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# Twelve-Month and Lifetime Prevalence of Mental Disorders in Cancer Patients

Susanne Kuhnt[a] Elmar Brähler[a, b] Hermann Faller[c] Martin Härter[d] Monika Keller[e] Holger Schulz[d] Karl Wegscheider[f] Joachim Weis[g] Anna Boehncke[g] Bianca Hund[h, i] Katrin Reuter[i] Matthias Richard[c] Susanne Sehner[f] Hans-Ulrich Wittchen[j] Uwe Koch[d] Anja Mehnert[a, d]

[a]Section of Psychosocial Oncology, Department of Medical Psychology and Medical Sociology, University Medical Center Leipzig, Leipzig, [b]Department of Psychosomatic Medicine and Psychotherapy, University Medical Center Mainz, Mainz, [c]Department of Medical Psychology and Psychotherapy, Medical Sociology and Rehabilitation Sciences, and Comprehensive Cancer Center Mainfranken, University of Würzburg, Würzburg, [d]Department and Outpatient Clinic of Medical Psychology, University Medical Center Hamburg-Eppendorf, Hamburg, [e]Division of Psychooncology, Department for Psychosomatic and General Clinical Medicine, University Hospital Heidelberg, Heidelberg, [f]Department of Medical Biometry and Epidemiology, University Medical Center Hamburg-Eppendorf, Hamburg, [g]Department of Psychooncology, Tumor Biology Center, University Medical Center Freiburg, Freiburg, [h]Rhein-Jura-Klinik, Bad Säckingen, [i]Department of Psychiatry and Psychotherapy, University Medical Center Freiburg, Freiburg, and [j]Institute of Clinical Psychology and Psychotherapy and Center of Clinical Epidemiology and Longitudinal Studies (CELOS), Technical University Dresden, Dresden, Germany

**Key Words**
Mental disorders · Cancer patients · Psycho-oncological interventions

**Abstract**
***Background:*** Psychological problems are common in cancer patients. For the purpose of planning psycho-oncological interventions and services tailored to the specific needs of different cancer patient populations, it is necessary to know to what extent psychological problems meet the criteria of mental disorders. The purpose of this study was to estimate the 12-month and lifetime prevalence rates of mental disorders in cancer patients. ***Methods:*** A representative sample of patients with different tumour entities and tumour stages (n = 2,141) in outpatient, inpatient and rehabilitation settings underwent the standardized computer-assisted Composite International Diagnostic Interview for mental disorders adapted for cancer patients (CIDI-O). ***Results:*** The overall 12-month prevalence for any mental disorder was 39.4% (95% CI: 37.3–41.5), that for anxiety disorders was 15.8% (95% CI: 14.4–17.4), 12.5% (95% CI: 11.3–14.0) for mood disorders, 9.5% (95% CI: 8.3–10.9) for somatoform disorders, 7.3% (95% CI: 6.2–8.5) for nicotine dependence, 3.7% (95% CI: 3.0–4.6) for disorders due to general medical condition, and 1.1% (95% CI: 0.7–1.6) for alcohol abuse or dependence. Lifetime prevalence for any mental disorder was 56.3% (95% CI 54.1–58.6), that for anxiety disorders was 24.1% (95% CI: 22.3–25.9), 20.5% (95% CI: 18.9–22.3) for mood disorders, 19.9% (95% CI: 18.3–21.7) for somatoform disorders, 18.2% (95% CI: 16.6–20.0) for nicotine dependence, 6.4% (95% CI: 5.4–7.6) for alcohol abuse or dependence, 4.6% (95% CI: 3.8–5.6) for disorders due to general medical condition, and 0.2% (95% CI: 0.1–0.6) for eating disorders. ***Conclusions:*** Mental

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Anja Mehnert, PhD
Section of Psychosocial Oncology, Department of Medical Psychology and Medical Sociology, University Medical Center Leipzig
Philipp-Rosenthal-Strasse 55, DE–04103 Leipzig (Germany)
E-Mail anja.mehnert@medizin.uni-leipzig.de

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disorders are highly prevalent in cancer patients, indicating the need for provision of continuous psycho-oncological support from inpatient to outpatient care, leading to an appropriate allocation of direct personnel and other resources.

