Common Chronic Pain Conditions in Developed and Developing Countries: Gender and Age Differences and Comorbidity With Depression-Anxiety Disorders

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Abstract: Although there is a growing body of research concerning the prevalence and correlates of chronic pain conditions and their association with mental disorders, cross-national research on age and gender differences is limited. The present study reports the prevalence by age and gender of common chronic pain conditions (headache, back or neck pain, arthritis or joint pain, and other chronic pain) in 10 developed and 7 developing countries and their association with the spectrum of both depressive and anxiety disorders. It draws on data from 18 general adult population surveys using a common survey questionnaire (N = 42,249). Results show that age-standardized prevalence of chronic pain conditions in the previous 12 months was 37.3% in developed countries and 41.1% in developing countries, with back pain and headache being somewhat more common in developing than developed countries. After controlling for comorbid chronic physical diseases, several findings were consistent across developing and developed countries. There was a higher prevalence of chronic pain conditions among females and older persons; and chronic pain was similarly associated with depression-anxiety spectrum disorders in developed and developing countries. However, the large majority of persons reporting chronic pain did not meet criteria for depression or anxiety disorder. We conclude that common pain conditions affect a large percentage of persons in both developed and developing countries.
Chronic Pain Comorbid With Depression-Anxiety

Perspective: Chronic pain conditions are common in both developed and developing countries. Overall, the prevalence of pain is greater among females and among older persons. Although most persons reporting pain do not meet criteria for a depressive or anxiety disorder, depression/anxiety spectrum disorders are associated with pain in both developed and developing countries. © 2008 by the American Pain Society

Key words: Chronic pain, depression, anxiety disorders, comorbidity, gender difference, age difference.

Various national surveys have indicated that chronic pain is common in the general population. Estimates of its prevalence vary by the survey methods used and the pain conditions examined. 12-15

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month prevalence estimates of chronic pain have ranged from 17% to 29% in west central Europe,7,25 and from 2% to 40% according to a review of surveys in developed countries.47 A large-scale epidemiological study covering western, northern, and central Europe and Israel found that 19% of respondents reported moderate or severe pain of at least 6 months’ duration.5

Chronic pain affects people’s well-being, their ability to maintain an independent lifestyle, productivity, and social relationships.5,10 Unsurprisingly, mood and anxiety disorders have been found to be associated with chronic pain among medical patients in both developed and developing countries.12,14,24 A review by Bair et al48 found that the prevalence of concurrent major depression in patients with pain varied by study setting but ranged between 13% and 85%. In the same review, citing mostly controlled studies performed in psychiatric settings and primary care settings, the prevalence of pain among those with major depression ranged between 15% and 100%.

Population-based studies on the pain-mental disorder association are less common than studies conducted in clinical settings where representativeness of the patients can be included as an issue. The odds of having a mental disorder for subjects with versus those without chronic widespread pain was 3.2 in a study in the United Kingdom.3 The National Comorbidity Survey (NCS) in the United States found that the odds ratio for association between chronic pain and mood disorder in the prior year was 2.8 (adjusted for sociodemographic variables) and 2.0 (adjusted for comorbid medical conditions).26 The consistent association of pain and depression has led some researchers to propose that pain is an integral part of depression which can be considered a somatoaffective syndrome.30,34

Prior studies regarding chronic pain and its association with mental disorders have yielded generally consistent findings but have some limitations. First, most studies were conducted in Western countries, even though chronic pain is believed to be highly prevalent among people in non-Western communities.21,24 There is consequently little known about the relative prevalence of different chronic pain conditions in developed versus developing countries.13 Second, published studies mostly focused on the pain-depression association.2,7,25,26 They often did not consider anxiety disorders despite emerging evidence on the association between pain and anxiety and the high level of comorbidity between mood and anxiety disorders.9,19,32 Third, differences in pain preva-
ence rates by demographic variables such as age and gender were often not reported. Although some research has suggested that old age and female gender are associated with increased prevalence and severity of pain,2,28 it is not known whether this finding is generalizable to people living outside of Europe and the United States.

