
THE ASSOCIATION BETWEEN CHRONIC WIDESPREAD PAIN AND MENTAL DISORDER: A Population-Based Study

[Clinical Science]

BENJAMIN, SIDNEY; MORRIS, STELLA; McBETH, JOHN; MACFARLANE, GARY J.; SILMAN, ALAN J.

Submitted for publication June 29, 1999; accepted in revised form November 9, 1999.

Address reprint requests to Alan J. Silman, MD, Arthritis Research Campaign Epidemiology Unit, School of Epidemiology and Health Sciences, Stopford Building, University of Manchester, Oxford Road, Manchester M13 9PT, UK.

Supported by the Arthritis Research Campaign, Chesterfield, UK.

Sidney Benjamin, MD: University of Manchester, Manchester, UK; Stella Morris, MRCPsych, John McBeth, MA, Gary J. Macfarlane, PhD, Alan J. Silman, MD: University of Manchester, and Manchester Royal Infirmary, Manchester, UK.

Abstract

Objective. Patients with chronic widespread pain (CWP) have been reported to have a greater prevalence of mental disorders and somatization than that found in the general population, but the true association between CWP and mental disorders is unknown. In this study, we investigated whether there is an increased prevalence of mental disorder in people with CWP from the general population. We also describe the psychiatric diagnoses associated with CWP.

Methods. In a population-based case-control study, 1,953 subjects (75% of a random sample of individuals age 18–65 years) completed a questionnaire that included a pain assessment and the 12-item General Health Questionnaire (GHQ-12). Of 710 subjects scoring >1 on the GHQ-12, 301 were assessed further using a structured psychiatric interview and detailed assessment of medical records to identify cases of mental disorder, in accordance with criteria of the 10th edition of the International Classification of Diseases. The association between CWP and mental disorder was modeled using logistic regression, adjusting for possible confounders including age, sex, and nonresponders.

Results. We estimated the overall population prevalence of mental illness to be 11.9%. The odds of having a mental disorder for subjects with versus those without CWP were 3.18 (95% confidence interval 1.97–5.11). Most subjects with mental disorders were diagnosed

as having mood and anxiety disorders. Only 3 cases of somatoform disorders were identified, and all were associated with pain.

Conclusion. This study, although unable to demonstrate a cause-and-effect relationship, showed that 16.9% of those with CWP were estimated to have a psychiatric diagnosis, suggesting that these disorders should be identified and treated.

Although there are many accounts of a relationship between chronic pain and mental disorders, these have been based mainly on investigations of consulting populations. Thus, compared with general population prevalence studies, patients attending pain (1), rheumatology (2), and fibromyalgia (3,4) clinics all have an excess of psychiatric disorders, although this may not be a consistent finding (5). Clinical samples are, however, liable to be influenced by consultation behavior and may be unrepresentative (6). In support of this, we recently showed that in a general population sample, people with chronic widespread pain (CWP, defined below) who sought primary care had greater psychological distress and more mental disorders than those who did not (7). However, even those who do not seek health care may have an increased prevalence of mental disorders. A Finnish study (8) found a 56% prevalence of mental disorder in people with fibromyalgia syndrome (FMS) compared with 17% in those without FMS, but these results are difficult to interpret since psychological symptoms were included as part of the classification process of fibromyalgia.

Many psychiatric diagnoses have been described in association with chronic pain, but 2 diagnostic groups have predominated. Mood (depressive) disorders have been conspicuous in some studies of clinical samples (1,9,10), and depressive symptoms have been associated, in population studies, with pains in bodily regions (11,12). These findings must be interpreted with caution, since assessments of depression may fail to differentiate depressed mood, symptoms, and diagnosis, do not always use standardized diagnostic criteria, and may be influenced by the inclusion of symptoms (particularly related to appetite, sleep, and sexual function) or social dysfunction, which can be directly related to organic status or other mental disorders. Thus, depressive disorders may be overdiagnosed in people with chronic pain. Conversely, depressive disorders may be underdiagnosed due to the process of somatization (13), whereby patients focus on physical complaints and deny psychosocial problems, and physicians fail to identify these mental disorders (14,15).

