with one pain versus those not reporting pain was about 1.8, reflecting a significant association between pain and mood disorder. The 95% confidence intervals of all but three of the odds ratio estimates included the pooled estimate across the 18 surveys (the exceptions being Mexico, Japan and New Zealand). When compared to Fig. 1b which displays the odds ratios for mood disorder for persons with 2 or more pains versus those with no pain, it can be seen that the pooled estimate of the odds ratio for two or more pains (relative to no pains) is about double (3.7).

Table 1
Sample characteristics, and number of pains prevalence

Country	National sample (*N*)	Mean age[a]	% 60 years or older	% women	Education Secondary or greater	Number of pains prevalence[b]			
						One pain		Two or more pains	
						N	Wt%	*N*	Wt%
America									
Colombia	2381	36.6	5.3	54.5	46.4	581	21.3	224	6.0
Mexico	2362	35.2	5.2	52.3	31.4	517	17.9	218	6.2
United States	5692	45.0	21.2	53.0	83.2	1644	27.8	1144	16.1
Asia and South Pacific									
Japan	887	51.4	34.9	53.7	70.0	208	20.2	112	7.9
PRC-Beijing	914	39.8	15.6	47.5	61.4	251	23.8	163	13.2
PRC-Shanghai	714	42.9	18.7	48.1	46.8	165	20.9	118	13.6
New Zealand	7312	44.6	20.7	52.2	60.4	1971	25.9	1187	13.2
Europe									
Belgium	1043	46.9	27.3	51.7	69.7	267	25.8	181	14.6
France	1436	46.3	26.5	52.2	NA	489	35.0	272	14.6
Germany	1323	48.2	30.6	51.7	96.4	328	22.1	149	10.4
Italy	1779	47.7	29.2	52.0	39.5	473	25.3	398	20.2
Netherlands	1094	45.0	22.7	50.9	69.7	276	20.7	173	12.5
Spain	2121	45.5	25.5	51.4	41.7	582	24.6	356	10.3
Ukraine	1720	46.1	27.3	55.1	79.5	422	26.4	768	33.9
Middle East and Africa									
Lebanon	602	40.3	15.3	48.1	40.5	114	15.9	80	10.5
Nigeria	2143	35.8	9.7	51.0	35.6	414	16.8	369	13.6
Israel	4859	44.4	20.3	51.9	78.3	1033	21.2	609	12.3
South Africa	4315	37.1	8.8	53.6	38.9	1090	25.5	1027	22.8

[a] Age range $\geqslant 18$, except for Colombia, Mexico (18–65), Japan ($\geqslant 20$) and Israel ($\geqslant 21$).

[b] Number of pains based on arthritis, headache, back pain and other chronic pain. Headache, back pain and other pain prevalence based on last 12 months; arthritis prevalence based on lifetime except for Beijing, Shanghai, Lebanon, Nigeria, Ukraine and South Africa (12 month prevalence).

Table 2
Prevalence (%) of mood disorders among persons with 0, 1 and 2+ pains

Country	Major depression					Dysthymia				
	No pains	1 pain	2+ pains	Beta	*P* value	No pains	1 pain	2+ pains	Beta	*P* value
Colombia	4.3	8.6	19.6	0.705	0.001	0.8	1.2	3.7	0.647	0.010
Mexico	2.4	8.5	12.7	0.810	0.001	0.6	1.5	2.7	0.630	0.001
United States	5.5	8.5	17.6	0.652	0.001	1.1	2.1	6.9	0.812	0.001
Japan	2.0	1.4	7.1	0.517	0.003	0.7	0.1	2.7	0.544	0.083
Beijing	1.3	3.5	5.6	0.793	0.001	0.1	0.8	0.7	0.727	0.010
Shanghai	0.8	0.5	7.7	1.332	0.001	0.3	0.5	0.3	0.143	0.628
New Zealand	5.4	6.3	12.6	0.547	0.001	1.3	1.8	4.4	0.609	0.001
Belgium	4.1	7.1	9.2	0.459	0.003	0.7	1.8	2.8	0.523	0.021
France	4.5	6.2	11.1	0.544	0.001	1.0	1.8	3.4	0.496	0.033
Germany	2.3	4.2	5.7	0.642	0.001	0.4	1.5	3.0	1.027	0.001
Italy	2.0	2.8	6.6	0.514	0.001	0.6	1.1	2.3	0.404	0.016
Netherlands	3.9	7.8	8.3	0.433	0.001	1.2	2.5	3.6	0.584	0.006
Spain	2.8	4.7	10.6	0.621	0.001	0.6	1.8	5.0	0.735	0.001
Ukraine	4.0	7.1	17.7	0.522	0.000	0.6	3.4	8.9	0.640	0.001
Lebanon	1.2	4.3	2.6	0.547	0.024	0.3	2.3	1.5	0.785	0.013
Nigeria	0.8	1.3	2.8	0.515	0.001	0.1	0.1	1.0	0.857	0.003
Israel	4.1	8.4	13.1	0.537	0.001	0.5	1.5	4.9	0.830	0.001
South Africa	3.1	4.8	8.9	0.406	0.001	0.0	0.0	0.0	–	NE

