Prevalence, co-morbidity and correlates of mental disorders in the general population: results from the German Health Interview and Examination Survey (GHS)

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ABSTRACT

Background. The German National Health Interview and Examination Survey (GHS) is the first government mandated nationwide study to investigate jointly the prevalence of somatic and mental disorders within one study in the general adult population in Germany. This paper reports results from its Mental Health Supplement (GHS-MHS) on 4-week 12-month, and selected life-time prevalence of a broad range of DSM-IV mental disorders, their co-morbidity and correlates in the community.

Methods. The sample of the GHS-MHS ($n=4181$; multistage stratified random sample drawn from population registries; conditional response rate: 87·6%) can be regarded as representative for the German population aged 18–65. Diagnoses are based on fully structured computer assisted clinical interviews (M-CIDI), conducted by clinically trained interviewers.

Results. 12-month prevalence for any DSM-IV study disorder is 31% (lifetime: 43%; 4-week: 20%) with anxiety disorders, mood disorders and somatoform syndromes being the most frequent diagnoses. Retrospective age of onset information reveals that most disorders begin early in life. Comorbidity rates among mental disorders range from 44% to 94%. Correlates of increased rates of mental disorders and co-morbidity were: female gender (except for substance disorders), not being married, low social class, and poor somatic health status. Health care utilization for mental disorders depended on co-morbidity (30% in 'pure', 76% in highly co-morbid cases) and varied from 33% for substance use disorders to 75% for panic disorder.

Conclusions. Results confirm and extend results from other national studies using the same assessment instruments with regard to prevalence, co-morbidity and sociodemographic correlates, covering a broader range of DSM-IV disorders [i.e. somatoform disorders, all anxiety disorders (except PTSD), mental disorders due to substance or general medical factor, eating disorders]. Intervention rates were higher than in previous studies, yet still low overall.

INTRODUCTION

Historically, despite some notable regional exceptions (e.g. Iceland; Hagnell, 1970), there

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have been only few nationally representative community surveys on the prevalence of mental disorders before the 1980s and those available revealed tremendous variation in findings (Weissman *et al.* 1993). This has been explained by various factors, including: the misconception that mental disorders are fairly infrequent

phenomena, the lack of reliable diagnostic criteria and diagnostic instruments, the almost exclusive focus on broad diagnostic categories of severe psychotic and neurotic disorders, the lack of efficient treatments and the lack of a broader spectrum of mental health services. Parallel to the introduction of explicit diagnostic criteria for specific forms of mental disorders in the DSM-III (APA, 1980), and subsequent to the landmark Epidemiological Catchment Area study (ECA; Regier *et al.* 1984; Robins & Regier, 1990) in 1980, this situation changed considerably. The ECA not only demonstrated that mental disorders can be assessed using standardized diagnostic interviews with a similar level of reliability, validity and accuracy as the assessment in surveys of somatic disorders, but also suggested that the risk of developing mental disorders in adolescence and over a lifetime, as well as the current prevalence and co-morbidity had been heavily underestimated.

Continuing interest in mental disorders has prompted the conduct of numerous nationwide mental health surveys, which have shown fairly convergently and with increasing sophistication that mental disorders affect at least one third of population over their lifetime and at least about one fifth in the past month. Examples include the Munich Follow-up Study in former West Germany (Wittchen, 1988), subsequent reanalyses of the Cross-National Collaborative Group (e.g. Weissman *et al.* 1996), the National Co-morbidity Survey in the USA (NCS; Kessler *et al.* 1994), the Australian National Mental Health Survey (ANMHS; Andrews *et al.* 2001), the National Psychiatric Morbidity Surveys of Great Britain (NPMS; Jenkins *et al.* 1997), The Netherlands Mental Health Survey and Incidence Study (NEMESIS; Bijl *et al.* 1998), and more recently several other countries around the world that have been involved in the cross national comparative studies of the WHO International Consortium in Psychiatric Epidemiology (Andrade *et al.* 2000).

Despite these developments, numerous critical and unresolved issues still make it difficult to draw firm conclusions about the size and scope of mental disorders, their associated correlates and consequences which could potentially provide guidance for health care planning. These include the following considerations.

(1) Even though the majority of epidemiological studies made use of the same diagnostic instrument to obtain diagnoses according to the criteria of DSM-III-R and IV (APA, 1987, 1994), the Diagnostic Interview Schedule (DIS; Robins *et al.* 1981) and its successor, the Composite International Diagnostic Interview (CIDI; WHO, 1997), there is still substantial and sometimes confusing variation in findings (even more when different diagnostic instruments are used).