The diagnosis of somatoform disorders (particularly somatization disorder) is uncommon in the general population but has been prominent in some reports of chronic pain patients attending clinics (14). Published population surveys of the prevalence of mental disorders have not assessed pain routinely, nor have they assessed organic state or consultation for physical symptoms or disability, all of which contribute to the diagnosis of somatoform disorders. Assessments of somatization disorder based on physical symptom counts (16) are of limited value in this context, because higher somatic (including pain) symptom counts are also associated with depression and anxiety (17,18). In the general population, the

relationship between chronic pain and somatoform disorders, identified in accordance with standardized diagnostic criteria, remains uncertain.

To address these issues, surveys require the use of standardized criteria and assessments for both chronic pain and mental disorders. The American College of Rheumatology (ACR) has defined classification criteria for fibromyalgia in terms of CWP and multiple tender points (19).

The evidence that mental disorders are associated with chronic pain, including fibromyalgia, in both clinic patients and the general population is inconclusive, and the relationship between separate diagnostic groups and CWP remains to be examined. In this study, we tested the hypothesis that subjects with CWP in the general population had higher rates of mental disorder than subjects without CWP. In addition, we determined the prevalence of psychiatric diagnostic groups including mood, anxiety, and somatoform disorders and examined the association of these diagnostic groups by comparing persons with CWP, other pain, and no pain.

SUBJECTS AND METHODS

Design and population.

A population-based case-control study involving prevalent cases of CWP was performed. A population sample of 3,004 subjects age 18–65 years was randomly selected from a general practice register in the south Manchester, UK, area. This is a mixed but relatively affluent sociodemographic area with high employment levels compared with other parts of the region. The general practice register provides a convenient sampling frame for community subjects, since >95% of the population in the UK is registered with a general practice (20).

Each subject was sent a postal questionnaire and, if necessary, a reminder postcard and then a further copy of the questionnaire.

Pain assessment.

The questionnaire survey, conducted in 1995, inquired about any pain experienced during the previous month that had persisted for at least 24 hours. Subjects were asked if they had been aware of this pain for >3 months. Four line drawings of the body were included (front, back, and sides), and subjects were asked to indicate the sites of their pain. These methods for determining the duration and location of pain have been used successfully in previous studies (21,22).

On the basis of the information provided by the questionnaire, subjects were categorized into 3 groups. The first group of subjects was classified as having CWP using the criteria for this component of the fibromyalgia syndrome as defined by the ACR (19). Briefly, pain must have been present for >3 months in at least 2 contralateral quadrants and in the axial skeleton. The other-pain group included all subjects who experienced pain that had lasted for >24 hours during the previous month, but who did not meet the ACR criteria for CWP.

The no-pain group comprised subjects who did not report any pain for >24 hours in the past month.

Psychiatric assessment.

The 12-item version of the General Health Questionnaire (GHQ-12) (23) was used to identify potential cases of mental illness, serving as the initial screening process in a 2-stage assessment of mental disorders. In validation studies, threshold scores ranging from 1/2 to 3/4 have been shown to discriminate between cases and noncases (23), depending on the purpose of screening. For the present study, we deliberately chose a low GHQ threshold of 2 to provide high sensitivity at the cost of relatively low specificity (those who score <2 are very unlikely to have a mental disorder).

Interviews.

Subjects completing the questionnaire were asked whether they would be willing to be interviewed. A random sample (the size of which was dictated by resources of those subjects scoring >1 on the GHQ (the screened-positive group) and agreeing to further contact (74%) was asked to participate in the interview. We used the 10th edition of the Present State Examination (PSE-10), a highly structured and standardized psychiatric interview included in the Schedules for Clinical Assessment in Neuropsychiatry (24). The PSE-10 assesses the presence and severity of symptoms of adult mental disorders in accordance with requirements for diagnoses included in the 10th revision of the International Classification of Diseases (ICD-10) (25). Diagnoses were made using a computer program that applies the ICD-10 algorithms (24). The PSE-10 has been shown to have good interrater reliability and validity. The psychiatrist (SM) was unaware of the subject's GHQ-12 score (apart from its being above the threshold) or pain group status.

Somatic symptoms that were elicited at interview and that might have contributed to the diagnosis of somatoform disorders were evaluated further to determine whether they were due to organic disorders. General practitioners' records were reviewed. Symptoms were attributed to physical disorders if there were clinical or investigative findings to support this. Two research psychiatrists (SM and SB) repeated this procedure independently with a proportion of records, and interrater reliability was almost perfect.

