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DSM-IV pain disorder in the general population
An exploration of the structure and threshold of medically unexplained pain symptoms

■ **Abstract** *Background* Despite an abundance of questionnaire data, the prevalence of clinically significant and medically unexplained pain syndromes in the general population has rarely been examined with a rigid personal-interview methodology. *Objective* To examine the prevalence of pain syndromes and DSM-IV pain disorder in the general population and the association with other mental disorders, as well as effects on disability and health-care utilization. *Methods* Analyses were based on a community sample of 4.181 participants 18–65 years old; diagnostic variables were assessed with a standardized diagnostic interview (M-CIDI). *Results* The 12-month prevalence for DSM-IV pain disorder in the general population was 8.1%; more than 53% showed concurrent anxiety and mood disorders. Subjects with pain disorder revealed significantly poorer quality of life, greater disability, and higher health-care utilization rates compared to cases with pain below the diagnostic threshold. The majority had more than one type of pain, with excessive headache being the most frequent type. *Conclusions* Even when stringent diagnostic criteria are used, pain disorder ranks among the most prevalent conditions in the community. The joint effects of high prevalence in all age groups, substantial disability, and increased health services utilization result in a substantial total burden, exceeding that of depression and anxiety.

■ **Key words** DSM-IV pain disorder · pain syndromes · comorbidity · impairment · Composite International Diagnostic Interview (CIDI)

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Introduction

Chronic pain is well known as a highly prevalent condition in the general population. However, population-based prevalence studies have provided only incomplete and quite inconsistent epidemiological characterization. For example, prevalence rates of pain vary from 2%–50% for the general population depending on varying methodological factors [48]. Table 1 presents core results along with basic methodological information from recent epidemiological studies focussing on community surveys.

Beyond "true" prevalence differences (e.g., due to cultural and ethnical factors [17]), this variability of prevalence rates can be largely attributed to critical issues in the assessment of pain and mental disorders in general, such as the conceptual level (coverage, symptoms vs. diagnosis), the time frame (e.g., 12 month vs. lifetime), and the assessment method (e.g., questionnaire vs. interview) [54, 55].

Because of the complex nature of pain, the development of a comprehensive and coherent theoretical framework for chronic pain and a universally applicable and accepted classification system has proven difficult [29]. As a result, there is also no universally accepted diagnostic instrument for epidemiological research in this domain. In the development of the Diagnostic and Statistical Manual of Mental Disorders (DSM) [2–4], the diagnostic criteria of pain were tentatively specified and revised several times and finally labelled "pain disorder" in DSM-IV as a primarily descriptive and not etiological term. The specification also allowed for the first time the development of a standardized diagnostic interview approach to assess and clinically evaluate pain, but representative epidemiological studies using DSM-IV criteria are still not available [14].

The inclusion of a pain assessment module in recent diagnostic instruments, such as CIDI, also allows examination with greater precision of correlates and patterns of comorbidity with other mental disorders. The associ-

Table 1 Prevalence rates of chronic pain in recent community-based surveys

Study	Sample	Definition/assessment of pain	Prevalence (time frame)
USA National Health and Nutrition Examination Survey (NHANES-I) [36]	N = 3.059 age: 25–74	chronic musculoskeletal pain for 6 months/self-report	total 14.4 % (12 months)
UK [15]	N = 3.605	any chronic pain for 3 months/two questions in unspecific questionnaire in postal survey	total 50.4 % (6 months)
Germany Early developmental stages of psychopathology study (EDSP) [35]	N = 3.021 age: 14–24	DSM-IV pain disorder/M-CIDI	total 1.4 %, men 0.3 %, women 2.6 % (12 months)
Australia [10]	N = 17.543	pain experienced every day for three months/ telephone survey	men 17.1 %, women 20 % (6 months)
Hungary [43]	N = 12.640	impairment caused by pain/unspecific questionnaire	total 32.7 %

Centers in 14 countries
  World Health Organization Collaborative
  Project on Psychological Problems in
  General Health Care [21]
	N = 3.197
	primary care
	patients
	age: 18–65
		pain on most days in past 6 months/CIDI	total 22.7 % (6 months)

Denmark Danish Health and Morbidity Survey [16]	N = 12.333	chronic pain for 6 months/one question in interview	total 19 %, men 16 %, women 21 % (6 months)
France [34]	N = 10.585	headache/interview, questionnaire	2.9 % (point prevalence)
Germany, Italy, Portugal, Spain, UK [40]	N = 18.980	painful condition for 6 months/unspecific question in telephone survey	total 17.1 %, men 13.2 %, women 20.7 % (12 months)