Very few developing countries have the resources to carry out large scale population-based surveys that include both pain and mental disorders.33 Almost none has done so in collaboration with developed countries using a common instrument for assessment that allows cross-national comparison.7,25 The present study investigated the association of chronic pain with both depressive and anxiety disorders by using data from 18 surveys conducted by countries that participated in the World Mental Health Surveys (WMHS).

A recent report from the WMHS data showed that, compared with persons with pain at a single site, multiple pains were associated with increasing risks of mood and anxiety disorders in diverse cultures.13 Chronic physical diseases were also associated with noncomorbid depression and noncomorbid anxiety disorders, whereas comorbid depression-anxiety disorder showed the strongest association with chronic physical disorders including chronic pain conditions.32 In analyses of the European country data of WMHS, painful physical symptoms were associated with depression. There was an additive effect of pain and depression on work loss days, but persons with pain conditions reported a low rate of help-seeking for emotional problems.7 This study extends our earlier findings from WMHS by examining how each of the chronic pain conditions (headache, back or neck pain, arthritis or joint pain, and other chronic pain) was associated with depression-anxiety disorders, taking the co-occurrence of chronic physical diseases into account, across developing and developed countries. Further, the present study compares prevalence rates of chronic pain between both genders and among age-groups in developing and developed countries.

Methods

The methods employed in the WMHS relevant to this report have been described in detail elsewhere.18 In this report, we provide a brief overview of the key methodological features.

Samples

Eighteen surveys were carried out in 17 countries in the Americas (Colombia, Mexico, United States), Europe (Belgium, France, Germany, Italy, Netherlands, Spain, Ukraine), the Middle East (Israel, Lebanon), Africa (Nigeria, South Africa), Asia (Japan, People’s Republic of China: Beijing, Shanghai), and New Zealand. An effort was made to recruit as many countries as possible in the initiative. The final set of countries was determined by availability of collaborators in the country who were able to obtain funding for the survey. Developing countries include countries with a Human Development Index lower than 0.9 such as China (Beijing, Shanghai), Columbia, Lebanon, Mexico, Nigeria, South Africa and Ukraine; developed countries include those with a Human Development Index of 0.90 or greater such as Belgium, France, Germany, Israel, Italy, Japan, Netherlands, New Zealand, Spain, and the United States.35

All surveys were based on multistage, clustered area probability household samples. Interviews were carried out face-to-face by trained lay interviewers. The combined total sample size was 85,052. Most of the respondents were at age 18 or older (except Japan, age 20 or older; Israel, age 21 or older; and New Zealand, age 16 or older). Survey response rate varied, with a weighted average response rate across surveys of 71%. Internal sub-sampling was used to reduce respondent burden by dividing the interview into 2 parts (except Israel survey, of which all respondents finished the whole interview and aged 21 or older). Part 1 included the core diagnostic assessment of mental disorders. Part 2 included additional information relevant to a wide range of survey aims; for this study it was the assessment of chronic pain and physical diseases. 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 paper were based on the weighted part-2 sample (N = 42,249). Additional weights were used to adjust for differential probabilities of selection within households and to match the samples to population sociodemographic distributions.

Training and Field Procedures

The central WMHS staff trained bilingual supervisors in each country. Consistent interviewer training documents and standardized translation protocols were used across surveys. Standardized descriptions of the goals and procedures of the study, data use and protections 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. The institutional review board of the organization that coordinated the survey in each country approved and monitored compliance with procedures for obtaining informed consent and protecting human subjects.