Analysis.

The association between CWP and mental disorder was modeled using logistic regression, adjusting for possible confounders including age and sex. Inevitably, in population-based studies involving intensive, time-consuming interviews on personal issues, there is an important proportion of individuals for whom interview data are lacking because of nonparticipation. In the current study, we attempted in our analysis to estimate the magnitude of any consequent bias using a weighted logistic regression (26). This technique assigns sampling weights to the interviewed subgroup, such that those subjects represent all those who were eligible to be interviewed. The advantage of this over other estimating techniques is that the variance and standard errors and, hence, the confidence intervals can

be calculated directly from the logistic model. Since the number of subjects included in the calculation is not inflated, the estimates are conservative. The theory and assumptions underlying this approach are given in Appendix A.

RESULTS [†]

From the 3,004 subjects to whom questionnaires were mailed, 1,953 completed responses were received (Table 1). On examination of the electoral roll, it was found that 402 nonresponders (264 men and 138 women) were not registered as living at the address of record at their general practice and were therefore unlikely to have received the questionnaire. Excluding these subjects, the total number of subjects was 2,602 (1,182 men and 1,420 women), and the overall adjusted response rate was 75%. As is usual with postal surveys, a higher proportion of women (79%) than men (71%) returned the questionnaire ($P < 0.001$ by chi-square test), with the highest response rate (89%) from women age 18–32 years.

Table 1. Age and sex of responders (first time and reluctant) and nonresponders to questionnaire*

Sex, age in years	Responders				Nonresponders	
	First time		Reluctant		No.	%
	No.	%	No.	%		
Men						
18–32	102	8.6	111	14.4	218	20.7
33–42	115	9.7	85	11	162	15.4
43–52	131	11.1	75	9.7	140	13.3
53–65	134	11.3	82	10.6	91	8.7
Women						
18–32	184	15.6	129	16.7	167	15.9
33–42	155	13.1	109	14.1	127	12.1
43–52	173	14.6	99	12.8	79	7.5
53–65	188	15.9	81	10.5	67	6.4
Total	1,182	100	771	100	1,051	100

Table 1. Age and sex of responders (first time and reluctant) and nonresponders to questionnaire*

Of those who responded, 60.5% responded to the first mailed questionnaire, while the remainder (referred to subsequently as reluctant responders) responded following a postal

reminder or further questionnaire. The distribution of the main variables measured is shown in [Table 2](#). Reluctant responders were more likely to be younger males. This group also had slightly higher GHQ scores, although there was no difference in the prevalence of CWP.

Table 2. Characteristics of responders to questionnaire*

	First time (n = 1,182)		Reluctant (n = 771)		Total (n = 1,953)	
	No.	%	No.	%	No.	%
Women	700	59	418	54	1,118	57
Age in years						
18–32	286	24	240	31	526	27
33–42	270	23	194	25	464	24
43–52	304	26	174	23	478	24
53–65	322	27	163	21	485	25
GHQ						
2–4	239	56	141	50	380	54
5–6	62	14	50	18	112	16
≥7	128	30	90	32	218	31
CWP group	157	13	95	12	252	13

* GHQ = General Health Questionnaire; CWP = chronic widespread pain.

Table 2. Characteristics of responders to questionnaire* GHQ = General Health Questionnaire; CWP = chronic widespread pain.

710 subjects (36%) screened positive on the GHQ and were therefore candidates for the psychiatric interview. A resource-constrained random sample of 526 subjects was chosen for interview. Of these, 301 subjects (57%) were interviewed. There were several differences between those subjects who were interviewed and those 409 (184 not selected, 225 refusing interview) who were not. Interviewed subjects tended to be older, female, and have higher GHQ scores ([Table 3](#)).

Table 3. Characteristics of interviewed and noninterviewed eligible subjects*

	Interviewed (n = 301)		Not interviewed (n = 409)	
	No.	%	No.	%
Women	191	63	232	57
Age in years				
18–32	76	25	124	30
33–42	67	22	106	26
43–52	85	28	99	24
53–65	73	24	80	20
GHQ				
2–4	154	51	226	55
5–6	52	17	60	15
≥7	95	32	123	30
CWP group	67	22	57	14
Reluctant responders	114	38	167	41

*See Table 2 for definitions.