Germany
  Core survey of the National Health
  and Examination survey (GHS) [31]
Germany: Catchment Area of Luebeck [20]
	N = 7.124
	age: 18–65
	N = 4.075
		musculoskeletal pain and other painful conditions/
		unspecific questionnaire
		DSM-IV pain disorder/M-CIDI
			total 16 %, men 14 %,
			women 18 % (12 month)
			men 1.8 %, women 3.6 %
			(6 months)

Netherlands, DMC3 Study [41]	N = 3.664	back pain/unspecific questionnaire in postal survey	total 26.9 % (12 months)
USA National Comorbidity Survey (NCS) [38]	N = 5.877	severe arthritis/unspecific questionnaire	total 7 % (12 months)
Canada Canadian Community Health Survey [13]	N = 118.533	chronic back pain for 6 months/unspecific questionnaire	total 9 % (12 months)

ation of pain with other mental disorders, particularly depression, has been of interest for many years. Prevalence rates of major depression in pain patients range from 18 %–54 % [6, 13, 14, 36], compared to 2 %–8 % in the general population [e. g., 28, 51, 52]. The increasing prevalence of chronic pain is associated with an increasing number of depressive symptoms; in addition, nearly every second respondent diagnosed with major depression reports also experiencing pain [40]. Bair et al. [5] point out that the presence of depression in pain patients is associated with more pain complaints and greater impairment and that the presence of pain in depressive patients effects quality of life, occupational functioning, and health-care utilization. Findings with regard to the chronological order of pain and comorbid conditions are heterogeneous. Fishbain et al. [18] reviewed 83 clinical and epidemiological studies with regard to several hypotheses on the comorbidity of pain (e. g., antecedent, consequence, or cognitive-mediation hypothesis). According to this review, pain precedes depression in most comorbid cases (i. e., there is stronger evidence for depression as a consequence of pain). Prospective studies indicate a bidirectional association, rather than a simultaneous beginning [e. g., 11, 35, 37].

Less attention is paid to comorbidity with anxiety disorders although data imply an association at least as strong as that which occurs with depression [38, 49].

Because of these inconsistent findings, the inconsistent definitions of "chronic pain", and the absence of representative studies using DSM-IV criteria for pain disorder, the aims of the present study were to examine (1) the prevalence of clinically significant and medically unexplained pain symptoms as well as of DSM-IV pain disorder in the general population; (2) the type and strength of associations of pain symptoms/DSM-IV pain disorder with mood, anxiety, and substance disorder; and (3) the association with disability days, quality of life, and health-care utilization.

Methods

Sample

The GHS covered a range of medical and social assessments in a multistage stratified random sample of the general German population from 18 to 79 years of age, drawn from population registries (N = 7.124; response rate: 61 %). The mental health supplement covered a subsample of this population (N = 4.181; response rate within that subsample: 87.6 %) and can be regarded as representative for the German noninstutionalized adult population from 18 to 65 years of age. GHS respondents older than 65 years were excluded because of unsatisfactory psychometric properties of the diagnostic interview for use in older populations [30].

Assessment

The assessment of mental disorders was based on the computer-assisted version of the Munich Composite International Diagnostic Interview (DIA-X/M-CIDI; [57, 59]), administered by clinically trained interviewers (psychologists and MDs). The M-CIDI is a fully structured interview that allows the assessment of symptoms and syndromes, as well as 4-week, 12-month, and selected lifetime diagnoses of a wide range of mental disorders, based on DSM-IV [4] and ICD-10 [60]. Psychometric properties of the M-CIDI were found to range from "acceptable" to "very good" [32, 42, 56, 59]. All subsequent analyses were performed for 12-month criteria.

■ **Pain symptoms and DSM-IV pain disorder.** Diagnostic criteria for DSM-IV pain disorder are presented in Table 2. In the M-CIDI, first the presence of the following painful conditions in the past 12 months was assessed: excessive abdominal pain, excessive back pain, joint pain, limb pain, chest pain, excessive headache, excessive painful menstruation, rectal and genital pain, and other pain. Whenever the respondent acknowledged having experienced at least one of these pain types, the interviewer entered a standardized complex set of probe questions to evaluate the nature of the complaint [45, 58]. There are several levels of probing before the symptom ultimately is considered "medically unexplained". The probe questions started with establishing clinical severity with respect to significance (criterion A [4]). A symptom was considered clinically significant if any of the following conditions are met: (1) the symptom prompts help-seeking behavior with a medical doctor or (2) another health professional; (3) medication was taken more than once for it; or (4) the symptom interfered substantially with life or activity.

The next probe questions targeted whether any somatic/substance-related factors might explain the occurrence of the symptom. If there was at least one significant occasion where the symptom was

not entirely explained by medical diagnosis, use of medication or drugs, injuries, or combinations of these, the symptom was rated as unexplained (or somatoform).