Mental Disorder Status

All surveys assessed mental disorders with the World Mental Health version of the WHO Composite International Diagnostic Interview (WMH-CIDI),20 a fully structured diagnostic interview. Disorders considered in this paper include 12-month anxiety disorders (generalized anxiety disorder, panic disorder and/or agoraphobia, posttraumatic stress disorder, and/or social phobia) and 12-month depressive disorders (dysthymia and/or major depressive disorder). Disorders were assessed using the definitions and criteria of the Diagnostic and Statistical
<table>
<thead>
<tr>
<th>Country</th>
<th>Female %</th>
<th>Finished Secondary Education or Above %</th>
<th>Mean Age Years</th>
<th>Crude Prevalence (and 95% CI) of Any Chronic Pain Conditions in Previous 12 Months</th>
<th>Age Standardized Prevalence (and 95% CI) of Any Chronic Pain Condition in Previous 12 Months*</th>
<th>Percent (95% CI) of Persons with Depression/Anxiety Disorder in Last 12 Months Stratified by Presence of Pain in the Previous 12 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Developing countries</strong></td>
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<td>Ukraine</td>
<td>55.1</td>
<td>81.9</td>
<td>46.12</td>
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<td>58.2 (55.9, 60.4)</td>
<td>6.4 (4.2, 9.6)</td>
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<td>South Africa</td>
<td>53.6</td>
<td>38.9</td>
<td>37.11</td>
<td>48.3 (45.3, 51.3)</td>
<td>51.8 (50.2, 53.4)</td>
<td>8.0 (6.4, 10.1)</td>
</tr>
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<td>China (Beijing)</td>
<td>47.5</td>
<td>61.4</td>
<td>39.82</td>
<td>37.0 (31.5, 42.8)</td>
<td>38.0 (34.8, 41.2)</td>
<td>2.2 (1.3, 3.7)</td>
</tr>
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<td>51.0</td>
<td>35.6</td>
<td>35.83</td>
<td>30.4 (27.7, 33.4)</td>
<td>37.4 (35.1, 39.7)</td>
<td>1.2 (0.7, 2.2)</td>
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<td>China (Shanghai)</td>
<td>48.0</td>
<td>46.8</td>
<td>42.86</td>
<td>34.5 (29.0, 40.4)</td>
<td>34.7 (31.5, 37.9)</td>
<td>0.9 (0.4, 2.0)</td>
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<td>48.1</td>
<td>40.5</td>
<td>40.29</td>
<td>26.4 (22.3, 30.9)</td>
<td>28.4 (25.3, 31.6)</td>
<td>2.5 (1.2, 5.0)</td>
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<td>54.5</td>
<td>46.4</td>
<td>36.64</td>
<td>27.3 (24.3, 30.4)</td>
<td>-</td>
<td>7.8 (6.5, 9.3)</td>
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<td>Mexico</td>
<td>52.3</td>
<td>31.4</td>
<td>35.16</td>
<td>24.1 (20.9, 27.7)</td>
<td>-</td>
<td>4.3 (3.6, 5.2)</td>
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<tr>
<td><strong>Developed countries</strong></td>
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<tr>
<td>France</td>
<td>52.2</td>
<td>100.0</td>
<td>46.34</td>
<td>49.6 (44.6, 54.5)</td>
<td>47.8 (45.3, 50.3)</td>
<td>8.7 (6.3, 12.0)</td>
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<td>United States</td>
<td>53.0</td>
<td>83.2</td>
<td>45.01</td>
<td>43.9 (41.4, 46.3)</td>
<td>43.0 (41.7, 44.2)</td>
<td>12.9 (11.5, 14.4)</td>
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<td>52.0</td>
<td>39.5</td>
<td>47.69</td>
<td>45.5 (42.3, 48.8)</td>
<td>42.8 (40.6, 45.1)</td>
<td>3.6 (2.7, 4.8)</td>
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<td>69.7</td>
<td>46.89</td>
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<td>38.9 (36.0, 41.9)</td>
<td>6.3 (4.7, 8.3)</td>
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<td>60.4</td>
<td>44.59</td>
<td>39.1 (37.3, 40.9)</td>
<td>38.5 (37.5, 39.6)</td>
<td>11.2 (10.2, 12.4)</td>
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<td>Spain</td>
<td>51.4</td>
<td>41.7</td>
<td>45.55</td>
<td>34.9 (32.3, 37.6)</td>
<td>33.4 (31.4, 35.3)</td>
<td>4.0 (3.1, 5.0)</td>
</tr>
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<td>Israel</td>
<td>51.9</td>
<td>78.3</td>
<td>44.43</td>
<td>33.5 (32.1, 34.8)</td>
<td>33.3 (32.0, 34.6)</td>
<td>5.4 (4.7, 6.3)</td>
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<tr>
<td>Netherlands</td>
<td>50.9</td>
<td>69.7</td>
<td>45.02</td>
<td>33.3 (28.1, 38.9)</td>
<td>32.4 (29.7, 35.2)</td>
<td>6.4 (4.8, 8.6)</td>
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<td>Germany</td>
<td>51.7</td>
<td>96.4</td>
<td>48.18</td>
<td>32.4 (29.5, 35.5)</td>
<td>30.8 (28.0, 32.9)</td>
<td>4.1 (3.2, 5.2)</td>
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<td>Japan</td>
<td>53.7</td>
<td>70.0</td>
<td>51.43</td>
<td>28.1 (24.5, 31.9)</td>
<td>27.4 (24.3, 30.5)</td>
<td>3.1 (2.3, 4.0)</td>
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<tr>
<td>Developing</td>
<td>52.4</td>
<td>45.0</td>
<td>38.2</td>
<td>37.7 (36.3, 39.0)</td>
<td>41.1 (40.3, 41.9)</td>
<td>5.1 (4.5, 5.7)</td>
</tr>
<tr>
<td>Developed</td>
<td>52.2</td>
<td>68.7</td>
<td>45.5</td>
<td>38.9 (38.0, 39.8)</td>
<td>37.3 (36.7, 37.8)</td>
<td>8.2 (7.8, 8.7)</td>
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<tr>
<td>Overall</td>
<td>52.3</td>
<td>59.9</td>
<td>42.9</td>
<td>38.4 (37.7, 39.2)</td>
<td>38.4 (37.7, 39.2)</td>
<td>7.1 (6.7, 7.4)</td>
</tr>
</tbody>
</table>