NE, non-estimable.

These figures show that single pain problems are associated with depressive illness, but that multiple pain conditions show a substantially stronger relationship with depression. The test of heterogeneity of the pain status-depression odds ratios across the 18 surveys was non-significant for persons with two or more pain problems ($P = 0.52$). However, there was greater variability in the odds ratios for the relationship between having pain at a single site and depression than would be expected on the basis of chance ($P = 0.03$).

The associations of specific anxiety disorders with number of pain sites are displayed in Table 3. The surveys showed a similar pattern for anxiety disorders as that observed for depression, with the prevalence of specific anxiety disorders increasing with the number of pain sites. However, the pattern of association of anxiety disorders was less consistent, possibly because the lower prevalence rates of the specific anxiety disorders resulted in less stable estimates. The number of surveys in which statistically significant ($P < 0.05$) or borderline significant ($P < 0.10$) associations were found between number of pain problems and anxiety disorder was 16 of 17 for generalized anxiety disorder, 13 of 16 for panic disorder/agoraphobia, 11 of 16 for social phobia, and 11 of 17 for post-traumatic stress disorder.

Funnel graphs show the odds ratios, adjusted for sex and age, for anxiety disorder (as a group) among persons with one pain disorder (Fig. 2a) and those with 2 or more pains (Fig. 2b) compared to those with no pain. The combined anxiety disorder category shows a clearer pattern of association with multiple pains than the individual anxiety disorders, likely due to the larger number of cases available for analyses. The pooled estimate of the odds ratio for persons with multi-site pain (vs. no pain) was 3.6, while the odds ratio was 1.9 for persons with single pain (vs. no pain). The 95% confidence intervals of the individual survey estimates typically included the pooled estimate. There was no greater variation than expected by chance in the odds ratios for the pain-anxiety disorder relationship for both persons with one pain problem ($P = 0.08$), but there was significant heterogeneity in the odds ratios for multi-site pain problems ($P = 0.003$).

Table 4 shows the prevalence of alcohol abuse or dependence among persons with no pain, pain at a single site, and for pain at multiple sites. Unlike mood and anxiety disorders, this table shows no clear pattern between alcohol abuse/dependence and the number of pain sites. Indeed, among the five surveys in which there was a significant association between number of pain sites and the prevalence of alcohol abuse/dependence ($P \leqslant 0.05$), a linear increase in the prevalence of alcohol abuse with number of pain problems was only observed in one survey.

4. Discussion

In this report, we have used data from 18 population surveys participating in the World Mental Health Survey Initiative to explore the relationships between pain at one or multiple anatomic sites with specific mood and anxiety disorders. Our research provides the first general population data addressing these relationships from both developed and developing countries. Prior research suggests that as the number of pain problems reported increases, the prevalence of depressive illness