If at least one painful condition was found to be present as clinically relevant, further questions were asked to assess the diagnosis of DSM-IV pain disorder (criterion B [4]): (1) Did the pain ever last for a period of at least six months? (2) Did the pain ever prevent you for a period of six months from meeting your friends and family and from doing your work? (3) How strongly did the pain interfere with your life and activities (a little, a lot, or very much)? If the respondent acknowledged impairment for six months or at least a substantial interference with daily living, the diagnosis of DSM-IV pain disorder was given.

For the main diagnostic category "any somatoform disorder", the retest reliability of the M-CIDI (1 week) as well as validity (concordance of interview and clinician's diagnoses in a clinical sample) were lower compared to depressive and anxiety disorders but still acceptable (kappa = 0.50–0.62 [42, 58, 59]).

■ **Mental disorders.** The following DSM-IV mental disorders were considered for the subsequent analysis: dependence and abuse of alcohol/illicit substances, mood disorders (major depression, dysthymia, bipolar disorders), and anxiety disorders (panic disorder, social phobia, any specific phobia, generalized anxiety disorder (GAD), obsessive-compulsive disorder). The temporal relation among disorders in comorbid cases was assessed by using retrospective, self-reported ages-of-onset data.

■ **Sociodemographic correlates, impairment, and health-care utilization.** The following sociodemographic correlates of DSM-IV pain disorder were examined: sex, age, marital status, education, employment status, and social class (derived from information on education, income and current (job) position [50]). Impairment was examined first by the self-reported number of disability days in terms of being unable to carry out usual daily activities within the past 12 months. Second, health-related quality of life (SF-36 [12, 50]) was presented as a physical and a mental health score (standardized to M = 50, SD = 10). The assessment of health-care utilization included self-reported data on primary care visits, consultations with specialists (12 domains, including neurologists, psychiatrists, and psychologists), and days spent in hospital within the past 12 months.

Analytic strategy

Statistical analyses were done with the STATA software package, version 8.0 [46]. Presented prevalence estimates (N, %) were calculated with the data weighted for age, gender, region, and screening status in order to address different sampling probabilities and systematic nonresponse [26]. Multinominal logistic regression models (odds ratios with 95 % confidence intervals) were used to quantify associations between DSM-IV pain disorder and several covariates (e. g., comorbid mental disorders, sociodemographic correlates). Associations with count variables (e. g., impairment days, number of comorbid disorders) were assessed with mean ratios (MRs) from negative binomial regression [25, 33]. MRs meet the positively skewed distribution of infrequent events and reflect the change in the expected count of a particular event per unit-increase in the covariate. For SF-36 (mental health) and SF-36 (physical health), the inversed ratios from a gamma regression were used to determine size and statistical significance of the differences among groups. All comparisons were controlled for age.

Table 2 Diagnostic criteria for DSM-IV pain disorder

A. Pain in one or more anatomical sites is the predominant focus of the clinical presentation and is of sufficient severity to warrant clinical attention.
B. The pain causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
C. Psychological factors are judged to have an important role in the onset, severity, exacerbation, or maintenance of the pain.
D. The symptom or deficit is not intentionally produced or feigned (as in Factitious Disorder or malingering).
E. The pain is not better accounted for by a Mood, Anxiety, or Psychotic Disorder and does not meet criteria for Dyspareunia.
Code as follows:
307.80 Pain Disorder Associated with Psychological Factors
307.89 Pain Disorder Associated with Both Psychological Factors and a General Medical Condition
Note: The following is not considered to be a mental disorder and is included here to facilitate differential diagnosis: Pain Disorder Associated with a General Medical Condition
Specify if:
Acute: duration of less than 6 months
Chronic: duration of 6 months or longer

Results

Prevalence of pain symptoms and DSM-IV pain disorder

Table 3 shows 12-month prevalences of pain symptoms considered as being clinically significant and medically

Table 3 The 12-month prevalence of clinically significant, medically unexplained pain symptoms and DSM-IV pain disorder in the general population (GHS-MHS; age: 18–65; total: N = 4.181; men: N = 2.107; women: N = 2.074)