(2) Some variations can be explained by design issues: the prevalence of mental disorders has been shown to differ by age groups and age cohort, thus the year the study was conducted and the age range of the sample is of relevance.

(3) Almost all studies made at least some modification in their assessment instrument, by either adding diagnoses, omitting diagnoses, changing diagnostic thresholds or algorithms, changing the order of sections, adding questions on impairment and help-seeking or dimensional measures; other important sources of variance might result from the use of lay or alternatively clinical interviewers. All of these modifications have been shown to have potentially significant effects on prevalence estimates as well as co-morbidity figures (Brugha *et al.* 1999; Wittchen *et al.* 1999*a*).

(4) A critical issue for health care policy decisions and implications derived from such studies is either lack or inconsistency of evaluation of disability and severity as well as help-seeking behaviour associated with mental disorders. Such considerations are of major importance for health care planners to determine met and unmet needs appropriately for different target groups. This problem is particularly evident in prevalence estimates of studies based on the lifetime version of the DIS or CIDI. The lifetime version of the CIDI ascertains primarily whether the diagnostic criteria are met at some point in the respondent's life and then asks for the first (onset) and last occurrence (recency codes) of at least some of the core features of the respective diagnosis. In these studies, current prevalence estimates merely indicate that the person had the diagnosis in the past and still has some symptoms without necessarily determining that the person meets the full set of diagnostic criteria. For health care purposes and need estimations, however, this type of diagnostic

cross-sectional information is crucial, especially in conjunction with information on associated impairment, disability and help-seeking behaviour in order to make an appropriate evaluation of need.

Against this background, in 1997 the German government commissioned a comprehensive nationwide morbidity and health survey in the community to describe in a coordinated study the prevalence of somatic and mental disorders in the adult German population. This project is unique in two respects: it is the first nationwide mental health survey in Germany and also the first survey in which somatic and mental disorders were both rigorously assessed within one study, using reliable structured somatic and psychiatric interviews in a representative national sample. Particular requirements for the mental health survey were: (1) a broad coverage of specific mental disorders, including all substance use and anxiety disorders (except PTSD) and previously neglected disorders like somatoform and eating disorders, as well as disorders due to substance and general medical factors, (2) the provision of predominantly strict 12-month estimates for symptoms and diagnoses of mental disorders in order to allow for the examination of associations with physical morbidities assessed for the same time frame and to make comparative analyses between disorders with regard to disabilities, quality of life and health service utilization.

This paper reports the basic prevalence findings of the GHS-MHS, focusing on four aims: (1) to report 12-month and selected 1-month and lifetime prevalence estimates and associated correlates of mental disorders in a nationally representative sample, including information on ages of onset; (2) to determine the degree of co-morbidity between mental disorders; (3) to determine associations between mental disorders, co-morbidity and treatment utilization, and (4) to report associated correlates of disorders and co-morbidity.

METHODS

Aims, design and methods

Aims, design and methods have been recently described in greater detail in a separate publication (Jacobi *et al.* 2002). Therefore, design and sample characteristics are discussed only briefly here.

Design and sample

Mental disorders were assessed in the Mental Health Supplement of the German National Health Interview and Examination Survey (GHS-MHS) in a subsample of its core survey (GHS-CS; Bellach *et al.* 1998). The core survey covered a range of medical and social assessments and was administered between June 1998 and October 1999. Its sample was a stratified random sample from 113 communities throughout Germany with 130 sampling units (sampling steps: 1, selection of communities; 2, selection of sampling units; and 3, selection of inhabitants). The sample was drawn from the population registries of subjects aged 18–79 living in Germany in the year 1997. As a result a gross sample of 13 222 people were eligible, representative according to the age, sex and community type criteria. The response rate (completing the total assessment in the GHS-CS) was 61·4 % ($n = 7124$). The response rate including subjects completing parts of the assessment was 77·8 %. Reasons for non-participation, analyses of non-response, and further information on sample and weighting in the GHS-CS are provided elsewhere (Thefeld *et al.* 1999).

For financial and logistical reasons the data for mental disorders were gathered using a two-stage design. The first stage entailed the administration of a 12-item screening questionnaire for mental disorders at the end of the medical examination of the core survey [CID-S; sensitivity for any 12-month diagnosis ('caseness'): 85·3 %, specificity: 55·3 %, positive predictive value: 38·3 %, negative predictive value: 92·0 %; Wittchen *et al.* 1999*b*].