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## Introduction

Many studies have shown high levels of emotional and psychosocial distress in cancer patients [1–5]. However, it is not well understood yet to what extent psychological problems meet the criteria of a mental disorder according to clinical diagnostic classification systems (ICD-10, DSM-IV/V) [6–8] – particularly with regard to the 12-month and lifetime prevalence. The presence of mental disorders and elevated levels of psychosocial distress in cancer patients can cause serious problems including reduced adherence and participation in medical care, increased mortality, length of hospital stay, more suffering of somatic side effects, and poorer quality of life [9–12].

Valid data about the prevalence of detected clinical diagnoses and thereby discrimination of mental disorders, subsyndromal disorders and mood changes in terms of psychological adaptation to the diagnosis of cancer and its treatment consequences are however essential for the implementation of specialized psychosocial and psychological services within the oncology care system.

Diagnosing mental disorders in oncology care settings is often impeded by a lack of relevant skills to diagnose mental disorders among the medical team, lack of time, unawareness of mental disorders in clinical practice, reluctance of patients to speak about psychological problems and the high variability of the onset of mental disorders [13–15]. Furthermore, it remains unclear whether a particular symptom, such as difficulty concentrating or weight loss, is a consequence of a treatment such as chemotherapy, or a symptom of a mental disorder such as depression.

Previous studies that have investigated the prevalence of mental comorbidity using a clinical psychiatric interview as the 'gold standard' have been limited by relatively small samples predominantly including breast cancer patients [16]. Meta-analyses and reviews furthermore indicate that only few studies have assessed the 12-month and lifetime prevalence of mental disorders in cancer so far [17, 18]. Results of these meta-analyses show a mean 12-month prevalence of 18% for mood disorders, 19% for anxiety disorders and 8% for somatoform disorders with a large variability between studies. Lifetime prevalence rates of 21% for anxiety disorders, 21% for adjustment disorders, 26% for mood disorders, and 16% for somatic disorders have been reported [17, 18].

Recently, we reported the 4-week prevalence of any mental disorder (31.8%; 95% CI 29.8–33.8) as a result of a large representative epidemiological study assessing psychological comorbidity in cancer patients [19, 20]. Given the fact that early diagnosis and advanced multimodal treatments lead to a higher number of cancer survivors and many patients receive long-term treatments, the 12-month prevalence rates are of particular importance for health care planning. Mental disorders could be a long-lasting problem for cancer survivors [21] leading to an increased risk for further somatic and psychological symptom burden.

Today, high-quality cancer care is needed for longer periods of time after diagnosis and primary treatments and should provide comprehensive concepts of psychosocial care considering the continuum of distress including mental disorders distinct from emotional distress [22]. In addition to the 4-week and 12-month prevalence, data on the lifetime prevalence of mental disorders are useful to better evaluate mental comorbidity across various cancer entities in the light of population-based demographic data [23, 24].

Given the potentially adverse effects of a pre-existing or emerging diagnosis of a mental disorder on a variety of treatment outcomes and quality of life in cancer patients, we investigated the 12-month and lifetime prevalence of mental disorders in a representative sample of cancer patients treated in different care settings in order to provide epidemiological data for evidence-based psycho-oncological care planning. We analysed the impact of cancer care settings as well as of basic demographic and medical variables on the 12-month prevalence estimates. Further aims were to provide diagnostically detailed information about the 12-month and lifetime prevalence of mental disorders for patient populations of the most common cancer sites

## Methods

*Study Design and Patients*

We conducted a multicentre, epidemiological cross-sectional study in which we consecutively recruited cancer patients across all major tumour entities and disease stages from acute care hospitals, outpatient cancer care facilities, and cancer rehabilitation clinics in Germany. Individuals were eligible if they had a diagnosis of a malignant tumour; were aged between 18 and 75 years, and able to speak and read German. Approval was obtained from the ethics committees of all participating centres (university medical



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centres of Hamburg-Eppendorf, Freiburg, Heidelberg, Leipzig, and Würzburg, Germany). All participants provided written, informed consent. The study methodology is described in detail elsewhere [19, 25].