	Total sample		Men				Women			
	N	%	total %	18–34 %	35–49 %	50–65 %	total %	18–34 %	35–49 %	50–65 %
Symptom level										
Clinically significant, medically not explained pain symptoms[1]										
Excessive abdominal pain	348	8.3	6.4	8.4	5.9	4.4	10.3	12.4	10.0	8.5
Excessive back pain	355	8.5	6.7	6.4	7.5	6.2	10.3	7.3	13.0	10.7
Joint pain	299	7.2	5.9	4.8	4.9	8.2	8.5	4.1	8.7	12.8
Limb pain	142	3.4	2.4	1.7	2.4	3.4	4.4	2.5	4.1	6.8
Chest pain	252	6.1	6.0	3.9	6.8	7.5	6.1	4.4	6.5	7.6
Excessive headache	529	12.7	8.2	8.4	9.0	8.8	16.7	18.5	15.2	16.2
Excessive painful menstruation	341	–	–	–	–	–	16.4	21.6	14.3	13.2
Rectal and genital pain	67	1.6	1.4	1.7	1.0	1.4	1.9	1.6	2.3	1.7
Any other pain	27	0.6	0.5	0.1	0.6	0.8	0.8	0.4	1.2	0.8
Any clinically significant, medically not explained pain symptom[2]	1523	28.3	22.4	22.1	23.7	21.3	34.2	36.6	32.9	33.1
Proportion of subjects with pain in one or more sites										
one		67.9	78.3	77.8	81.6	75.0	61.0	66.7	56.9	58.5
two		22.7	15.4	14.2	14.8	17.7	27.6	25.4	31.0	26.5
three		6.5	4.9	7.3	2.4	5.1	7.6	4.2	8.8	10.1
four or more		2.9	1.4	0.7	1.3	2.2	3.9	3.7	3.3	4.8
Diagnostic level										
DSM-IV pain disorder[3]	340	8.1	4.3	4.0	4.5	6.4	11.4	11.2	12.2	10.7
Proportion of subjects with pain in one or more sites										
one		45.0	46.6	61.9	30.2	48.6	44.3	56.4	44.1	31.3
two		32.4	32.5	20.9	50.1	26.8	32.4	25.7	38.5	32.6
three		14.5	16.8	14.2	16.1	19.2	13.6	11.3	9.4	21.0
four or more		8.1	4.2	14.5	3.7	5.4	9.7	6.7	8.0	15.2

[1] Rated by the interviewer as not the result of somatic condition, injury, medication, or drug use; at least mild impairment

[2] At least one of the somatoform pain symptoms above (DSM-IV criteria A and C) without meeting criterion B for pain disorder

[3] Significant impairment by at least one pain symptom for at least six months (DSM-IV criterion B); rates without diagnostic exclusion rules (non-hierarchical); if the full diagnostic differential criteria were applied (hierarchical: exclusion if somatization disorder or undifferentiated somatization disorder/Somatic Symptom Index (SSI4.6) according to Escobar et al. [17] was present), rates would be as follows: total sample: 6.4 % (N = 268), men: 3.9 % (N = 82), women: 8.9 % (N = 185)

unexplained, as well as DSM-IV pain disorder in the general population. All pain symptoms as well as DSM-IV pain disorder were more frequent in women. Excessive headache was the most frequent painful condition (total sample: 12.7 %; men: 8.2 %; women: 16.7 %), consistent over all age groups. Abdominal pain and excessive back pain were also often reported (total: 8.3 % and 8.5 %, respectively); in women, excessive, painful menstruation was very common, peaking at age 18–34 with 21.6 %.

Of the sample, 28 % (men: 22.4 %; women: 34.2 %) reported at least one pain symptom without meeting criteria for DSM-IV pain disorder, and 8.1 % met the criteria for DSM-IV pain disorder (men: 4.3 %; women: 11.4 %). If the exclusion criteria of somatization disorder or undifferentiated somatization disorder/Somatic Symptom Index (SSI4.6) according to Escobar et al. (1989) [17] were applied, the number decreased to 6.4 % (men: 3.9 %; women: 8.9 %). If the diagnosis of DSM-IV pain disorder was given, in most cases (55 %) multiple pain symptoms were reported; 8.1 % reported four or more symptoms. If clinically significant, medically un-explained pain symptoms were present, men reported a pure pain symptom more often than did women (78.3 % vs. 61 %); in DSM-IV pain disorder, the number of combined symptoms was about the same in men and women except for the category of four or more symptoms, which was more frequent in women (9.7 % vs. 4.2 %).

We also examined the prevalence of DSM-IV pain disorder by pain site (not shown in Table 3), revealing that in the total sample, 3.8 % had a DSM-IV pain disorder associated with excessive headache, 2.3 % with excessive back pain, 2.1 % with excessive abdominal pain, 1.9 % with joint pain, 1.5 % with chest pain, 1.3 % with limb pain, and 0.3 % with rectal and genital pain or other pain.