Table 3. Characteristics of interviewed and noninterviewed eligible subjects*See [Table 2](#) for definitions.

Within this interviewed subgroup, 97 persons (32%) were diagnosed as having a mental disorder. The prevalence of mental disorder was higher in females (n = 69, 36%) than in males (n = 28, 25%) and twice as common in women age 53–65 years (n = 21, 42%) than in men age 53–65 years (n = 4, 17%). The rate of mental disorder was higher in the 67 persons with CWP (n = 30, 45%) compared with the 234 without CWP (n = 67, 29%). The odds of having a mental disorder in the CWP group were 2.0 (95% confidence interval [95% CI] 1.1–3.6) relative to those without CWP.

Within this interviewed subgroup, 97 persons (32%) were diagnosed as having a mental disorder. The prevalence of mental disorder was higher in females (n = 69, 36%) than in males (n = 28, 25%) and twice as common in women age 53–65 years (n = 21, 42%) than in men age 53–65 years (n = 4, 17%). The rate of mental disorder was higher in the 67 persons with CWP (n = 30, 45%) compared with the 234 without CWP (n = 67, 29%). The odds of having a mental disorder in the CWP group were 2.0 (95% confidence interval [95% CI] 1.1–3.6) relative to those without CWP.

For subjects who were interviewed, univariate analysis (separately for those with and without CWP) indicated that GHQ score and response category were important factors in predicting which subjects were likely to be diagnosed as having a mental disorder (Table 4). Also, we were unable to exclude important influences of age and sex. However, there were no significant interactions. Since exposures to these influences differed between interviewed subjects and remaining eligible subjects (Table 3), weighted logistic regression was used to reflect the sampling fraction, with respect to these potentially important explanatory variables, to estimate the relationship between CWP and mental disorder in all the questionnaire responders (see Appendix A). The adjusted odds of having a mental disorder in the presence of CWP (relative to those without CWP) for all 1,953 subjects who responded were 3.14 (95% CI 1.74–5.64). Using these data, we estimated an overall population prevalence of mental disorder of 11.7% (95% CI 9.8–14.1) in the questionnaire responders. The prevalence in those with CWP was 16.9%, versus 6.5% in those without CWP.

Table 4. Results of logistic models for predicting mental disorder in interviewed subgroup*

	CWP (n = 67)	Non-CWP (n = 234)
Women	1.48 (0.38–5.89)	1.47 (0.79–2.72)
Age in years		
18–32	Referent	Referent
33–42	0.22 (0.20–2.40)	0.87 (0.38–1.93)
43–52	0.85 (0.12–6.00)	0.74 (0.33–1.65)
53–65	0.47 (0.07–3.36)	1.24 (0.53–2.93)
GHQ		
2–4	Referent	Referent
5–6	2.70 (0.55–13.16)	1.83 (0.80–4.21)
≥7	17.00 (3.84–75.29)	3.04 (1.55–5.99)
Reluctant responders	1.16 (0.34–4.04)	1.91 (1.04–3.47)

* Except where otherwise indicated, values are odds ratios (95% confidence intervals). See Table 2 for definitions.

Table 4. Results of logistic models for predicting mental disorder in interviewed subgroup* Except where otherwise indicated, values are odds ratios (95% confidence intervals). See Table 2 for definitions.

It was important to extrapolate from the available data to the original population sample, including questionnaire nonresponders. We therefore assumed that the relationship between CWP and mental disorder among the 25% of subjects who did not respond to the questionnaire resembled that among the subjects who were reluctant to respond to the

original questionnaire, after allowing for age and sex (see Appendix A). We therefore performed further logistic regression weighting the data from the 1,953 responders to account for all subjects who were mailed questionnaires. The estimated odds of having a mental disorder in the presence of CWP relative to those without CWP were not altered (odds ratio 3.18, 95% CI 1.97–5.11). Using these data, we estimated the overall population prevalence of mental disorder in all subjects who were mailed questionnaires to be 11.9% (95% CI 9.4–15.1).

