

Increased 12-Month Prevalence Rates of Mental Disorders in Patients with Chronic Somatic Diseases

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Key Words

Mental disorders · Depression · Anxiety · Musculoskeletal diseases · Cardiovascular diseases · Neoplasms · Respiratory tract diseases

Abstract

Background: Although it is well established that chronic somatic diseases are significantly associated with a wide range of psychopathology, it remains unclear to what extent subjects with chronic somatic diseases are at increased risk of experiencing mental disorders. The present epidemiological study investigates age- and sex-adjusted 12-month prevalence rates of mental disorders in patients with cancer, and musculoskeletal, cardiovascular and respiratory tract diseases, based on comprehensive physicians' diagnoses and compared with physically healthy probands. **Methods:** Prevalence rates were calculated from two large epidemiological surveys. These studies investigated inpatients and patients from the general population with cancer (n = 174) and musculoskeletal (n = 1,416), cardiovascular (n = 915) and respiratory tract diseases (n = 453) as well as healthy controls (n = 1,083). The prevalence rates were based on the Munich Composite International Diagnostic Interview, a standardized interview for the assessment of mental disorders. **Results:** Prevalence rates were very similar for inpatients (43.7%) and

patients from the general population (42.2%). The adjusted odds ratios (OR) of patients with chronic somatic diseases were significantly elevated for mental disorders in comparison with healthy probands (OR: 2.2). Mood, anxiety and somatoform disorders were most frequent. The prevalence rates did not differ significantly between the somatic index diseases. The number of somatic diseases per patient had a higher association with mental disorders. **Conclusions:** There is a strong relationship between chronic somatic diseases and mental disorders. A future task is to improve the care of mental disorders in patients with chronic physical illness, specifically with multimorbid conditions.

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A close relationship has consistently been reported between somatic diseases, mental disorders and the negative impact of comorbid mental disorders on mortality, quality of life and health costs [1–7]. Although many patients with chronic somatic diseases suffer from mental disorders [8–16], the extent to which patients with chronic somatic diseases are, in general, at increased risk of experiencing mental disorders remains unexplored.

Only a small number of studies have shown that prevalence rates of mental disorders adjusted for demographic variables (e.g. age and sex) are higher in patients with

chronic somatic diseases than in a physically healthy comparison group. Most of these studies focused on specific somatic diseases, e.g. asthma, cancer, chronic spinal pain and atherosclerosis [9, 10–14], while others focused on certain mental disorders such as somatoform or affective disorders [8, 13]. The only study to comprise a broader range of somatic diseases and mental disorders was the NIMH Epidemiologic Catchment Area Study [16], but this study had several limitations: (1) it was based on DSM-III criteria and focused only on the categories ‘affective disorders’, ‘anxiety disorders’ and ‘substance-related disorders’; (2) diagnoses of chronic somatic diseases originated only from patients’ self-evaluations and were not based on physicians’ diagnoses; (3) patients were selected from the general population, and therefore did not include inpatients.

In the present study, for the first time, the frequency of mental disorders in patients with somatic diseases diagnosed by physicians in comparison with physically healthy probands will be investigated. The following 4 questions will be addressed:

- 1 Do prevalence rates of mental disorders differ between patients from different settings (inpatient setting vs. general population)?
- 2 What are the age- and sex-adjusted 12-month prevalence rates of mental disorders according to DSM-IV in patients with frequent chronic somatic diseases (musculoskeletal diseases, cardiovascular diseases, respiratory tract diseases and cancer)?
- 3 Do prevalence rates of mental disorders differ between musculoskeletal diseases, cardiovascular diseases, respiratory tract diseases and cancer?
- 4 Is somatic comorbidity associated with the prevalence of mental disorders?

Methods

Study Design and Samples

Patients with chronic somatic diseases and healthy probands were selected from the German National Health Interview and Examination Survey Mental Health Supplement (GHS-MHS) and the Epidemiology of Mental Disorders in Medical Rehabilitation Study (EMDMR). Both studies were based on epidemiological sampling procedures. The 2-stage cross-sectional design included (1) the screening of representative population samples and (2) stratified random sampling of probands for diagnostic interview.