Eligible patients were screened with the depression module of the Patient Health Questionnaire (PHQ-9) [26]. Patients with a score of ≥9 were selected for a personal interview with the CIDI-O as was a random sample of those with a PHQ-9 score <9. Using the CIDI-O, we assessed both the 12-month and lifetime prevalence of the following disorders according to the DSM-IV and ICD-10: mental disorders resulting from a general medical condition, substance use disorders (dependence and abuse of alcohol and nicotine), mood disorders (unipolar and bipolar), anxiety disorders (including acute and posttraumatic stress disorder; without obsessive compulsive disorder), somatoform disorders and eating disorders. Schizophrenia and psychotic disorders were not assessed. Cancer-related adjustment disorders were estimated only for the last 4-week period as described elsewhere [19].

*Measures*

We used the PHQ-9 [26], a patient self-report measure for depressive symptoms based on the DSM-IV diagnostic criteria for major depressive disorder, as a screening tool (cut-off point of ≥9) [27].

To estimate the prevalence of mental disorders, we used the standardized computer-assisted CIDI-O [28] that is based on the Munich-Composite International Diagnostic Interview in the DIA-X version and was further developed for our specific study purposes [29]. Further details about the application of the CIDI-O are described elsewhere [19].

*Statistical Analysis*

We calculated prevalence estimates (number of patients, percentage, and SE) with weights to compensate for the oversampling of patients with a PHQ score ≥9. Statistical inference (SEs, CIs, and p values) was based on the Huber-White sandwich estimator of variance [30–32]. Furthermore, a weighted logistic regression model with tumour entity, gender, cancer remission, cancer care settings, age groups and time since cancer diagnosis as predictors for the presence of any mental disorder in the last 12-month was used. Odds ratios and marginal means with corresponding 95% CIs were reported. Nominal p values are reported without correction for multiplicity. Two-sided $p < 0.05$ were considered significant. All analyses were computed using STATA 12.1 (STATA, College Station, Tex., USA).

## Results

*Participants*

A total of 5,889 cancer patients fulfilled the inclusion criteria. 4,020 (68.3%) patients had agreed to participate in the study. Among those, 2,710 patients were selected to be interviewed with the CIDI-O. 569 patients could not be reached (e.g. due to early discharge) or refused participation. In total, 2,141 patients (79.0%) completed the CIDI-O. Of these, 1,103 (51.5%) were female and 1,358 patients (63.4) were married (table 1). The mean age was 57.6 years (range 18–75). We conducted the interviews mostly during inpatient care (43.5%), followed by outpatient care (29.9%) and inpatient rehabilitation (26.6%). The average time since current cancer diagnosis was 13.5 months (range 0–126).

Non-responder analyses showed that study participants were significantly younger, had a higher school education, and were more likely treated in a rehabilitation clinic than during inpatient acute care. Differences in non-responder rates were found between study centres. Furthermore, patients with male genital cancers as well as patients with cancers of the respiratory and intrathoracic organs were significantly more likely to refuse study participation [19].