Most of the mental disorders diagnosed in the interviewed subsample were single or dual diagnoses of mood (depressive episodes and dysthymia) and/or anxiety disorders (Table 5). Diagnoses of somatoform disorders were limited to undifferentiated somatoform disorder, and occurred in only 3 subjects (1%), 2 in the CWP group and 1 in the other-pain group. Other diagnoses were mainly alcohol abuse, adjustment disorders, and neurasthenia, the last occurring only in the 2 pain groups. Since the number of subjects with individual diagnoses was small, weighted logistic regression analysis was conducted only on all those subjects with mood disorders and, separately, on those with anxiety disorders (including dual diagnoses). The findings indicated that depression and dysthymia were more strongly associated with the presence of CWP (Table 6).

Table 5. Number of diagnosed mental disorders by pain group in the interviewed subsample*

Disorder	No pain (n = 86)		Other pain (n = 143)		CWP (n = 67)	
	No.	%	No.	%	No.	%
Mood†	14	16	22	15	20	30
Anxiety†	12	14	25	17	14	21
Somatoform	0	–	1	0.7	2	3
Other	1	1	5	3	4	6
Total	23	27	41	29	30	45

* See Table 2 for definitions.

† Includes subjects with diagnoses in >1 group of disorders.

Table 5. Number of diagnosed mental disorders by pain group in the interviewed subsample** See Table 2 for definitions.† Includes subjects with diagnoses in >1 group of disorders.

Table 6. Results of weighted logistic regression: odds of having a mental disorder (other pain and CWP versus no pain) adjusted for age, sex, and GHQ score*

Disorder	No pain	Other pain	CWP
Mood	Referent	1.3 (0.5–3.3)	2.3 (0.96–5.5)
Anxiety	Referent	1.1 (0.4–2.7)	1.6 (0.6–3.8)

* Except where otherwise indicated, values are odds ratios (95% confidence intervals). See Table 2 for definitions.

Table 6. Results of weighted logistic regression: odds of having a mental disorder (other pain and CWP versus no pain) adjusted for age, sex, and GHQ score* Except where otherwise indicated, values are odds ratios (95% confidence intervals). See [Table 2](#) for definitions.

DISCUSSION

Subjects in clinical and population samples satisfying criteria for CWP have been described as having greater psychological distress and more depressive symptoms (21) and mental disorders (particularly depressive disorders and somatoform disorders) (3,4) than would be expected in the general population. These studies have not included structured, standardized assessments of mental disorders in the general population. In summary, this study has estimated for the first time the prevalence of mental disorder in people with and without CWP in a general population sample. Recognizing that nonparticipation is inevitable in this type of study, we have adjusted for possible sources of bias in our analysis. We estimate that 1) the prevalence of mental disorder in the population lies in the range of 11–12% and 2) persons with CWP have a 3-fold increased odds of mental disorder compared with persons not reporting such symptoms.

The goal of this study was to describe the association between mental disorder and musculoskeletal pain in the population as a whole. In all, 25% of the population estimated to have received a questionnaire did not respond. It is possible, but perhaps unlikely, that there is a difference in the association of pain with psychiatric disorder in those who did versus those who did not respond to the questionnaire. We evaluated this possibility by assuming that those who were reluctant responders might be more representative of the nonresponders, and compared the association of mental disorder with pain in reluctant responders with that in those who responded to the questionnaire the first time. No difference in this association was seen.

A more important consideration discussed at length in Appendix A is that those interviewed were not representative of those eligible for interview. We attempted to address this issue using the data available to permit the best prediction of the likely effect this nonparticipation bias would have on the occurrence of mental disorder in each of the pain groups. We allowed for the effects of differences in age, sex, GHQ score, and response

category between participants and nonparticipants. However, there may have been other unmeasured confounders whose distribution varied between the 2 groups. Thus, our estimate of the strength of the association extrapolated to the population may still be subject to error.

The focus of this study was on estimating the true association between chronic pain and mental disorder in the population. Taking into account the impact of nonparticipation, our estimate of a 3-fold increase in the association provides the best overall prediction. The estimated prevalence of mental disorder in the mailed-to population, which was derived from the interview data, is similar to other general population estimates of mental disorders that have used standardized diagnostic classifications and structured interviews (27–29). A more recent survey (30) found an overall prevalence of 16%; in the present study, the lower prevalence was probably determined by the relatively advantageous sociodemographic characteristics of our sample (e.g., higher-than-average socioeconomic status, lower unemployment rates). Considering all of this information together, it seems reasonable to conclude that the effect of any participation bias on the prevalence estimates is unlikely to be large.