*Because Columbia and Mexico surveys did not include persons over the age of 65 years, only crude prevalence is reported.
Manual of Mental Disorders, Fourth Edition (DSM-IV). CIDI organic exclusion rules were imposed 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 in the WMH-CIDI. Prevalence estimates of specific anxiety and depressive disorders had been presented; in this paper we combined both groups of disorders to examine how the presence of pain was associated with the spectrum of depression and anxiety disorders across gender and age.

**Chronic Pain**

Pain conditions were assessed with a standard chronic condition checklist adapted from the questions in the US Health Interview Survey. The respondents were asked if they had ever had “arthritis or rheumatism” in their lifetime (referred to here as arthritis/joint pain, which was commonly recognized as the main symptom of arthritis and rheumatism), then they were asked if this had been present in the prior 12 months. They were also asked whether they had ever had “chronic back or neck problems” (referred to here as back pain), “frequent or severe headaches” (referred to here as headaches), and “other chronic pain” in the prior 12 months.

**Chronic Physical Disease**

The respondents were asked whether they had ever had stroke or heart attack, or been told by a doctor that they had heart disease, high blood pressure, asthma, diabetes, cancer or ulcer, HIV/AIDS, or tuberculosis in lifetime. Prior research has demonstrated reasonable correspondence between self-reported chronic physical diseases such as diabetes, heart disease and asthma, and general practitioner records. In assessing the association of pain with depression/anxiety disorder status, we controlled for the number of chronic physical diseases reported by each participant (0, 1, 2, or more).