(a) The GHS-MHS was the first nationwide epidemiological study of mental health carried out in the adult general population in Germany [17, 18]. The data collection for the GHS-MHS was based on a 2-stage procedure: first, all participants of the GHS Core Survey (n = 7,124) were screened for mental disorders using the screening questionnaire [19] of the Munich Composite Inter-

national Diagnostic Interview (M-CIDI) and diagnosed as having a somatic illness. The somatic examination took place in special centers at the study sites and began with a self-report questionnaire to evaluate the subjects’ current and past somatic symptoms and complaints, health care utilization, impairments and disabilities. Completion of the questionnaires was followed by a structured interview conducted by a study physician in order to reexamine and refine the data from the self-report packet. This interview was computer assisted for standardization and integrity purposes (computer-aided personal interview). Diagnoses were then supplemented and, depending on the medical condition, revised on the basis of laboratory test data, which were available 2 weeks later. The mean duration of the overall assessment was 2 h [10].

Second, all participants who screened positively according to the screening interview of the M-CIDI and 50% of those who screened negatively were examined by means of a standardized clinical interview for mental disorders (M-CIDI; n = 4,181 [17]). All probands of the GHS-MHS with diagnosed cancer or musculoskeletal, cardiovascular or respiratory tract diseases present within the previous 12 months were included in this study (n = 1,662).

The physically healthy comparison group included all probands of the GHS-MHS who were not diagnosed as having 1 of the 4 somatic index diseases or any other chronic somatic disease within the previous 12 months (n = 1,083).

(b) The EMDMR Study examined the frequency of mental disorders among inpatients with cancer or musculoskeletal, cardiovascular or respiratory tract diseases. The sample originated from 16 German inpatient rehabilitation centers. Patient recruitment was based on a 2-stage procedure analogous to the sampling procedure of the World Health Organization study on mental illness in general health care [15]: all newly admitted patients were screened by means of the General Health Questionnaire (GHQ; n = 2,902 [20]). Ten percent of low GHQ-12 scorers (0–4), 30% of medium GHQ-12 scorers (5–7) and 50% of high GHQ-12 scorers (8–12) were then selected randomly for the standardized clinical M-CIDI (n = 648 [21]). All inpatients passed through a comprehensive diagnostic procedure based on the patients’ admission reports, laboratory test data and a complete physical examination. Physicians were instructed to document all diagnoses according to ICD-10 using a standardized medical chart. This procedure was very similar to the physicians’ interview (computer-aided personal interview) used in the GHS.

Assessment and Interviewers

In both epidemiological studies, mental disorders were assessed using the M-CIDI in the DIA-X version [22]. It enables a reliable and efficient assessment of symptoms, syndromes and diagnoses of mental disorders, along with information about age of onset, duration of symptoms and clinical and psychosocial severity. The main advantages of this procedure are its high objectivity and test-retest reliability (κ : 0.56–0.78 [22]). The M-CIDI was used to determine the presence of substance abuse/dependence, mood, anxiety and somatoform disorders according to DSM-IV criteria. All interviewers were clinically experienced psychologists, physicians or other health professionals. The interviewers received standardized interview training for conducting the M-CIDI interviews, consequently warranting a high reliability. Interviewers were monitored closely and supervised by trained M-CIDI clinical supervisors [17, 21].

Table 1. Sex- and age-adjusted 12-month prevalence rates of DSM-IV mental disorders in patients from two different samples (inpatients and patients from the general population) in comparison with healthy probands

	Inpatients (n = 648)			General population (n = 1,662)			Healthy (n = 1,083) %
	%	OR	95% CI	%	OR	95% CI	
Total ¹	43.7	2.3*	1.8–3.0	42.2	2.2*	1.8–2.7	25.0
Mood disorders	23.2	2.9*	2.1–4.1	20.5	2.5*	1.9–3.3	9.4
Anxiety disorders	24.3	2.5*	1.8–3.4	22.5	2.2*	1.7–2.9	11.6
Somatoform disorders	10.7	2.0*	1.3–3.0	16.6	3.3*	2.3–4.6	5.7
Substance use disorders ²	3.9	0.7	0.4–1.4	7.9	1.5	1.0–2.4	5.3
More than one disorder	18.0	2.9*	2.0–4.2	21.8	3.7*	2.7–5.0	7.1

* $p < 0.01$ (two-tailed). CI = Confidence interval. OR are based on the adjusted prevalence rates of the healthy comparison group.

¹ At least one of the mentioned disorders.

² Excluding nicotine dependence.