As has been found with other population and primary care surveys, the majority of mental disorders diagnosed were mood and anxiety disorders, but only mood disorders were specifically associated with the CWP group. We cannot rule out the possibility that some cases of mood and anxiety disorders were missed due to the process of somatization, but this should have been minimized by the use of standardized diagnostic criteria and a structured psychiatric interview. This should also have mitigated the possibility of interviewer bias, since it was impossible in practice to blind the psychiatrist totally about pain status. Any such cases would be more likely to occur in the CWP group, since multiple pains are associated with depression (17), reducing the prevalence found in this group. It is possible that the true excess morbidity in the CWP group may be somewhat greater than our estimate. It would also be of interest to investigate whether the relationships we found were related to the severity and chronicity of the pain complaint. However, this would require further study using validated approaches to assessing these dimensions of pain.

Somatoform disorders were uncommon, precluding any meaningful analysis. The prevalence was similar to that in other population surveys that use such restrictive criteria (16,28), and the 3 cases all occurred in subjects in the 2 pain groups. Somatoform disorders have been reported to be much more common in some studies of fibromyalgia patients (3,4). This difference is likely to be accounted for by less stringent criteria for diagnosis and ascertainment of somatoform disorders (16), and also by the more severe disorders and extreme forms of illness behavior that occur in consulting subjects with fibromyalgia. Even so, it is notable that in the present study there were no diagnoses of persistent somatoform pain disorder. Although we were able to identify cases of chronic pain that, on scrutiny of medical records, could not be explained fully by a physical or physiologic disorder, the structured interview did not include data from collateral informants and may have failed to identify psychosocial causes. In addition, the ICD-10 algorithm excludes this diagnosis when pain thought to be psychogenic occurs in the course of a depressive disorder or is thought to be due to psychophysiological mechanisms. Thus, less restrictive criteria for the

diagnosis of somatoform disorders would be likely to result in the identification of more cases. Even so, it is clear that within the general population, ICD-10 diagnoses of most of the somatoform disorders (including somatization disorder, hypochondriacal disorder, and persistent somatoform pain disorder) and of dissociative disorder are uncommon in people with CWP.

In conclusion, one-sixth of subjects with CWP in the general population are also found to have a mental disorder when assessed by a trained psychiatrist using standardized, internationally accepted criteria and a structured psychiatric interview. Although the other subjects do not have a psychiatric diagnosis, the number of subjects with relatively high GHQ-12 scores indicates that many are distressed. A longitudinal prospective study is required to confirm the direction of any causal relationship between mental disorders and CWP. However, our findings should alert medical practitioners in primary and secondary care to look for and treat these disorders, and the routine use of a screening instrument such as the GHQ-12 might help to identify them.

ACKNOWLEDGMENTS

The authors are grateful for the participation and help of the doctors, patients, and staff of the general practice in Altrincham, Greater Manchester; to Lesley Jordan, who helped to prepare the manuscript; and to Ann Papageorgiou and Isabelle Hunt for survey administration.

REFERENCES

1. Benjamin S, Barnes D, Berger S, Clarke I, Jeacock J. The relationship of chronic pain, mental illness and organic disorders. *Pain* 1988; 32:185–95. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
2. Brown GK, Nicassio PM, Wallston KA. Pain coping strategies and depression in rheumatoid arthritis. *J Consult Clin Psychol* 1989; 57:652–7. [Ovid Full Text](#) [Bibliographic Links](#) [\[Context Link\]](#)
3. Wolfe F. Fibromyalgia. In: Sessle BJ, Bryant PS, Dionne RA, editors. *Temporomandibular disorders and related pain conditions*. Seattle: IASP Press; 1995. p. 31–46. [\[Context Link\]](#)
4. Bennett RM, Burckhardt CS, Clark SR, O'Reilly CA, Wiens AN, Campbell SM. Group treatment of fibromyalgia. *J Rheumatol* 1996; 23:521–8. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
5. Ahles TA, Khan SA, Yunus MB, Masi AT. Psychiatric status of patients with primary fibromyalgia, patients with rheumatoid arthritis, subjects without pain: a blind comparison of DSM-III diagnoses. *Am J Psychiat* 1991; 148:1721–6. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
6. Barsky AJ, Wyshak G, Klerman GL. Medical and psychiatric determinants of outpatient utilization. *Med Care* 1986; 24:548–60. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
7. Macfarlane GJ, Morris S, Hunt IM, Benjamin S, McBeth J, Papageorgiou AC, et al. Chronic widespread pain in the community: the influence of psychological symptoms and mental disorder on health-care seeking behaviour. *J Rheumatol* 1999; 26:413–9. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
8. Makela M, Heliövaara M. Prevalence of primary fibromyalgia in the Finnish population. *BMJ* 1991; 303:216–9. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)