**Analytic Methods**

Estimates reported in this article are based on weighted data. Survey weights take into account differences in the probability of selection of respondents within each survey so that unbiased estimates of population parameters are obtained by using weighted data. Variance estimates also take into account the complex sample survey design. Age standardized prevalence rates for any chronic pain condition were estimated for each survey, for developing and developed countries, and for all countries combined. The prevalence of any chronic pain condition by gender and by age group (18–35, 36–50, 51–65, 66+), and the prevalence of comorbid depression-anxiety disorders by chronic pain status were estimated for developed and developing countries and all countries combined. Odds ratios for the association of depression-anxiety disorder with each of the chronic pain condition (headache, back pain, arthritis/joint pain) were estimated for developed and developing countries and for all countries combines adjusted for age, sex, and number of chronic physical diseases. The 95% confidence intervals for the odds ratios were estimated using the Taylor Series method with SUDAAN software to adjust for clustering and weighting.

**Results**

Table 1 shows the sample characteristics for each of the participating countries, along with the crude and age-standardized prevalence of any chronic pain condition for each country. Chronic pain conditions were common in both developed and developing countries, although appreciable cross-national variation in chronic pain prevalence rates remained after adjusting for age differences. Nonetheless, the crude prevalence of chronic pain conditions in developing countries was quite similar to that of developed countries. Ukraine, followed by South Africa, France, and the United States, exhibited the highest prevalence rates. Lebanon, a developing country, and Japan, a developed country, had the lowest prevalence rates of chronic pain among the participating countries. Even so, more than one-quarter of the adult population reported chronic pain conditions in Lebanon and Japan.

As occurred in all survey sites, the proportions of people with depression/anxiety disorders among those having any chronic pain in the previous 12 months were more than the proportion among those without.

**Figure 1.** Age-standardized prevalence rates of any chronic pain conditions and any chronic pain plus comorbid depression-anxiety disorders (shaded bars), between female and male, in developing and developed countries.
The shaded part of the bars in Fig 1 shows the age-standardized population prevalence (percent) of persons with both a depression-anxiety disorder and a chronic pain condition. A significant minority (about one-sixth to one-eighth) of persons with a chronic pain condition did meet diagnostic criteria for a depressive and/or an anxiety disorder. Females had a higher prevalence of depression-anxiety comorbid with chronic pain than males in both developed and developing countries. However, even among females, more than 80% of persons with a chronic pain condition did not meet diagnostic criteria for any of the depressive or anxiety disorders assessed.

The prevalence of any chronic pain condition increased with age in both developing and developed countries (Fig 2). Consistently more females than males reported any chronic pain condition in all age groups. The difference in chronic pain prevalence between developing and developed countries was not significant for either sex except for the oldest age group (66 years or above). In the oldest age group, the prevalence of chronic pain condition continued to increase linearly for females, whereas the increase in prevalence with age was not as great among males, especially in developed countries.

Table 2 provides age-standardized prevalence rates of headache, back pain, arthritis/joint pain, other pain conditions, and for any of these chronic pain conditions for developed and developing countries, and for all countries combined. The age-standardized prevalence rates of headache, back pain, and other chronic pain conditions were higher in developing than developed countries. On the other hand, the age-standardized prevalence of arthritis/joint pain was higher in developed countries. For both groups of countries, all specific chronic pain conditions were significantly associated with depression-anxiety disorders status. Headache was more strongly associated with depression-anxiety disorders than back pain, arthritis/joint pain and other chronic pain in developed countries; whereas the association was stronger for headache and back pain than other specific chronic pain in developing countries.

Discussion

By using the same research instrument and rigorous sampling methodology, the WMHS provide data that permit comparison of the prevalence of common chronic pain conditions in developing and developed countries. Although the prevalence of headache and back/neck pain was somewhat higher in developing countries than in developed countries, the similar overall prevalence of any chronic pain condition in the 2 groups of countries confirms that chronic pain conditions are common in the general population world-wide.
Despite wide variation in socioeconomic, demographic, and cultural characteristics across the participating countries, and in the country-specific prevalence rates of chronic pain conditions, several findings were cross-nationally consistent. Females exhibited a higher overall prevalence of chronic pain than males, a finding in line with prior research.\textsuperscript{7,8,29,36} This might be due to greater sensitization to pain and its reporting arising from hormonal and/or psychosocial factors specific to female gender.\textsuperscript{5} Another cross-nationally consistent finding that confirms published epidemiological surveys is an increased vulnerability to chronic pain with increasing age, especially arthritis/joint pain.\textsuperscript{2,6-8} It should be noted that the age-sex distribution of pain differs across specific pain conditions, so these results do not apply equally to each pain condition. For example, back pain is not consistently more common among females than males, and headache does not increase in prevalence with older age.