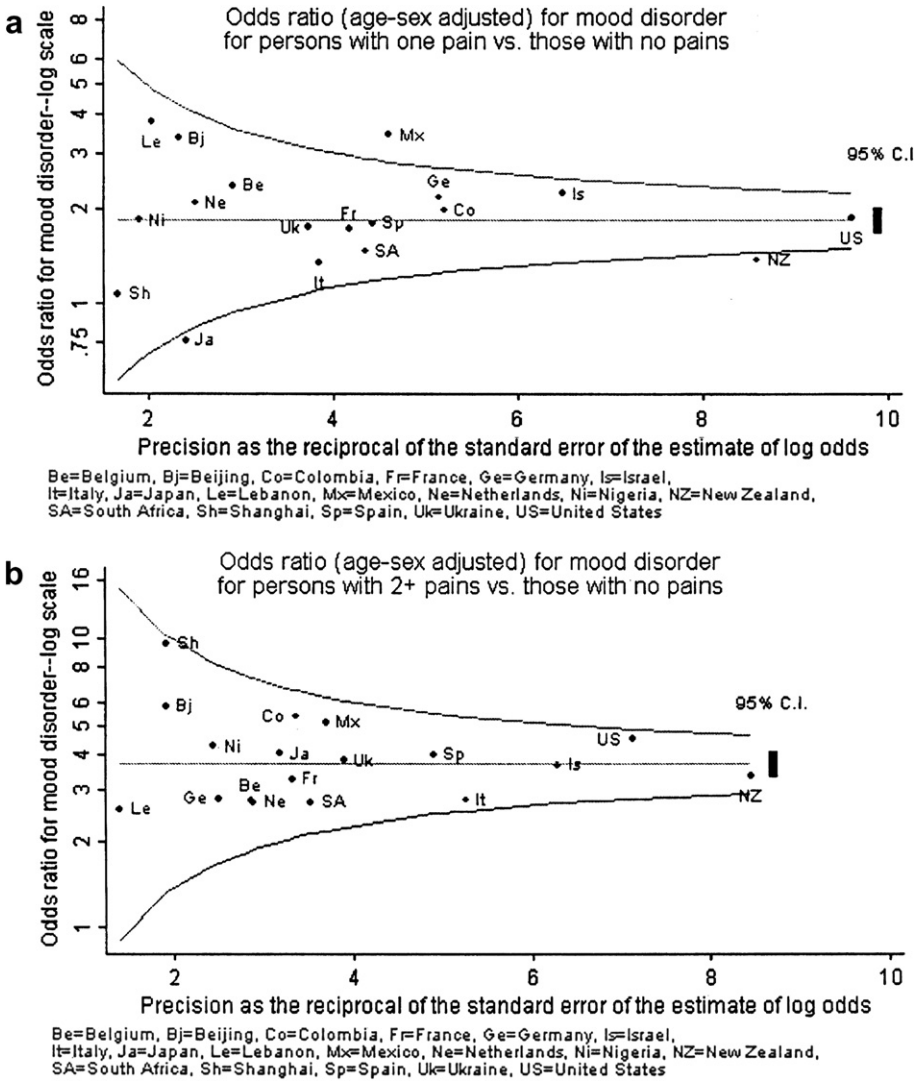

Fig. 1. (a) Odds ratio (age-sex adjusted) for mood disorder for persons with one pain vs. those with no pains. (b) Odds ratio (age-sex adjusted) for mood disorder for persons with +2 pains vs. those with no pains.

also increases. This report shows, for the first time, that this relationship is observed in general population samples in diverse countries world-wide. The results of these surveys also show that this relationship applies for four different anxiety disorders: panic disorder, generalized anxiety disorder, social phobia and post-traumatic stress disorder. Rates of depressive illness and anxiety disorders were elevated both among persons with a single pain problem, and persons reporting multiple pain conditions, but the association was substantially stronger for persons with multi-site pain.

Previous studies have shown that chronic pain constitutes a major public health problem. Estimates vary, depending on the survey and on the anatomical site of interest, but community surveys conducted in Western Europe and North America have reported that as many as 25–50% of the adult population may suffer from some form of chronic pain (Bovim and Schrader, 1994; Rajala and Keinanen-Kiukaanniemi, 1995; Palmer and Walsh, 2000; Santos-Eggiman and Wietlisbach, 2000; Picavet and Schouten, 2003; Von Korff and Crane, 2005). The results of the World Mental Health Surveys also show that chronic pain problems are common world-wide, in both developed and developing countries.