■ Association of pain with mental disorders

We examined the prevalence of major comorbid diagnostic subgroups and the mean number of 12-month disorders in the groups having (a) no pain symptoms, (b) any clinically relevant pain symptom, and (c) DSM-

IV pain disorder. As compared to subjects without pain symptoms, rates for mental disorders were strongly elevated in subjects meeting criteria for DSM-IV pain disorder, with GAD (7.1%; OR = 7.31; CI: 4.32–12.37) and dysthymia (16.7%; OR = 5.63; CI: 4.01–7.92) being the most elevated comorbid diagnoses. Substance-use disorders tended also to be more frequent in subjects with DSM-IV pain disorder (men: 9.9% vs. 6.4% without pain symptoms; women: 3.1% vs. 1.7%), but this increase in frequency did not reach statistical significance. In subjects with DSM-IV pain disorder, 56% met the diagnostic criteria for any other 12-month disorder (vs. 33.5% without pain disorder; OR = 2.56; CI: 1.96–3.35) and showed a mean number of 2.4 comorbid 12-month disorders (vs. 1.6; MR = 1.48; CI: 1.36–1.62). Having more than one pain symptom increased the comorbidity with all examined mental disorders, even significantly for any 12-month disorder, mean number of 12-month disorders, and any anxiety disorder.

Because of noticeable sex differences in comorbidity rates, comorbid pain symptoms and DSM-IV pain disorder are presented separately for men and women (Table 4). Women showed higher prevalence rates of all disorders as well as higher comorbidity rates in cases with any pain symptom (except for any substance abuse/dependence). The increase of additional diagnoses with vs. without pain disorder was higher in males, especially for GAD (men: 8%; OR = 13.00; CI: 5.12–31.10 vs. women: 6.7%; OR = 4.91; CI: 2.58–9.33). Further analyses of depressive symptom patterns in persons with and without pain disorder revealed a slightly greater number of depressive symptoms in men than in women; this increase was not specific to somatic symptoms because cognitive and affective symptoms were significantly elevated as well (not presented in tables).

In an examination of the prevalence of DSM-IV pain disorder by pain site (not shown in Table 4), joint and limb pain were found to be highly comorbid with mental disorders compared to the other pain symptoms under consideration. DSM-IV pain disorder associated with limb pain showed the greatest comorbidity with any 12-month disorder (81.3%; OR = 3.60; CI: 1.64–7.90), especially in men (84.4%; OR = 5.37; CI: 1.36–21.20). In contrast, DSM-IV pain disorder associated with excessive back pain showed relatively lower comorbidity rates.

■ Correlates and effects of pain syndromes and pain disorder on impairment and health-care utilization

■ **Sociodemographic correlates.** Sociodemographic correlates for DSM-IV pain disorder were found to be female sex (OR = 2.48; CI: 1.92–3.20) and unemployment compared to working fulltime (OR = 2.10; CI: 1.37–3.22). Subjects from the lower social class showed elevated rates compared to those of medium or high social class (OR = 1.48; CI: 1.07–2.06).

■ **Impairment and health care utilization.** Table 5 shows (1) impairment in terms of number of disability days and quality of life and (2) different domains of health-care utilization in subjects with any pain symptom and DSM-IV pain disorder. Because we found no significant sex differences (although men tended to have more disability days and visits with specialists and primary care visits), results are shown for the total sample.

The diagnosis of DSM-IV pain disorder is significantly associated with impairment and health-care utilization for all variables under consideration. Whereas subjects having no pain symptoms and any clinically significant pain symptom reported fewer disability days than did the total sample (12.9), the mean number of disability days was significantly increased in subjects with diagnosed DSM-IV pain disorder (29.7; MR = 2.55; CI: 1.99–3.27).

Quality of life with regard to mental health (SF-36) was significantly reduced in subjects with any pain symptom; this effect was much stronger in subjects with DSM-IV pain disorder. The physical component of the SF-36 was decreased only in DSM-IV pain disorder.

The mean numbers of visits in general practice, specialist visits, and number of days in hospital were increased in subjects with any pain symptom, and even more in those with a diagnosis of DSM-IV pain disorder (e.g., number of days in hospital: 2.6; MR = 1.91; CI: 1.28–2.84). Findings were not as pronounced but still significant after having been controlled for duration of pain or comorbidity with mental disorders and somatic conditions. To check whether the effects were better explained by comorbidity than pain itself, we conducted the same analyses for pure DSM-IV pain disorder (43%, N = 148). Effects remained significant for number of disability days and doctor visits (specialists and primary care). In an analysis of pain symptoms separately in subjects with diagnosed DSM-IV pain disorder (not shown in Table 5), the number of pain symptoms was strongly associated with all impairment measures; however, we found no special pain symptom related to increased impairment or health-care utilization in the total sample, either in men or in women.