The significant association between chronic pain conditions and mental disorder in both developed and developing countries notwithstanding, it is worth noting that the large majority of persons with a chronic pain condition in these general population samples did not meet diagnostic criteria for a depressive or anxiety disorder. This suggests that chronic pain in the community is an independent illness entity rather than a somatic presentation of masked mental disorders.\textsuperscript{21}

It is beyond the scope of this paper to explain the variations in prevalence estimates of chronic pain across countries, or to explain differences between developing countries and developed countries. It is likely that a variety of biosocial and cultural factors could account for them.\textsuperscript{4,6,11,16} Although there are large differences in pain prevalence rates between countries, the differences in the overall prevalence of pain conditions between developed and developing countries were modest.

Among countries that took part in the WMH Survey Initiative, depressive and anxiety disorders have been found to be much less prevalent in developing than developed countries.\textsuperscript{8} It is believed that methodological factors (such as those related to psychiatric stigma and validity of translation) that cause downward bias in the assessment of psychological symptoms could partly account for the low prevalence of mental disorders in developing countries. In this regard, our finding that the overall prevalence of chronic pain was similar in developed and developing countries (while headache and back pain were even more prevalent in developing countries) is of interest. Further research on factors influencing the reporting of pain symptoms in different countries and cultures is needed to better understand these results.

Our findings should be interpreted in the context of several limitations. First, the assessment of pain condition did not include severity and duration of pain. Since respondents subjectively defined chronicity in response to the interview questions that asked about “frequent,” “severe,” and “chronic” pain, their responses probably reflect a broad spectrum of pain conditions varying in both severity and duration. Responses could also reflect...
differences in understanding of the specific pain conditions. This study used a standard set of questions from the U.S. National Health Interview Survey to ascertain common pain conditions. Future studies should define pain severity and chronicity in more detail than was possible in the WMHS. Second, chronic pain and physical diseases were ascertained by self-report rather than clinical examination or medical records. Although self-report of chronic pain is generally employed in morbidity surveys, self-reported physical diseases do not necessarily replicate physician diagnoses of the same disease conditions. Nonetheless, methodological studies have found that self-report of diagnosis has generally showed good agreement with medical record data. Third, the cross-sectional nature of our study limits interpretation about the nature of the association between chronic pain and mental disorder. It is generally believed that the connection between mental disorders and chronic pain is bidirectional, but associations found in this study did not imply causal relationships.

One strength of our study is that the prevalence of chronic pain and association with risk factors was based on results from a large number of population surveys executed with rigorous sampling methods and using a common instrument. This sheds light on cross-national comparison relevant to understanding the consistency in the occurrence of chronic pain, adjusting gender and age variations among countries. A second strength of the study was its controlling for chronic physical diseases, thereby demonstrating that the association between chronic pain and mental disorders was independent of physical disease comorbidity.

Regarding clinical implications, the present study indicates that comorbid anxiety and depression should be considered in the assessment of pain patients in both developed and developing countries. Similarly, since chronic pain often accompanies and can increase the duration and severity of mental disorders, mental health professionals should be prepared to address comorbid chronic pain conditions during the treatment of patients with depression and anxiety disorders. The management of comorbid chronic pain and mental disorders may be particularly deficient in developing countries where mental health literacy of both patients and health care practitioners is low and the segmentation of health and mental health services is marked. Among elderly people in both developing and developed countries, the present study suggests that the same clinical sensitivity to comorbid mental disorders and chronic pain (including arthritis) is essential.

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