**Table 1.** Sociodemographic and medical sample characteristics (n = 2,141)

| | |
|---|---|
| *Demographic characteristics* | |
| Mean age ± SD, years | 57.6±11.1 |
| Female | 1,103 (51.5) |
| Married | 1,358 (63.4) |
| Education | |
| High school/university degree | 666 (31.1) |
| Other | 1,475 (68.9) |
| Occupational situation | |
| Employed | 823 (38.4) |
| Retired | 861 (40.2) |
| Other | 457 (21.4) |
| *Medical characteristics* | |
| Setting | |
| Inpatient | 932 (43.5) |
| Outpatient | 640 (29.9) |
| (Inpatient) rehabilitation | 569 (26.6) |
| Tumor entity | |
| Breast | 442 (20.6) |
| Prostate | 318 (14.9) |
| Colon/rectum | 293 (13.7) |
| Lung | 189 (8.8) |
| Female genital organs | 183 (8.5) |
| Haematological cancers | 170 (7.9) |
| Stomach/oesophagus | 85 (4.0) |
| Kidney/urinary tract | 74 (3.5) |
| Head and neck | 67 (3.1) |
| Bladder | 54 (2.5) |
| Pancreas | 52 (2.4) |
| Malignant melanoma | 34 (1.6) |
| Other | 180 (8.5) |
| Mean time since current diagnosis ± SD, months | 13.5±24.9 |

Figures are numbers with percentages in parentheses unless indicated otherwise.



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**Table 2.** Twelve-month and lifetime prevalence of mental disorders (CIDI-O) for the total sample (n = 2,141)[a]