Discussion

This is to our knowledge the first community study examining the prevalence and selected correlates of medically unexplained and clinically significant pain symptoms as well as pain disorder according to the rigid criteria of DSM-IV. Unlike most other studies, prevalence estimates reported here are based on a careful exploration of the symptom level by use of a standardized diagnostic module administered by clinical interviewers and using an objective, computerized diagnostic analysis. Limitations are (1) a restricted range of pain types assessed, (2) the lack of diagnostic routine medical appraisal of symptoms, (3) the sole reliance on a cross-sectional assessment without chart information, and (4) a

Table 4 Associations with other mental disorders in men and women with any clinically significant, medically unexplained pain symptom or DSM-IV pain disorder: 12-month prevalences and odds ratios of major diagnostic subgroups, mean number of comorbid disorders (GHS-MHS; men: N = 2.102; women: N = 2.079)

Disorders (DSM-IV)	Prevalence in the general population				Prevalence if any clinically significant, medically unexplained pain symptom is present						Prevalence if DSM-IV pain disorder is present					
	Total		Men	Women	Men			Women			Men			Women		
	N	%	%	%	%	OR[5]	95% CI	%	OR[5]	95% CI	%	OR[5]	95% CI	%	OR[5]	95% CI
Any substance																
Abuse/dependence[1]	187	4.5	6.4	1.7	9.4	1.93	0.99–2.28	2.4	1.76	0.92–3.38	9.9	1.59	0.77–3.31	3.1	2.00	0.88–4.55
Any mood disorder[2]	499	11.9	6.7	15.4	9.6	1.19	0.81–1.76	20.5	1.78*	1.39–2.29	30.0	5.48*	3.39–8.87	29.7	2.69*	1.96–3.71
Major depression	347	8.3	4.5	11.2	6.0	1.14	0.71–1.86	15.1	1.78*	1.34–2.37	17.5	4.28*	2.42–7.57	20.8	2.37*	1.66–3.38
Dysthymia	188	4.5	1.8	5.8	4.5	1.58	0.92–2.72	7.4	1.59*	1.08–2.34	19.6	9.75*	5.45–17.46	15.4	3.91*	2.56–5.94
Any anxiety disorder[3]	604	14.5	6.6	19.8	12.3	1.55*	1.11–2.19	26.7	1.88*	1.51–2.35	32.8	5.65*	3.56–8.94	36.5	2.69*	2.12–3.62
Panic disorder	98	2.3	0.7	3.0	3.2	2.62*	1.28–5.37	4.6	2.09*	1.29–3.37	9.0	7.35*	3.36–16.09	7.8	3.45*	2.83–5.87
GAD	63	1.5	0.5	2.1	1.1	1.19	0.46–3.08	2.7	1.64	0.88–3.04	8.0	13.00*	5.12–33.11	6.7	4.91*	2.58–9.33
Social phobia	82	2.0	1.0	2.7	1.2	0.90	0.33–2.49	3.1	1.27	0.74–2.17	7.3	7.99*	3.27–19.55	6.3	3.01*	1.62–5.60
Specific phobia	318	7.6	3.4	10.8	6.3	1.61	1.00–2.59	15.4	1.97*	1.49–2.61	12.5	3.41*	1.82–6.35	18.8	2.14*	1.51–3.11
Any 12-month disorder (without pain)[4]	1152	27.6	18.2	31.9	31.7	1.76*	1.35–2.01	43.2	2.16*	1.77–2.63	59.0	5.52*	3.52–8.65	55.4	3.05*	2.27–4.10
	Mean		Mean	Mean	Mean	MR[6]	95% CI	Mean	MR[6]	95% CI	Mean	MR[6]	95% CI	Mean	MR[6]	95% CI
Mean number of 12-month disorders[4]	0.6		0.3	0.7	0.5	1.26*	1.01–1.56	0.8	1.23*	1.06–1.43	2.4	7.90*	6.60–9.47	2.3	4.81*	4.23–5.49

[1] Alcohol or illicit substances, without nicotine
[2] Major depression, dysthymia or any bipolar disorder
[3] Panic disorder (with/without agoraphobia), generalized anxiety disorder (GAD), any phobia, obsessive-compulsive disorder
[4] Any 12-month diagnosis other than pain disorder (i. e., any comorbid disorder)
[5] Odds ratios (OR) from multinominal logistic regression and 95 % confidence intervals (CI); controlled for age; reference group: not having the condition under consideration (any clinically significant pain symptom, DSM-IV pain disorder)
[6] Mean ratios (MR) from negative binominal regression and 95 % confidence intervals (CI); controlled for age; reference group: not having the condition under consideration (any clinically significant pain symptom, DSM-IV pain disorder)
* P < 0.05

Table 5 Impairment and health-care utilization in participants with no pain symptom, any clinically significant, medically unexplained pain symptom or DSM-IV pain disorder (GHS-MHS; total: N = 4.181)