9. Romano JM, Turner JA. Chronic pain and depression: does the evidence support a relationship? *Psychol Bull* 1985; 97:18–34. [Ovid Full Text](#) [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
10. Krishnan KRR, France RD, Pelton S, McCann UD, Davidson J, Urban BJ. Chronic pain and depression. I. Classification of depression in chronic low back pain patients. *Pain* 1985; 22:279–87. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
11. Von Korff M, Le Resch L, Dworkin S. First onset of common pain symptoms: a prospective study of depression as a risk factor. *Pain* 1993; 55:251–8. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
12. Magni G, Morreschi C, Rigatti-Luchini S, Merskey H. Prospective study on the relationship between depressive symptoms and chronic musculoskeletal pain. *Pain* 1994; 56:289–97. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
13. Kleinman A, Kleinman J. Somatisation: the interconnectedness in Chinese society among culture, depressive experiences and meaning of pain. In: Kleinman A, Good B, editors. *Culture and depression: studies in the anthropology of cross culture psychiatry of affect and disorder*. London: University of California Press; 1985. p. 429–90. [\[Context Link\]](#)
14. Kirmayer LJ, Robins JM, Dworkin M, Yaffe M. Somatization and the recognition of depression and anxiety in primary care. *Am J Psychiat* 1993; 150:734–41. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
15. Weich S, Lewis G, Donmall R, Mann A. Somatic presentation of psychiatric morbidity in general practice. *Br J Gen Pract* 1995; 45:143–7. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
16. Escobar JI, Gara M, Cohen Silver R, Waitzkin H, Holman A, Compton W. Somatisation disorder in primary care. *Br J Psychiat* 1998; 173:262–6. [Ovid Full Text](#) [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
17. Dworkin SF, Von-Korff M, LeResche L. Multiple pain and psychiatric disturbance: an epidemiologic investigation. *Arch Gen Psychiatry* 1990; 47:239–44. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
18. Simon G, Gater R, Kisely S, Piccinelli M. Somatic symptoms of distress: an international primary care study. *Psychosom Med* 1996; 58:481–8. [Ovid Full Text](#) [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
19. Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, et al. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia: report of the multicenter criteria committee. *Arthritis Rheum* 1990; 33:160–72. [\[Context Link\]](#)
20. Ritchie J, Jacoby A, Bone M. Office of Population Censuses and Surveys, Social Survey Division: access to primary health care. London: Her Majesty's Stationery Office; 1981. [\[Context Link\]](#)
21. Croft P, Rigby AS, Boswell R, Schollum J, Silman AJ. The prevalence of chronic widespread pain in the general population. *J Rheumatol* 1993; 20:710–3. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
22. Macfarlane GJ, Croft PR, Schollum J, Silman AJ. Widespread pain: is an improved classification possible? *J Rheumatol* 1996; 23:1628–32. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
23. Goldberg DP, Williams P. *The user's guide to the General Health Questionnaire*. Windsor: NEFR-Nelson; 1988. [\[Context Link\]](#)
24. Wing JK, Babor T, Brugha T, Burke J, Cooper JE, Giel R, et al. SCAN: schedules for clinical assessment in neuropsychiatry. *Arch Gen Psychiatry* 1990; 47:589–93. [Library Holdings](#) [Bibliographic Links](#) [\[Context Link\]](#)
25. World Health Organization. *The ICD-10 classification of mental and behavioral disorders*. Geneva: World Health Organization; 1992. [\[Context Link\]](#)