| ICD Code | Mental disorder | 12-month | | | Lifetime | | |
|---|---|---|---|---|---|---|---|
| | | prevalence % | 95% CI | | prevalence % | 95% CI | |
| | | | lower | upper | | lower | upper |
| | *Any mental disorder* | 39.4 | 37.3 | 41.5 | 56.3 | 54.1 | 58.6 |
| | *Any anxiety disorder* | 15.8 | 14.4 | 17.4 | 24.1 | 22.3 | 25.9 |
| | (Panic attack) | 7.6 | 6.6 | 8.8 | 12.5 | 11.2 | 14.0 |
| | (Panic attack with or w/o agoraphobia) | 3.1 | 2.5 | 3.9 | 5.3 | 4.4 | 6.3 |
| F41.0 | Panic disorder w/o agoraphobia | 1.6 | 1.2 | 2.2 | 3.1 | 2.5 | 4.0 |
| F40.01 | Panic disorder with agoraphobia | 1.5 | 1.1 | 2.1 | 2.2 | 1.7 | 2.8 |
| F40.00 | Agoraphobia w/o history of panic disorder | 2.7 | 2.1 | 3.5 | 4.0 | 3.3 | 4.9 |
| | Agoraphobia w/o panic disorder | 3.3 | 2.6 | 4.1 | 5.0 | 4.2 | 6.0 |
| F41.1 | Generalized anxiety disorder | 2.1 | 1.6 | 2.7 | 2.1 | 1.6 | 2.7 |
| F43.1 | Posttraumatic stress disorder | 2.6 | 2.0 | 3.3 | 4.9 | 4.1 | 5.9 |
| F40.2 | Any specific (simple) phobia | 6.8 | 5.8 | 7.9 | 9.6 | 8.4 | 10.9 |
| | Animal type | 1.2 | 0.8 | 1.8 | 1.5 | 1.0 | 2.1 |
| | Natural environment type | 2.8 | 2.2 | 3.6 | 4.9 | 4.1 | 5.9 |
| | Blood-injection-injury type | 2.4 | 1.8 | 3.1 | 3.0 | 2.4 | 3.8 |
| | Situational type | 2.1 | 1.6 | 2.8 | 3.4 | 2.7 | 4.3 |
| | Other type | 0.4 | 0.3 | 0.8 | 0.6 | 0.3 | 1.0 |
| F40.1 | Social phobia | 2.2 | 1.6 | 2.9 | 2.3 | 1.7 | 3.0 |
| F41.9 | Anxiety disorder NOS | 2.3 | 1.8 | 3.1 | 5.4 | 4.5 | 6.5 |
| | *Any mood disorder* | 12.5 | 11.3 | 14.0 | 20.5 | 18.9 | 22.3 |
| F32.x/F33.x | Any major depression (single or recurrent episode) | 10.3 | 9.1 | 11.6 | 18.2 | 16.6 | 19.9 |
| F32.x | Any major depression, single episode | 5.5 | 4.6 | 6.5 | 11.2 | 10.0 | 12.7 |
| F33.x | Any major depression, recurrent episodes | 4.8 | 4.0 | 5.8 | 6.9 | 5.9 | 8.1 |
| F34.1 | Dysthymic disorder | 4.4 | 3.7 | 5.2 | 4.7 | 4.0 | 5.6 |
| | Any single hypomanic or manic episode | 0 | – | | 0 | – | |
| | *Any somatoform/conversion disorder/syndrome* | 9.5 | 8.3 | 10.9 | 19.9 | 18.3 | 21.7 |
| F45.4 | Pain disorder | 4.7 | 3.9 | 5.7 | 10.4 | 9.2 | 11.8 |
| F45.1 | Undifferentiated somatization disorder | 0.2 | 0.1 | 0.5 | 0.3 | 0.1 | 0.7 |
| F45.0 | Somatization disorder | 0 | – | | 0 | – | |
| F44.xx | Conversion disorder | 0 | – | | 0 | – | |
| 45.2 | Hypochondriasis | 0 | – | | 0 | – | |
| | Som./diss. syndrome | 4.7 | 3.8 | 5.7 | 9.4 | 8.2 | 10.8 |
| | Any somatoform/ conversion disorder | 4.7 | 3.9 | 5.7 | 10.4 | 9.2 | 11.8 |
| | Any somatoform/conv. syndrome | 4.8 | 4.0 | 5.9 | 9.7 | 8.5 | 11.1 |
| | *Any disorder due to GMC* | 3.7 | 3.0 | 4.6 | 4.6 | 3.8 | 5.6 |
| F06.3x | Mental disorder due to GMC: depression | 2.2 | 1.7 | 2.8 | 2.7 | 2.1 | 3.4 |
| | Mood disorder due to GMC: mania or mixed mood | 0 | – | | 0 | – | |
| F06.4x | Anxiety disorder due to GMC: | 1.2 | 0.8 | 1.8 | 1.5 | 1.0 | 2.1 |
| | Anxiety disorder with panic attacks due to GMC | 0.4 | 0.2 | 0.7 | 0.5 | 0.3 | 0.8 |
| | Generalized anxiety disorder due to GMC | 0.6 | 0.4 | 1.0 | 0.7 | 0.4 | 1.1 |
| | *Any alcohol abuse or alcohol/nicotine dependence* | 8.1 | 7.0 | 9.4 | 21.8 | 20.1 | 23.7 |
| F10.1/2x | Alcohol abuse or dependence | 1.1 | 0.7 | 1.6 | 6.4 | 5.4 | 7.6 |
| F17.2x | Nicotine dependence | 7.3 | 6.2 | 8.5 | 18.2 | 16.6 | 20.0 |
| | *Any eating disorder* | 0 | – | | 0.2 | 0.1 | 0.6 |
| F50.0 | Anorexia nervosa | 0 | – | | 0 | – | |
| | Atypical anorexia nervosa | 0 | – | | 0 | – | |
| F50.2 | Bulimia nervosa | 0 | – | | 0.1 | 0.0 | 0.4 |
| | Atypical bulimia nervosa | 0 | – | | 0.2 | 0.1 | 0.4 |
| F43.x | *Cancer-related adjustment disorder*[b] | 11.1 | 9.7 | 12.4 | 11.1 | 9.7 | 12.4 |

NOS = Not otherwise specified; GMC = general medical condition; ICD = International Classification of Diseases.

[a] On the basis of the 2,141 CIDI-O interviews, prevalence estimates were calculated for the total sample of 4,020 patients with weights for compensation of the oversampling of patients with a PHQ score ≥9. [b] The prevalence of cancer-related adjustment disorder refers to a 4-week period only.