The second stage involved the separate administration of a complete, structured, clinical psychopathological interview to all core survey respondents who had been screened positive for a mental disorder and to a random sample of 50 % who had been screened negative. Due to the resulting oversampling of screen positives, data were weighted in the later analyses. In order to adjust the net sample to German age, sex and community distribution, data were also weighted for age, sex, and region corresponding to the national administrative statistics of December 1997. The presented weighted results can be regarded as representative for the German

non-instutionalized adult population from 18 to 65 years of age with sufficient language skills to follow the interviews. Hospitalized patients who were hospitalized throughout the recruitment phase (0·5–0·8% of the target population in the sample points) were only omitted if they were in institutions during the entire recruitment period. Therefore it is unlikely that this exclusion criterion might have an effect on the reported prevalences. Respondents of the German Health Survey older than 65 years were excluded because the psychometric properties of the CIDI, the interview used in the study, have not yet been satisfactorily established for use in older populations (Knäuper & Wittchen, 1994).

After exclusion of the subjects older than 65 and 50% of the screen negatives, the eligible sample size for the GHS-MHS was $n = 4773$. The conditional response rate of the GHS-MHS was 87·6%, resulting in a total of 4181 respondents who completed the mental health assessment. Sociodemographic variables of the sample are shown in the first column of Table 3.

Assessment

We present DSM-IV prevalences because (1) their operationalization in terms of criteria is more straightforward and (2) the validity of ICD-10 diagnostic criteria for research (ICD-10-DCR) has never been established for the CIDI. ICD-10 compatible codes can easily be derived from the coding rules for 'translation' from DSM-IV.

Psychopathological and diagnostic assessments were based on the computer-assisted version of the Munich Composite International Diagnostic Interview (DIA-X/M-CIDI; Wittchen & Pfister, 1997), a modified version of the World Health Organization CIDI (version 2.1; WHO, 1997) for a wider range of mental disorder according to the criteria of DSM-IV than previous studies.

Unlike previous versions of the CIDI, the study version focuses strictly on the assessment of 12-month symptoms and disorders. The standard CIDI lifetime assessment was only performed when lifetime information was necessary for evaluating current diagnoses (e.g. mood disorders).

Psychometric properties of the CIDI were found to range from acceptable to very good (Wittchen, 1994; Lachner *et al.* 1998; Reed *et al.* 1998). The interviewers ($n = 24$, mostly psychologists who had already worked on other CIDI studies) had received a 3-day CIDI training session for the GHS-MHS and CIDI refresher courses every 3 months throughout the field period. They conducted on the average 174 interviews in eight sampling units and were closely monitored and provided with feedback by trained M-CIDI clinical editors who regularly checked all interviewers according to a standard procedure. In a final quality control only eight interviews had to be eliminated due to missing or inconsistent datasets (Jacobi *et al.* 2002).

The following mental disorders according to DSM-IV were included: mental disorders due to general medical condition; schizophrenia and possible psychotic disorders (screening without further differential diagnosis); substance use disorders (dependence and abuse of alcohol, illicit substances, and nicotine); mood disorders (unipolar and bipolar); anxiety disorders (including obsessive compulsive disorder; without PTSD), somatoform disorders (including the abridged somatization syndrome SSI4.6; Escobar *et al.* 1989; without conversion and body dysmorphic disorder); and eating disorders. Unfortunately, we were not commissioned to include post-traumatic stress disorder and antisocial personality (as for example in the NCS) because of time and financial restrictions. Subthreshold diagnoses could be assessed as well (Carter *et al.* 2001). Health care utilization is presented in form of the variable 'at least minimal intervention', a combination of items asking about having ever sought treatment due to psychological, mental, addictive or psychosomatic problems, or been recommended by a doctor to do so.

Analytic strategy

Presented prevalence estimates (n, %, S.E.) were calculated with the data weighted for age, gender, region and screening status in order to address different sampling probabilities and systematic non-response. Logistic regression (odds ratios and 95% confidence intervals) were used to quantify the associations between mental disorders and their correlates.

Age and sex were adjusted for in each analysis to control for different base distributions of

prevalence and co-morbidity within the sample. To account for the weighting scheme as well as the stratified sampling design by screening status, statistical inference (standard errors, confidence intervals and *p* values) was based on the Huber–White sandwich estimator of variance (Woodruff, 1971; Binder, 1983; Royall, 1986). This was done with the Stata software package, release 7.0 (StataCorp, 2001).

RESULTS

Table 1 shows CIDI/DSM-IV prevalence estimates and corresponding standard errors of a range of selected lifetime, 12-month, and 4-week disorders (or aggregated diagnostic categories) assessed in the GHS-MHS.

Overall prevalences

About 20% of the sample reported at least one of the listed disorders in Table 1 in the past 4 weeks, 31% had one or more disorders in the 12 months before the interview and a total of 43% had a lifetime history of at least one of the selected DSM-IV disorders.