	Total sample	No clinically significant, medically unexplained pain symptoms			Clinically significant, medically unexplained pain symptoms			DSM-IV pain disorder		
	Mean (SD)	Mean (SD)	Ratio[4]	95% CI	Mean (SD)	Ratio[4]	95% CI	Mean (SD)	Ratio[4]	95% CI
Number of disability days[1]	12.9 (38.4)	11.4 (35.8)	0.72*	0.59–0.86	11.6 (32.3)	0.89	0.73–1.08	29.7 (34.8)	2.55*	1.99–3.27
SF-36 (mental health)[2]	50.5 (8.8)	51.9 (7.8)	0.92*	0.21–0.93	48.7 (9.4)	1.05*	1.03–1.06	45.7 (8.5)	1.11*	1.08–1.13
SF-36 (physical health)[2]	49.2 (8.8)	50.1 (8.8)	0.95*	0.94–0.96	48.8 (8.3)	1.01	0.99–1.02	43.2 (8.5)	1.12*	1.10–1.15
Number of general practice visits[3]	3.0 (4.8)	2.7 (4.1)	0.77*	0.68–0.86	3.3 (5.3)	1.16*	1.02–1.32	4.3 (4.6)	1.46*	1.21–1.75
Number of specialist visits[3]	5.4 (8.8)	4.4 (7.5)	0.65*	0.58–0.72	6.2 (9.6)	1.24*	1.11–1.40	9.4 (8.2)	1.84*	1.57–2.16
Number of days in hospital[3]	1.5 (1.5)	1.3 (6.2)	0.71*	0.52–0.99	1.5 (8.1)	1.10	0.74–1.62	2.6 (6.9)	1.91*	1.28–2.84

[1] Reported number of days being unable to carry out usual activities (within past 12 months)

[2] SF36 [10, 47] sum scores mental and physical health (MW = 50, SD = 10)

[3] Self-reported health-care utilization within last 12 months: visits to general practice, visits to specialists (12 domains), days spent in hospital

[4] For count variables (number of disability days, number of doctor visits, inpatient days): Mean ratios (MRs) from negative binominal regression and 95% confidence intervals (CI); controlled for age; reference group: not having the condition under consideration (any clinically significant pain symptom, DSM-IV pain disorder)

For SF-36 (mental health) and SF-36 (physical health): inversed ratio from gamma regression and 95% confidence intervals (CI); controlled for age; reference group: not having the condition under consideration (any clinically significant pain symptom, DSM-IV pain disorder); for interpretation: a significant ratio of > 1 indicates a decrease of health related quality of life

* p < 0.05

restricted age range. Respondents older than 65 years were not considered because the psychometric properties for such interview tools in older populations have not yet been established [30].

■ **Prevalence of pain.** Even with our more stringent complex interview approach, medically unexplained and clinically significant *symptoms of pain* were found to be a highly prevalent phenomenon in the general population: 22% of all males and 34% of all females reported having experienced at least one such problem during the past 12 months. Consistent with previous findings [e.g., 35, 40] excessive headache, abdominal pain, excessive back pain, and painful menstruation in women were the most frequent painful conditions in the total sample as well as in subjects with diagnosed DSM-IV pain disorder. Prevalence rates for specific pain types ranged from 0.6% (other, not specified pain) to 13% (excessive headache). Although similar high frequencies have been reported elsewhere [e.g., 1, 13, 15, 16, 21], direct comparisons with previous studies are difficult and restricted because most studies used a different range and scope of symptoms [14].

Using the DSM-IV diagnostic criteria, the study findings revealed that one out of four subjects with pain symptoms also met the criteria for *DSM-IV pain disorder*. The 12-month prevalence estimates of 8% (men: 4%; women: 11%) make this the most prevalent of all 12-month mental disorders in the general population. This estimate lies between the much higher rates of questionnaire-type studies and the lower rates of psychiatric diagnostic investigations.

Because there is still a lack of consensus with regard to uniformly accepted definitions and assessments of pain and a dearth of coherent theoretical and methodological evidence, diagnoses based on DSM-IV criteria are a reasonable methodological refinement, for exam-

ple, by facilitating comparisons of prevalence rates across different studies [14, 29]. In this regard it has to be kept in mind that neither DSM-IV nor epidemiological research conceptualize mental disorders as nosological entities with clear-cut boundaries. This is a basic problem in our current research practice for which there are no solutions yet. Although it is claimed that the criteria offer the best comprehensive reliable diagnosis and classification of pain – regardless of the pain manifestation – available today, Sullivan [47] criticizes DSM-IV pain disorder as "a diagnosis of exclusion", providing neither clear criteria for diagnosis nor implications for therapy, indicating that we are still not close to a perfect method of diagnosing this condition.