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*Overall 12-Month Prevalence Estimates*

The 12-month prevalence of mental disorders in cancer patients was 39.4% (35.7% without alcohol abuse/dependency and nicotine dependency). Most prevalent axis I mental disorders were anxiety disorders (15.8%) and mood disorders (12.5%). Within the spectrum of anxiety disorders, specific phobias were most prevalent (6.8%). Table 2 shows the prevalence rates for axis I mental disorders.

*Overall Lifetime Prevalence Estimates*

The overall lifetime prevalence was 56.3% for any axis I mental disorder (47.6% without alcohol abuse/dependency and nicotine dependency). Major groups of mental disorders were anxiety disorder (24.1%), mood disorders (20.5%) and nicotine dependence and/or alcohol dependence/abuse (21.8%) (table 2).

*12-Month Prevalence Estimates by Tumour Entity*

The 12-month prevalence of any axis I mental disorder between distinct tumour entities ranged between 30.4 and 59.2% (online suppl. table; for all online suppl. material, see www.karger.com/doi/10.1159/000446991). Patients with head and neck cancer (59.2%), breast cancer (47.8%), kidney/urinary tract cancer (45.5%) or female genital cancer (45.0%) were most frequently diagnosed with an axis I mental disorder. The lowest prevalence of any axis I mental disorder was found in patients with prostate cancer (26.5%) and pancreas cancer (30.4%) followed by patients with stomach/oesophagus cancer (34.1%) (online suppl. table).

*Lifetime Prevalence Estimates by Tumour Entity*

The highest lifetime prevalence of any axis I mental disorder was found in head and neck cancer patients (69.9%), patients with malignant melanoma (66.1%) and patients with breast cancers (63%). The lowest prevalence of any axis I mental disorder had patients with prostate cancer (47%), pancreas cancer (48.1%), or bladder cancer (50.6%) (online suppl. table).

*12-Month Prevalence Estimates Depending on Demographic and Medical Factors*

Table 3 shows the regression analysis on the impact of demographic and medical factors on the 12-month prevalence estimates of any mental disorder. Head and neck cancer patients had a significantly higher risk for having any mental disorder (predicted marginal probability 58.7%; 95% CI: 46.4–71.1) in comparison to most of the other tumour entities, except for bladder (49.9%; 95% CI: 34.6–65.2), kidney/urinary tract cancer patients (46.9%; 95% CI: 34.1–59.8) and patients with malignant melanoma (37.8%; 95% CI: 19.8–55.7). Yet, we did not find an overall significant effect of tumour entity on the 12-month prevalence estimates of any mental disorder ($p = 0.179$). We found men having a significantly lower risk for having any mental disorder than women with 29.6% (95% CI: 26.0–33.3) and 47.9% (95% CI: 43.7–52.0), respectively. Patients between 40 and 49 years (41.9%; 95% CI: 36.1–47.7) and patients older than 60 years (60–69 years: 34.8%; 95% CI: 31.0–38.7 and 70–75 years: 29.4%; 95% CI: 23.6–35.3) were found to have a significantly decreased risk for having any mental disorder compared to patients younger than 40 years (53.6%; 95% CI: 43.8–63.4). Patients who were diagnosed with cancer more than 12 months but less than 24 months ago also had a significantly higher risk of having any mental disorder compared to patients who were diagnosed in the last 6 months (48.0%; 95% CI: 40.8–55.3 vs. 36.0%; 95% CI: 32.9–39.1). We found no significant difference between patients with cancer remission and those with no cancer remission as well as between inpatient and outpatient cancer care settings.

## Discussion

In this multicentre epidemiological study, we aimed to provide comprehensive and reliable estimates of the 12-month and lifetime prevalence of axis I mental disorders in cancer patients across major tumour entities using a standardized clinical interview. Our findings showed a total prevalence of any mental disorder in 39.4% of patients over a 12-month period and a 56.3% lifetime prevalence. The most frequent mental disorders were anxiety disorder (15.8 and 24.1%, respectively) and mood disorders (12.5 and 20.5%, respectively).