Diagnostic groups

As an aggregated category, anxiety disorders were more prevalent (4-week and 12-month, lifetime not assessed) than somatoform disorders/syndromes and mood disorders which show comparable prevalence numbers: in the previous 12 months one in every seven respondents had fulfilled the criteria for an anxiety disorder, and about one of every 10 respondents had suffered from a mood or somatoform disorder/syndrome. Substance use disorders (without nicotine) in the previous 12 months were diagnosed in about one in every 20 participants.

A considerable number met criteria of the M-CIDI psychosis screen (4-week: 1·5%; 12-month: 2·6%; lifetime: 4·5%). This count includes about equal proportions of subjects with mood congruent or incongruent psychotic features occurring exclusively in the course of depressive or bipolar disorders, and subjects reporting psychotic symptoms of varying duration occurring at other times. M-CIDI syndrome information for psychotic disorders do not allow for the derivation of specific diagnoses of psychotic disorders such as schizophrenia.

The least prevalent diagnoses were mental disorders due to a general medical condition (4-week: 0·5%; 12-month: 1·3%) and eating disorders (4-week: 0·2%; 12-month: 0·3%).

(Aggregated) subdiagnoses

The most common mental disorders were phobic disorders (4-week: 7·4%; 12-month: 12·6%; lifetime not assessed), depressive disorders (4-week: 5·6%; 12-month: 10·7%; lifetime: 17·1%), and somatoform pain disorder (4-week: 5·4%; 12-month: 8·1%; lifetime: 12·7%).

The next most common disorders were alcohol abuse or dependence (4-week: 2·5%; 12-month: 4·1%; lifetime: 8·5%) and the subthreshold somatization disorder SSI4.6 (Escobar *et al.* 1989; 4-week: 3·1%; 12-month: 4·3%; lifetime: 5·6%).

Gender differences

As in previous epidemiological studies men fulfil diagnostic criteria for mental disorders less often than women. The only exceptions are substance use disorders, where men have considerably higher prevalence rates than women (especially alcohol abuse or dependence), and possible psychotic disorders (distributed equally among men and women). In addition, women seem more likely than men to suffer from co-morbid mental disorders (4-week: 40·3% *v.* 30·3%; 12-month: 43·7% *v.* 33·5%; lifetime: 48·7% *v.* 35·7%; not shown in Table 1).

Ages of onset

In the GHS-MHS, ages of onset were assessed retrospectively. Figure 1 shows the cumulative distribution of age of onset for selected disorders [note: for anxiety disorders (except panic disorders) ages of onset were only assessed in subjects with a 12-month diagnosis].

Most mental disorders develop in adolescence and early adulthood, reaching the median of lifetime disorders by the age of 20 (anxiety, bipolar mood, somatoform and substance use disorders). Depressive disorders and possible psychotic disorders tend to emerge later (median = 31 years/37 years). The range between the 25th and the 75th percentile of the age of onset is lowest in substance and bipolar disorders, where over 75% begin before the age of 30 and prevalence drops sharply in respondents older than 30.

Table 1. *Prevalences of mental disorders (4-week, 12-month and lifetime M-CIDI/DSM-IV) in the general population (GHS-MHS; n = 4181)*[a]