Data Analysis

The data analysis was completed using Stata Statistical Software® [23]. Statistical weighting procedures were used to compensate for the oversampling of probands [17, 21]. For example, with regard to the GHS-MHS, screen negatives received twice the weight of screen positives. The average weight was set to 1 [17]. Analogous sampling weights were calculated for patient subgroups with high, medium or low GHQ scores within the EMD-MR study [21]. Within the GHS-MHS, subjects were further weighted to adjust the sample to match the age, sex and regional distribution of the national administrative statistics in Germany [17]. These weighting procedures allow for representative analyses for both the inpatient sample and the general population sample. The weighted distribution of 12-month mental disorders (yes/no) in somatically ill sample patients was compared with the healthy comparison group by logistic regression, controlling for age and sex. Regression coefficients were transformed to odds ratios (OR). Based on the weighted 12-month prevalence rates of the physically healthy comparison group, prevalence rates of somatically ill patients were calculated using the estimated OR. Thus, one would expect prevalence rates of mental disorders to be illustrated in the physically ill samples if their age and sex distribution corresponded with the distribution in the healthy sample. In order to carry out a correct weighting and stratification of the random samples, the Stata SVY (survey) commands were used. These commands enable an adequate handling of weighted and stratified data. Between-patient-group comparisons were conducted via the logistic regression using a postestimator (lincom), which enables a comparison of coefficients on significant differences.

Results

The total sample consisted of 3,393 probands, who were interviewed using the standardized clinical interview. A total of 2,310 probands entered the patient group,

manifesting at least 1 of the index diseases within the previous 12 months. During the same period, 1,083 probands were physically healthy. The mean age of the healthy probands was 36.3 years, and 40.6% were female. The mean age of the chronically ill probands was 49.8 years, and 49.3% were female.

The following 12-month prevalence rates of mental disorders are adjusted for age and sex. We excluded further sample characteristics that may confound the prevalence rates of mental disorders. More detailed characteristics comprising marital status, education, income and employment status of all 8 samples (patients in general, healthy controls, 4 disease groups, 2 settings) are available on request.

Question 1

Inpatients (43.7%; OR: 2.3) and patients from the general population (42.2%; OR: 2.2) showed a similarly increased risk of having any mental disorder compared with healthy probands (table 1). The increased risk was mainly due to significantly higher prevalence rates of mood disorders, anxiety disorders and somatoform disorders in both patient samples. There were no significant differences between inpatients and patients from the general population regarding prevalence rates of mood disorders (OR: 1.2; confidence interval, CI: 0.9–1.5), anxiety disorders (OR: 1.1; CI: 0.9–1.4), any mental disorders (OR: 1.1; CI: 0.9–1.3) or the number of comorbid mental disorders (OR: 0.8; CI: 0.6–1.0). Somatoform disorders (OR: 0.6; CI: 0.4–0.8) and substance-related disorders (OR: 0.5; CI: 0.3–0.9) were significantly more frequent in

Table 2. Sex- and age-adjusted 12-month prevalence rates of DSM-IV mental disorders in patients with a chronic illness in comparison with healthy probands

	Patients (n = 2,310)			Healthy (n = 1,083) %	Cancer (n = 174)			MSD (n = 1,416)			CVD (n = 915)			RTD (n = 453)		
	%	OR	95% CI		%	OR	95% CI	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI
Total ¹	42.5	2.2**	1.8–2.7	25.0	36.8	1.7*	1.1–2.7	45.3	2.5**	2.0–3.1	40.7	2.1**	1.5–2.7	42.1	2.2**	1.7–2.9
Mood disorders	21.1	2.6**	1.9–3.4	9.4	19.6	2.4**	1.3–4.2	20.4	2.5**	1.8–3.4	18.4	2.2**	1.5–3.3	22.7	2.8**	2.0–4.1
Anxiety disorders	22.9	2.3**	1.7–2.9	11.6	18.5	1.7*	1.0–3.0	23.4	2.3**	1.8–3.1	22.4	2.2**	1.5–3.1	24.5	2.5**	1.8–3.5
Somatoform disorders	15.3	3.0**	2.1–4.2	5.7	9.1	1.7	0.7–3.8	18.0	3.6**	2.5–5.2	13.3	2.5**	1.6–4.1	14.0	2.7**	1.7–4.2
Substance use disorders ²	7.0	1.3	0.9–2.1	5.3	4.8	0.9	0.2–3.3	6.7	1.3	0.8–2.1	8.4	1.6	0.8–3.1	7.3	1.4	0.8–2.5
More than one disorder	20.9	3.5**	2.6–4.8	7.1	16.6	2.6**	1.3–5.2	20.8	3.5**	2.5–4.8	20.4	3.4**	2.2–5.2	23.7	4.1**	2.8–6.0

* $p < 0.05$, ** $p < 0.01$ (two-tailed). MSD = Musculoskeletal diseases; CVD = cardiovascular diseases; RTD = respiratory tract diseases. OR are based on the adjusted prevalence rates of the healthy comparison group.