The association of chronic pain with depression has been widely reported (Von Korff and Simon, 1996; Fishbain and Cutler, 1997; Currie and Wang, 2004). The association of pain with anxiety disorders is less studied and findings have been less consistent. Our results provide evidence in support of an association between chronic pain and anxiety disorders as well as the first large cross-national evidence that the association of chronic pain with both mood and anxiety disorders extends to non-Western countries. The notion that chronic pain is a variant of depression (Blumer and Heilbronn, 1982), or is a depressive equivalent or

Table 3
Prevalence (%) of anxiety disorders among persons with 0, 1 and 2+ pains

Country	Generalized anxiety					Agoraphobia or panic disorder				
	No pains	1 pain	2+ pains	Beta	*P* value	No pains	1 pain	2+ pains	Beta	*P* value
Colombia	0.8	1.6	1.3	0.441	0.059	1.9	3.0	5.3	0.382	0.030
Mexico	0.3	1.2	1.6	0.740	0.001	0.9	1.6	6.3	0.771	0.001
United States	2.2	4.4	9.9	0.680	0.001	2.4	3.6	8.0	0.611	0.001
Japan	1.0	2.2	4.9	0.661	0.001	0.3	0.7	4.2	1.110	0.001
Beijing	0.3	2.4	2.4	0.622	0.001	0.1	0.5	1.4	0.918	0.050
Shanghai	0.1	0.3	4.6	2.039	0.001	0.0	0.0	0.9	–	NE
New Zealand	1.9	2.9	8.3	0.746	0.001	1.6	2.0	5.8	0.716	0.001
Belgium	0.4	1.5	2.8	0.849	0.003	1.6	1.4	1.6	0.367	0.209
France	1.2	2.3	4.5	0.719	0.001	1.4	2.1	1.7	0.232	0.282
Germany	0.3	0.8	1.2	0.751	0.007	0.8	1.5	1.8	0.480	0.030
Italy	0.4	0.3	1.0	0.302	0.338	0.5	1.4	2.1	0.539	0.002
Netherlands	0.4	2.3	2.5	0.791	0.001	1.3	2.3	2.6	0.306	0.141
Spain	0.8	0.8	2.8	0.616	0.001	0.4	1.0	2.7	0.804	0.001
Ukraine	0.5	1.2	5.3	0.765	0.001	0.4	1.4	4.0	0.619	0.001
Lebanon	0.1	0.4	0.7	0.742	0.009	0.2	0.2	0.2	–	NE
Nigeria	0.0	0.0	0.2	–	NE	0.1	0.0	1.4	1.034	0.001
Israel	1.4	4.5	6.3	0.666	0.001	0.4	1.6	2.5	0.725	0.001
South Africa	1.1	1.7	4.0	0.521	0.001	3.7	6.7	8.8	0.335	0.001
	Social phobia					PTSD				
	No pains	1 pain	2+ pains	Beta	*P* value	No pains	1 pain	2+ pains	Beta	*P* value
Colombia	2.3	4.6	5.1	0.467	0.000	0.4	1.0	1.1	0.345	0.168
Mexico	1.3	3.5	7.8	0.874	0.001	0.3	1.4	1.2	0.681	0.001
United States	5.8	7.4	11.7	0.438	0.001	1.9	3.8	9.1	0.732	0.001
Japan	0.5	0.9	1.5	0.551	0.111	0.4	0.4	0.4	0.048	0.888
Beijing	0.3	0.2	0.6	0.363	0.368	0.2	0.2	0.9	0.678	0.240
Shanghai	0.0	0.0	0.0	–	NE	0.0	0.3	0.4	1.446	0.015
New Zealand	4.5	5.8	7.9	0.420	0.001	1.8	3.6	7.5	0.701	0.001
Belgium	1.0	0.5	3.6	0.721	0.010	0.4	0.5	2.1	0.899	0.042
France	2.8	3.2	1.4	−0.042	0.841	1.3	2.8	4.6	0.565	0.001
Germany	1.1	4.2	1.1	0.527	0.004	0.6	0.4	1.7	0.426	0.200
Italy	0.8	1.3	2.1	0.379	0.025	0.4	1.2	1.0	0.458	0.149
Netherlands	0.8	2.0	2.4	0.557	0.003	0.9	3.6	9.0	0.663	0.001
Spain	0.5	0.9	1.5	0.873	0.001	0.3	0.3	2.3	0.939	0.001
Ukraine	1.3	2.4	2.8	0.545	0.004	0.6	2.9	5.1	0.509	0.001
Lebanon	0.6	0.7	0.0	−0.464	0.642	0.8	3.0	6.0	0.781	0.119
Nigeria	0.3	0.0	0.2	−0.227	0.809	0.0	0.0	0.0	–	NE
Israel	NA	NA	NA	–	NA	0.3	0.8	1.5	0.686	0.001
South Africa	1.3	2.2	3.0	0.483	0.001	0.3	0.5	1.4	0.691	0.002

NE, non-estimable; NA, data not available.

masked depression (Magni and De Bertolini, 1983), is not consistent with our findings, as anxiety disorders showed a comparable level of association with pain at single and multiple anatomic sites. That is, chronic pain condition, either in single or multiple anatomic sites, is no less related to anxiety than it is to depression.