■ **Association of pain with other mental disorders.** 56% of the cases with DSM-IV pain disorder met the criteria of at least one other mental disorder. Findings confirm that comorbidity seems to be the rule rather than the exception [54, 55]. DSM-IV pain disorder revealed high comorbidity rates in particular with depressive (30%) and anxiety disorders (35%). The novelty of this finding lies in the fact that it provides evidence for the presence of full-blown threshold mental disorders with DSM-IV pain disorder and not merely an association with syndromes. In longitudinal studies, pain and major diagnostic subgroups showed a bidirectional association, with a prevalent prior onset of pain in comorbid cases with depressive and substance-use disorders [11, 18, 35, 37]. We did not report temporal patterns here because of methodological limitations (age of onset was assessed only retrospectively), but our data are consistent with these findings (e.g., pain as the primary condition in 75% of pain cases comorbid with depression, supporting the hypothesis of depression being a consequence of pain).

The association with depressive disorders is well doc-

umented [e. g., 7, 13, 21, 24, 40, 49], but the exact mechanism has not yet been properly established [6, 39]. Since most of this knowledge can be drawn from clinical studies, further research should examine cognitive and behavioral factors in this association as well as shared psychopathological mechanisms and pathways that are consistent in particular with the consequence hypothesis. However, for the subgroup of comorbid cases without an earlier onset of threshold pain disorder, other mechanisms might be applied. Pain symptoms that exist for a long time without fulfilling the criteria for pain disorder can, for example, achieve a completely different quality (e. g., decreased pain tolerance) in the context of a major depressive episode without necessarily "causing" the depression or "being caused" by the depression; additionally, a predisposition to depressive symptoms may increase the likelihood for the development of a full-blown depression in some pain patients. These kind of mechanisms correspond to the "scar hypotheses" that is supported in several studies [18].

Current treatment strategies for pain do include some components that are used in depression treatment as well (e. g., establishment and maintenance of positive activities, increasing self-functioning), but overall the frequent comorbidity seems not to be adequately covered. It can be assumed already under current conditions – even though the interplay between pain and comorbid mental disorders is not yet satisfactorily explained – that it is important to include and implement knowledge about the comorbidity of pain more explicitly in treatment.

■ **Gender differences.** Women showed higher rates of all pain symptoms examined, DSM-IV pain disorder, and number of combined pain symptoms. If the diagnosis of DSM-IV pain disorder is given, men show significantly higher comorbidity rates for all mental disorders, with GAD and dysthymia being the most frequent comorbid disorders. The association of pain disorder with other mental disorders was more pronounced in males (e. g., mood disorders: 7 % without vs. 30 % with pain disorder) as compared to females (15 % vs. 30 %). This could lead to the assumption that that DSM-IV pain disorder works as a stressor especially in men [see also 19, 23]. It may also be suggested that in terms of a "masked" depression [9], men report more somatic symptoms because of an inability to communicate depressive feelings. This view is not supported by closer analyses of depressive symptom patterns: the number of somatic symptoms of depression were more elevated in men than in women, but this increase was not specific to somatic symptoms because in comorbid cases cognitive and affective symptoms were significantly elevated as well.

■ **Impairment and health-care utilization.** Pain was associated with extraordinary rates of disability days, substantially reduced physical and mental well-being, and highly increased rates of health-care utilization in several different domains. The associations were already pronounced for any clinically significant pain syndrome and even more pronounced for DSM-IV pain disorder, even exceeding those of depression and anxiety. The commonly reported major effect of comorbidity on impairment for mental disorders in general [e. g., 21, 22] and for pain and depression in particular [6] was confirmed in this study, but disability days and health-care utilization were significantly increased in cases without comorbidities as well. The effects of the diagnosis of DSM-IV pain disorder remained stable after having been controlled for sex, age, duration of pain, or comorbidity with mental and physical disorders, suggesting that DSM-IV pain disorder itself is strongly associated with impairment, decreased self-rated health status, and increased health-care utilization.

■ **Implications.** The value of the data lies in the demonstration that (a) even using stringent diagnostic criteria, 8 % of the general population meet criteria for pain disorder and that (b) pain disorder is associated with high comorbidity of DSM-IV depressive and anxiety disorders (which cannot be explained solely by symptom overlap), as well as reduced rates of quality of life and impairment. The joint effects of high prevalence in all age groups, substantial disability, and reduced quality of life, as well as increased health-services utilization result in a substantial total burden, exceeding that of depression and anxiety. The data further indirectly highlight the considerable degree of unmet need for treatment in patients with pain disorder.

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