¹ At least one of the mentioned disorders.

² Excluding nicotine dependence.

patients from the general population. The similar rates of any mental disorder justify a comprehensive analysis of patients versus healthy probands from both samples.

Question 2

The age- and sex-adjusted prevalence rate of mental disorders was significantly higher in patients with chronic somatic diseases (42.5%) compared with physically healthy probands (25.0%; OR: 2.2; table 2). Mood (21.1%) and anxiety disorders (22.9%) were most common in somatically ill patients as well as in healthy probands (9.4%; 11.6%). The prevalence rates of mood (OR: 2.6) and anxiety disorders (OR: 2.3) differed significantly in patients versus healthy probands. The difference between physically ill (15.3%) and healthy probands (5.7%) was found to be most distinct for somatoform disorders (OR: 3.0). The prevalence rate of substance use disorders in patients with chronic somatic diseases (7.0%) did not differ significantly from that of healthy controls (5.3%; OR: 1.3). Furthermore, patients (20.9%) displayed more than one mental disorder significantly more often than healthy probands (7.1%; OR: 3.5).

Question 3

Patients with musculoskeletal (45.3%), cardiovascular (40.7%) and respiratory tract diseases (42.1%) showed comparably increased prevalence rates of mental disorders (table 2). Mood and anxiety disorders were most prevalent in patients who had respiratory tract diseases, whereas somatoform disorders co-occurred mainly in patients with musculoskeletal diseases. Patients with re-

spiratory tract diseases most often had more than one mental disorder. The prevalence rates of anxiety disorders, somatoform disorders and substance use disorders were lowest for cancer patients. Moreover, cancer patients reported a lower rate of mental comorbidity. However, the ORs for any mental disorder were still high in all 4 disease groups when compared with healthy probands.

Question 4

The amount of somatic comorbidity is associated with higher risks for mental disorders. Table 3 shows increased prevalence rates for any mental disorder according to the number of somatic diseases. In comparison with healthy probands, patients with 3 or more somatic diseases, a subgroup accounting for more than half of all physically ill patients, showed the highest increase in prevalence rates of any mental disorders (OR: 2.8). However, prevalence rates of mental disorders still remain significantly increased for patients with only 1 somatic disease, with the exception of substance use disorders.

Discussion

The present study is the first to compare age- and sex-adjusted 12-month prevalence rates of mental disorders in patients with somatic diseases based on physicians' diagnoses compared with healthy probands. The rationale for including a combination of inpatients and patients from the general population was to minimize selection

Table 3. Sex- and age-adjusted 12-month prevalence rates of DSM-IV mental disorders in patients with 1, 2, and more than 2 somatic diseases in comparison with healthy probands

	1 disease (n = 421)			2 diseases (n = 526)			>2 diseases (n = 1,363)			Healthy (n = 1,083) %
	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI	
Total ¹	34.4	1.6**	1.2–2.1	37.9	1.8**	1.4–2.4	48.2	2.8**	2.2–3.5	25.0
Mood disorders	15.5	1.8**	1.2–2.6	19.2	2.3**	1.6–3.3	24.4	3.1**	2.3–4.3	9.4
Anxiety disorders	21.2	2.1**	1.4–2.9	17.0	1.6*	1.1–2.2	26.5	2.8**	2.1–3.7	11.6
Somatoform disorders	9.4	1.7*	1.0–2.8	13.3	2.5**	1.7–3.8	18.8	3.8**	2.7–5.5	5.7
Substance use disorders ²	5.4	1.0	0.5–1.9	6.4	1.2	0.7–2.2	8.3	1.6	1.0–2.6	5.3
More than one mental disorder	15.8	2.5**	1.6–3.8	16.9	2.7**	1.8–3.9	25.3	4.5**	3.2–6.2	7.1

* p < 0.05, ** p < 0.01 (two-tailed). OR are based on the adjusted prevalence rates of the physically healthy comparison group.

¹ At least one of the mentioned disorders.

² Excluding nicotine dependence.

bias, the so-called Berkson's bias [24], which states that samples from the general population are restricted to the noninstitutionalized population.

While 1 in 4 persons without somatic disease reported a mental disorder within the previous year, this percentage was almost twice as high among chronically ill patients. In addition, patients show an OR of 3.5 for having more than one mental disorder. The differences in overall prevalence rates between physically ill patients and healthy probands are due mainly to *higher frequencies* of mood, anxiety, and somatoform disorders (OR: 2.3–3.0). In line with previous studies [10, 11, 14, 16], mood and anxiety disorders are most frequent in physically ill patients. However, while patients often rate the severity of their mood disorder as serious, there is a considerable amount of mild anxiety disorders, and in particular mild specific phobias, which can lead to an overemphasis of the need for treatment of anxiety disorders [25].