Compared to persons with one pain condition, those with multiple pains had almost double the likelihood of having both mood and anxiety disorders. This observation differs from that reported by Dworkin and Von Korff, 1990. They found an elevated risk of algorithm diagnosis of major depression for persons with multiple pains, found no difference between those with one and those with no pain condition. Our findings, based on representative population samples from widely divergent national and cultural settings, are inconsistent with those observations. Rather, our findings suggest that multiple pain conditions are more strongly associated with psychiatric disorder, but pain at a single anatomical site was also significantly associated with psychiatric disorders. Our data suggest that the presence of one chronic pain condition increases the likelihood of co-occurring psychiatric disorder and that the risk is further elevated when pain at multiple sites is present.

The surveys reported in this paper were cross-sectional and cannot provide information on the direction of causality between pain and psychiatric disorders. There is indeed evidence for a bi-directional relationship between pain and psychopathology. In a 1-year longitudinal follow-up, Gureje et al. reported that persistent pain at baseline predicted new onset of depression over 12 months and vice versa (Gureje and Simon, 2001). We can therefore only speculate on the possible routes by which the associations between pain and psychiatric

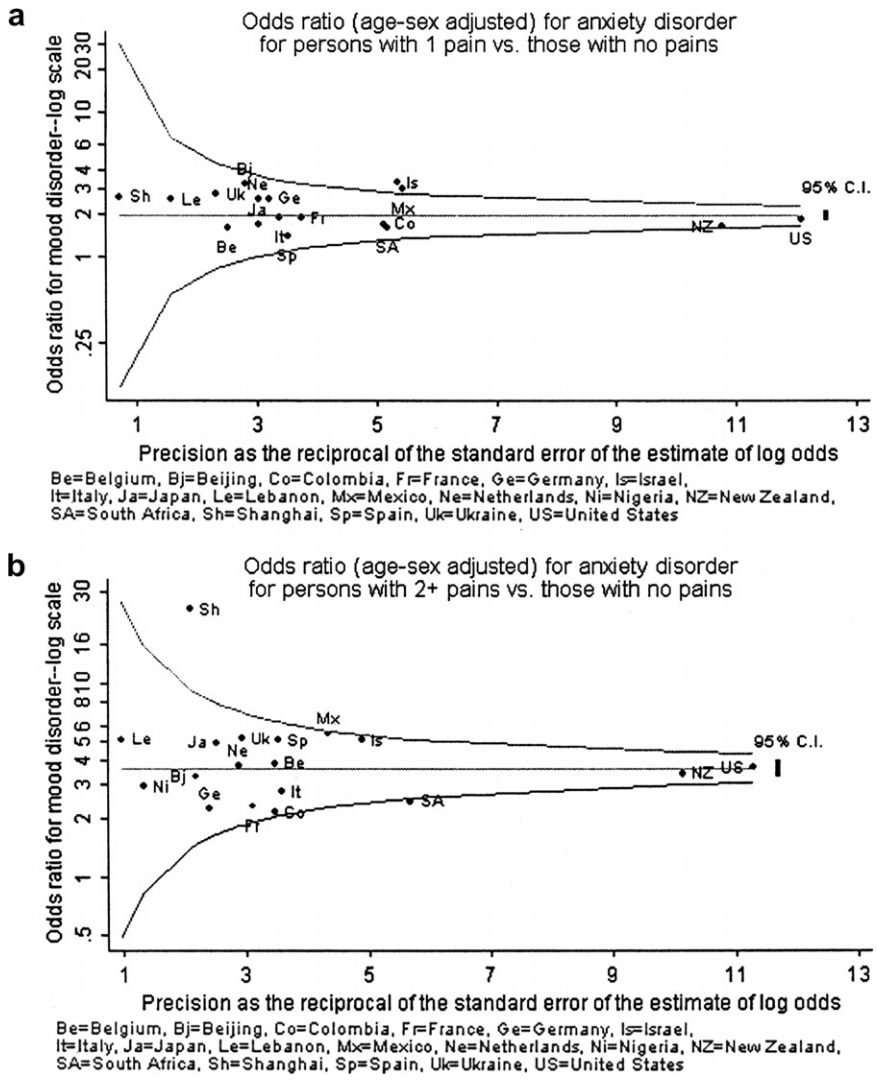

Fig. 2. (a) Odds ratio (age-sex adjusted) for anxiety disorder for persons with 1 pain vs. those with no pains. (b) Odds ratio (age-sex adjusted) for anxiety disorder for persons with +2 pains vs. those with no pains.

disorders are established. Some have speculated that a finding of a higher occurrence of psychiatric disorders among persons with multiple pains relative to those with one pain might indicate that chronic pains precede psychiatric disorders (Fishbain and Cutler, 1997). There is some evidence that persons with multiple pain conditions are less likely to recover from their pains over a 12-month period than those with single pains (Gureje and Simon, 2001). Thus, if the likelihood of psychiatric disorders occurring is increased with persistence of pain, persons with multiple pains may be expected to experience more psychiatric disorders. There is however also the possibility, as has been suggested for migraine (Breslau and Davis, 1993), that certain pain conditions share a common predisposition with some psychiatric disorders.