Meta-analyses of German studies using standardized clinical interviews in cancer populations showed lower 12-month prevalence rates for mood disorders (12.6 vs. 18%), anxiety disorders (15.8 vs. 19%) and slightly higher rates for somatoform disorders (9.5 vs. 8%) [17, 18]. We also found lower lifetime prevalence rates for mood disorders (20.5 vs. 26%) and anxiety disorders (24.1 vs. 30%) compared to the meta-analyses of studies with German patients. Compared to international studies, we found a higher lifetime prevalence of any anxiety disorder (24.1 vs. 21%) [17]. However, comparisons of findings with previous studies are limited by the fact that other studies used different time frames of assessment and different diagnostic conventions and thus should be interpreted with caution.



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**Table 3.** Regression analysis on 12-month prevalence estimates of any mental disorders (CIDI-O)

| Characteristics | | OR | 95% CI | | p | $p_{(global)}$ |
|---|---|---|---|---|---|---|
| | | | lower | upper | | |
| Tumor entity | Breast | 0.92 | 0.62 | 1.36 | 0.666 | 0.179 |
| | Prostate | 1.00 | 0.66 | 1.51 | 0.987 | |
| | Colon/rectum[a] | | | | | |
| | Female genital organs | 0.74 | 0.47 | 1.18 | 0.206 | |
| | Lung | 0.91 | 0.56 | 1.48 | 0.704 | |
| | Bladder | 1.61 | 0.78 | 3.30 | 0.194 | |
| | Hematological malignancies | 0.95 | 0.60 | 1.49 | 0.815 | |
| | Stomach/oesophagus | 0.93 | 0.52 | 1.68 | 0.816 | |
| | Kidney/urinary tract | 1.41 | 0.76 | 2.64 | 0.278 | |
| | Malignant melanoma | 0.94 | 0.39 | 2.24 | 0.889 | |
| | Head and neck | 2.37 | 1.28 | 4.39 | 0.006 | |
| | Pancreas | 0.73 | 0.34 | 1.53 | 0.399 | |
| | Other | 1.00 | 0.63 | 1.59 | 0.997 | |
| Remission (tumor-free) | No | 1.16 | 0.91 | 1.48 | 0.235 | |
| | Yes[a] | | | | | |
| Sex | Female[a] | | | | | |
| | Male | 0.45 | 0.34 | 0.59 | <0.001 | |
| Setting | Inpatient care/hospital care[a] | | | | | .608 |
| | Outpatient care | 1.14 | 0.88 | 1.47 | 0.323 | |
| | (Inpatient) rehabilitation clinic | 1.09 | 0.81 | 1.47 | 0.575 | |
| Age | ≤40[a] years | | | | | <0.001 |
| | 40–49 years | 0.61 | 0.38 | 0.98 | 0.041 | |
| | 50–59 years | 0.65 | 0.41 | 1.02 | 0.062 | |
| | 60–69 years | 0.45 | 0.28 | 0.70 | <0.001 | |
| | >70 years | 0.34 | 0.21 | 0.57 | 0.000 | |
| Months after current diagnoses | 0–6[a] | | | | | 0.020 |
| | >6–12 | 1.24 | 0.92 | 1.65 | 0.154 | |
| | >12–24 | 1.70 | 1.21 | 2.40 | 0.002 | |
| | >24 | 1.20 | 0.88 | 1.64 | 0.259 | |

[a] Reference category.

As expected, the findings of our previous work [19] revealed that the 4-week prevalence (31.8%) is lower than 12-month (39.4%) and lifetime prevalence (56.3%), although we need to consider that the 11% adjustment disorder refers to the 4-week prevalence but is included into the 12-month and lifetime prevalence estimates.

The 12-month and lifetime prevalence estimates showed a higher percentage increase of any mood disorder compared to the 4-week prevalence rates than any other mental disorder. Our higher rates for 12-month mood disorders seem to be a more appropriate indication of the true morbidity rate than the 4-week diagnoses, because they describe the psychopathology and course of affective syndromes more appropriately and take into account that many subjects with threshold diagnoses in the past 12 months are likely to be only partially remitted. Further the 12-month time frame takes better into account the middle- and long-term consequences of the cancer and cancer treatments such as fatigue, pain, lower quality of life, illness perceptions and maladaptive coping strategies [33, 34].