Almost as frequent as affective and anxiety disorders are *somatoform disorders*. A small number of epidemiological studies have reported prevalence rates of somatoform disorders [8, 15, 18, 26, 27]. Somatization alone accounts for approximately 16% of the yearly health care expenditure of the USA [28]. However, problems with reliability and validity as well as difficulties in operationalization complicate the measurement of this diagnostic category, particularly in patients with somatic diseases [8, 29, 30]. Patients may be more likely to attribute their symptoms to a somatic factor than healthy probands. Moreover, physically ill inpatients may have a more somatic attribution style than patients from the general population due to their intensive somatic treatment [8]. However, our results underscore the fact that these disor-

ders also occur when they are associated with organic medical illness (see also the current debate on somatoform disorders and DSM-V).

Prevalence rates of *substance disorders* are low compared with previous studies [16]. Beyond different classification algorithms (DSM-III vs. DSM-IV), a possible explanation for the lower prevalence rates may be that inpatients in particular tend to dissimulate their substance-related symptoms. This dissimulation may be due to possible negative consequences of reporting symptoms of substance-related disorders in the context of a primarily somatic treatment environment. Finally, it is well known from international comparisons that substance-related disorders are more frequent in US American samples [31].

Prevalence rates of mental disorders differ significantly between persons who have a chronic somatic disease and those who do not, while there are only slight differences in prevalence rates of mental disorders among the disease groups investigated. However, similar frequencies between disease samples may be attributable to other inherent causes, such as a frequent comorbid somatic disease. Therefore, we calculated additional prevalence rates of mental disorders of patients with the respective index disease compared to those without the index disease, and adjusted for age, sex and number of somatic comorbidities. The OR for mental disorders proved to be very similar between disease groups, highlighting once again the small differences of mental disorders between somatic diseases. However, patients who display more than 2 somatic diseases show an increased risk for mental disorders of 40% in comparison with patients who have just 1 somatic disease.

This investigation tried to overcome the limitations of previous studies by using 2 large, independent samples with the same standardized interview procedure that covers a wide range of mental disorders. Furthermore, comprehensive physician-based medical diagnoses were used rather than self-reports of patients, as was the case in earlier investigations. However, some *methodological issues* should be noted. First, this is a cross-sectional study and therefore cannot demonstrate causal associations between somatic diseases and mental disorders. Moreover, the effect of depression-triggered mortality in some somatic diseases [1, 32] on prevalence rates of mental disorders is not reflected in cross-sectional studies. Second, even though the CIDI is regarded as the gold standard for large epidemiological surveys, there are *limitations in terms of the reliability and validity* of some specific diagnoses [22]. Third, the inpatient sample comprises mainly patients from rehabilitation centers. The similar prevalence rates within the 2 samples suggest, however, that the impact of the setting on prevalence rates of mental disorders is low. Fourth, for reasons of brevity, we used broad categories of somatic diseases. There is literature showing that the strength of association of at least some of these categories may vary depending on the specific diseases included [33, 34]. Therefore, the prevalence rates of mental disorders shown for somatic disease groups in our study should be examined for differences within disease groups (e.g. respiratory tract disease: asthma, chronic obstructive pulmonary disease; cardiovascular disease: hypertension, coronary diseases, myocardial infarction etc.).

The findings underscore the overall *high impact* of comorbid mental disorders in patients with chronic somat-

ic diseases. Unfortunately, comorbid mental disorders often remain unrecognized and untreated [35, 36]. Comorbid mental disorders can negatively influence *patients' adherence* to interventions and *effectiveness of treatment, quality of life, mortality* and *costs of disease and care* [1–7]. Furthermore, psychosocial interventions can improve clinical outcomes in organic diseases [4, 5, 32, 37–39]. Due to the large range of somatic and psychiatric diseases, there are no general recommendations that can be made for effective treatments. However, a recent consensus statement of experts on mood disorders in the medically ill highlighted evidence-based antidepressant and psychotherapy treatments for several medical conditions comprising disease-dependent antidepressants (selective serotonin reuptake inhibitors, tricyclic antidepressants etc.) and cognitive-behavioral therapy [32]. More of these types of approaches are needed, particularly for further frequent disorders such as anxiety disorders.

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