Our findings are consistent with a view that pain and psychiatric disorders, especially depression and anxiety disorders, are commonly associated across diverse cultural settings. Even though this consistent association could be interpreted to mean a lack of support for the claim that diffuse pain represents an idiom for expressing distress in particular cultural settings, our study is specific to chronic pain and was not designed to examine the psychological or somatic response to stress. However, evidence from other large studies suggests that the association between diverse somatic complaints, not just pain, and common psychiatric disorders does not support specific and unique cultural patterning (Gureje and Ustun, 1997).

Our results are based on very large datasets collected from a broad range of countries. However, and as stated in Methods, there was a wide variability in the strength of the association of mood and anxiety disorders with multiple pain conditions. The resulting significant heterogeneity of the estimates of the odds ratio across countries limits the precision of the pooled estimates. The results of those pooled estimates therefore require some caution in their interpretation. Also, we assessed pain

Table 4
Prevalence (%) of alcohol use disorders among persons with 0, 1 and 2+ pains

Country	Alcohol abuse or dependence				
	No pains	1 pain	2+ pains	Beta	*P* value
Colombia	2.6	2.8	1.9	0.343	0.095
Mexico	2.2	1.3	4.6	0.506	0.035
United States	3.5	1.8	3.9	0.348	0.001
Japan	1.0	0.7	2.9	0.500	0.298
Beijing	1.5	3.1	6.1	0.891	0.001
Shanghai	0.5	0.1	0.5	0.128	0.833
New Zealand	2.8	2.7	3.2	0.466	0.001
Belgium	0.8	2.3	1.5	0.663	0.012
France	0.8	0.8	0.5	0.102	0.770
Germany	1.3	1.7	0.2	0.238	0.524
Italy	0.1	0.1	0.0	−0.165	0.838
Netherlands	1.8	1.3	1.7	0.130	0.629
Spain	0.5	0.0	0.0	–	NE
Ukraine	8.0	6.2	4.0	0.132	0.360
Lebanon	1.5	0.0	0.0	–	NE
Nigeria	0.6	1.1	1.0	–	NE
Israel	0.9	2.0	1.0	0.486	0.001
South Africa	5.6	4.5	3.8	−0.025	0.752

NE, non-estimable.

conditions using self-reports and with terms such as ''frequent'', ''severe'' or ''chronic'' which could have been interpreted in different ways by our respondents.

In conclusion, we have presented data showing that the presence of chronic pain is associated with mood and anxiety disorders, while persons with multiple pains have a further increase in the risk of mood and anxiety disorder. In contrast, there was no evidence of an association of alcohol abuse/dependence with multiple pain status. It is important to evaluate patients with mood and anxiety disorders for pain, and vice versa, in view of the prevalence of their association, and the availability of treatments that may target each of these sets of symptoms.

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