26. Pickles A, Dunn G, Vazquez-Barquero JL. Screening for stratification in two-phase ('two-stage') epidemiological surveys. *Stat Methods Med Res* 1995; 4:73–89. [Library Holdings](#) [Bibliographic Links](#) [Context Link](#)
27. Bebbington P, Hurry J, Tennant C, Sturt E, Wing JK. Epidemiology of mental disorders in Camberwell. *Psychol Med* 1981; 11:561–79. [Library Holdings](#) [Bibliographic Links](#) [Context Link](#)
28. Regier DA, Boyd JH, Burke JD, Rae DS, Myers JK, Kramer M, et al. One-month prevalence of mental disorders in the United States: based on five Epidemiologic Catchment Area sites. *Arch Gen Psychiatry* 1988; 45:977–86. [Library Holdings](#) [Bibliographic Links](#) [Context Link](#)
29. Lehtinen V, Joukamaa M, Lahtela K, Raitasalo R, Jyrkinen E, Maatela J, et al. Prevalence of mental disorders among adults in Finland: basic results from the Mini Finland Health Survey. *Acta Psychiatr Scand* 1990; 81:418–25. [Library Holdings](#) [Bibliographic Links](#) [Context Link](#)
30. Jenkins R, Bebbington P, Brugha TS, Farrell Lewis G, Meltzer H. British psychiatric morbidity survey. *Br J Psychiatr* 1998; 173:4–7. [Ovid Full Text](#) [Library Holdings](#) [Bibliographic Links](#) [Context Link](#)

APPENDIX A

THE ANALYSIS OF ASSOCIATION BETWEEN CHRONIC WIDESPREAD PAIN AND MENTAL DISORDER, ACCOUNTING FOR NONPARTICIPATION

1. The design of the study involved individuals being asked to participate in a psychiatric interview based on their GHQ score of >1. Three groups of individuals who screened positive were eligible but not interviewed. These were a) those who, on the questionnaire form, asked not to be contacted again, b) those who had agreed to be contacted again but refused when subsequently contacted for an interview, and c) those eligible to be interviewed who were randomly not selected, since resource constraints limited the number of interviews to ~300. We assumed that individuals who responded to the screening study but who scored <2 on the GHQ were free of psychiatric disorder. The presence or absence of psychiatric disorder in the remaining subjects was therefore only ascertained in the interviewed subgroup.
2. The first analysis of the association between the occurrence of pain and the presence of psychiatric disorder included only those subjects who were randomly selected and successfully interviewed. Univariate analysis of data for these individuals suggested that 4 variables selected from the original screening questionnaire were predictive of the likelihood of mental disorder at interview. These were age, sex, GHQ score, and whether the subject responded to the questionnaire initially or only after 1 or more reminder.
3. The distributions of these variables were different in those who were interviewed versus those who were eligible but not interviewed. Therefore, to more accurately define the association between CWP and mental disorder in all those who responded to the questionnaire, we conducted a weighted logistic regression based on the data from the interviewed subsample. Briefly, the 4 variables were age (divided by quartiles), sex (male/female), GHQ score (divided by tertiles), and response category (first-time responders versus all other responders to the questionnaire). The data from the interviewed subsample were weighted to take account of the difference in distribution of these 4 variables in the subsample in relation to the entire population of those eligible to be interviewed. The association between CWP and psychiatric disorder was then estimated.

4. The other potential contribution to nonresponse bias was that questionnaire data were only available from 75% of subjects. As we wished to extrapolate our association to the entire population, certain assumptions had to be made about the relationship of the association in the 25% of individuals who did not even respond to the questionnaire. Although it is perhaps unlikely that even if the questionnaire nonresponders had a different prevalence of mental disorder, there would also be a different association between CWP and mental disorder, we thought it appropriate to attempt some adjustment. We therefore assumed that the questionnaire nonresponders, in each of their age and sex categories, would behave more like those who only responded to the questionnaire after the first mailing. The analyses were then repeated based on this assumption to determine whether the obtained odds ratio would be attenuated using this approach. Thus, the data from the questionnaire responders were weighted to represent all those subjects who were mailed questionnaires.

5. Similarly, weighted logistic regression was used to define the association between CWP and individual diagnostic groups of mental disorders compared with the other-pain and no-pain groups.