Prevalence estimates differ widely between different tumour entities, which is in accordance with previous findings based on patients' self-report [16, 35, 36]. Mental disorders were more frequently diagnosed in patients with breast cancer, head and neck cancer, malignant melanoma and kidney/urinary tract cancers. Lower prevalence rates were observed in patients with pancreas cancer, stomach/oesophagus cancer, prostate cancer and bladder cancer. However, we did not find any significant differ-



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ence in the 12-month prevalence between distinct cancer entities except for a higher risk in patients with head and neck cancer, which might be a result of the severe impairments following surgery and further cancer treatments in this group [37]. The high prevalence of nicotine abuse, e.g. in patients with head and neck cancer, can only partly account for this – particularly with regard to the lifetime prevalence. Excluding nicotine abuse from the set of mental disorders, the highest prevalence rates (over 40%) were found in patients with the following cancer entities: malignant melanoma, breast cancer, female genital organs, kidney/urinary tract, and haematological malignancies, and the lowest prevalence (below 30%) rates in patients with lung cancer, bladder and prostate cancer.

In addition, other patterns of mental disorders could be observed: breast cancer patients and patients with malignant melanoma showed a high prevalence in anxiety and mood disorders and a low prevalence of nicotine dependence. On the other hand, somatoform disorders were less pronounced in patients with head and neck cancer, as well as bladder cancer, but a higher prevalence in nicotine dependence was found.

In comparison with the general German population, the prevalence estimates in our total cancer population were higher. Lifetime prevalence of any mental disorder in the German population ranges from 43 to 45% in comparison with 56% in the total sample in our study [24, 38, 39]. The 12-month prevalence is also higher in cancer patients (39%) compared with the general population in Germany (28–31%) [24, 38]. Considering different mental diagnoses reveals that anxiety disorders, mood disorders and somatoform disorders are more often found in cancer patients, while other mental disorders have prevalence rates closer to that in the general population, e.g. nicotine dependence [24, 40].

Our findings revealed no significant differences in the 12-month prevalence estimates of mental disorders between different cancer care settings indicating the need for provision of continuous psycho-oncological support from inpatient to outpatient cancer care facilities. Our findings that men have a lower risk for developing a mental disorder are in accordance with studies in the general population, although the causes of these gender differences in prevalence rates are not well understood so far. Possible theories include response bias, biological, social, and demographic influences as well as internalizing versus externalizing liability structure of psychopathology [41]. Our analyses also showed a lower risk for mental disorders in elderly patients demonstrating the particular supportive care needs for younger patients.

The results of our study are novel and important with regard to the planning of psycho-oncological interventions and services tailored to the specific needs of different cancer patient populations; however, they must be considered in the light of study limitations. Our sample is biased towards younger age and higher school education, which might result in an underestimation of the lifetime prevalence of mental disorders given that older patients and patients with lower school education are more likely to develop a mental disorder. Also, differences in patients' response rate between study centres and a rate of 20.6% of patients who withdrew from completing the CIDI-O after having been assigned to it may limit the generalizability of our prevalence estimates. A further limitation of our study is that we have no information on concomitant medical illness, besides cancer, and specific treatments.

Nevertheless, our study is one of the few more recent studies based on a broad representative cancer sample interviewed in a standardized clinical interview to estimate the prevalence of mental disorders. The reported prevalence of mental disorders in cancer patients should sensitize clinicians to a possible manifestation of mental disorders across all stages of cancer inpatient and outpatient care. Our findings show that mental disorders are a common problem in cancer patients and emphasize the need for tailored psycho-oncological and psychotherapeutic support leading to an appropriate allocation of direct personnel and others resources. It might also be appropriate to consider the development of tumour-entity-specific (survivorship) care models.


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