Disorders (DSM-IV)	4-week				12-month				Lifetime			
	Total		Male	Female	Total		Male	Female	Total		Male	Female
	n[j]	% (s.e.)[k]	% (s.e.)	% (s.e.)	n	% (s.e.)	% (s.e.)	% (s.e.)	n	% (s.e.)	% (s.e.)	% (s.e.)
Any mental disorder due to general medical condition	19	0·5 (0·1)	0·4 (0·1)	0·6 (0·1)	56	1·3 (0·2)	0·8 (0·2)	1·9 (0·3)	94	2·3 (0·2)	1·8 (0·3)	2·7 (0·4)
Any substance disorder[b]	119	2·9 (0·3)	4·4 (0·5)	1·3 (0·3)	188	4·5 (0·3)	7·2 (0·6)	1·7 (0·2)	414	9·9 (0·6)	15·6 (0·9)	4·2 (0·4)
Alcohol abuse/dependence	104	2·5 (0·3)	4·0 (0·5)	0·9 (0·2)	170	4·1 (0·3)	6·8 (0·6)	1·3 (0·2)	355	8·5 (0·5)	14·4 (0·9)	2·6 (0·3)
Any illicit substance abuse/dependence	21	0·5 (0·1)	0·6 (0·2)	0·4 (0·1)	30	0·7 (0·1)	1·0 (0·2)	0·5 (0·1)	90	2·1 (0·2)	2·3 (0·3)	1·9 (0·3)
Possible psychotic disorder[c]	61	1·5 (0·2)	1·6 (0·3)	1·3 (0·2)	107	2·6 (0·3)	2·6 (0·4)	2·5 (0·3)	189	4·5 (0·4)	4·1 (0·5)	5·0 (0·5)
Any mood disorder[d]	262	6·3 (0·4)	4·8 (0·5)	7·8 (0·6)	499	11·9 (0·5)	8·5 (0·7)	15·4 (0·8)	779	18·6 (0·6)	12·3 (0·8)	25·0 (1·0)
Any unipolar depression	223	5·6 (0·4)	4·2 (0·5)	6·9 (0·6)	448	10·7 (0·5)	7·5 (0·6)	14·0 (0·8)	716	17·1 (0·6)	11·1 (0·8)	23·3 (0·9)
Any bipolar disorder	23	0·6 (0·1)	0·3 (0·1)	0·8 (0·2)	34	0·8 (0·1)	0·6 (0·1)	1·1 (0·2)	42	1·0 (0·1)	0·8 (0·2)	1·2 (0·2)
Any anxiety disorder[e]	375	9·0 (0·4)	5·3 (0·5)	12·7 (0·7)	604	14·5 (0·5)	9·2 (0·6)	19·8 (0·9)				
Panic disorder[f]	47	1·1 (0·2)	0·9 (0·2)	1·3 (0·2)	98	2·3 (0·2)	1·7 (0·2)	3·0 (0·4)	162	3·9 (0·3)	2·2 (0·3)	5·5 (0·5)
Any phobia[g]	311	7·4 (0·4)	3·9 (0·4)	11·0 (0·7)	525	12·6 (0·6)	7·5 (0·6)	17·7 (1·0)				
Generalized anxiety disorder	50	1·2 (0·2)	0·9 (0·2)	1·5 (0·3)	64	1·5 (0·2)	1·0 (0·2)	2·1 (0·3)				
Obsessive compulsive disorder	18	0·4 (0·1)	0·2 (0·2)	0·6 (0·0)	30	0·7 (0·1)	0·6 (0·2)	0·9 (0·2)				
Any somatoform disorder/syndrome[h]	311	7·5 (0·4)	4·9 (0·5)	10·0 (0·7)	461	11·0 (0·6)	7·1 (0·6)	15·0 (0·8)	678	16·2 (0·7)	10·3 (0·8)	22·2 (1·0)
SSI4.6	128	3·1 (0·3)	2·2 (0·3)	3·9 (0·5)	181	4·3 (0·3)	3·1 (0·4)	5·5 (0·6)	235	5·6 (0·4)	3·9 (0·4)	7·3 (0·6)
Pain disorder	227	5·4 (0·4)	3·4 (0·4)	7·5 (0·6)	340	8·1 (0·5)	4·9 (0·5)	11·4 (0·7)	533	12·7 (0·5)	7·8 (0·6)	17·8 (0·9)
Any eating disorder[i]	8	0·2 (0·0)	0·1 (0·0)	0·3 (0·1)	14	0·3 (0·1)	0·2 (0·1)	0·5 (0·2)	33	0·8 (0·1)	0·3 (0·1)	1·3 (0·3)
Any of the above	829	19·8 (0·6)	15·8 (0·9)	23·9 (1·0)	1301	31·1 (0·8)	25·3 (1·1)	37·0 (1·1)	1791	42·6 (0·8)	36·8 (1·2)	48·9 (1·1)

[a] Weighted data; DSM-IV hierarchy rules were dropped; age distributions and confidence intervals available on request.
[b] Abuse or dependence (without nicotine).
[c] Screening for Schizophrenia and other psychotic disorders without further differential diagnosis; includes psychotic features occurring as part of mood disorders.
[d] Major Depressive Disorder, Dysthymic Disorder, Bipolar I Disorders, Bipolar II Disorders, single hypomanic episode; unipolar and bipolar mood disorders do not add up to 100% because single hypomanic episode was not included in either category.
[e] For anxiety disorders (including Obsessive Compulsive Disorder, excluding Post-traumatic Stress Disorder) no lifetime diagnoses except for panic disorders available.
[f] With or without Agoraphobia.
[g] Agoraphobia without history of Panic Disorder, Social Phobia, Specific Phobias (animal, natural environment, blood-injection-injury, and situational type), Anxiety Disorder NOS.
[h] Somatization Disorder, Undifferentiated Somatization Disorder, Somatic Symptom Index SSI4.6, Hypochondriasis, Pain Disorder.
[i] Anorexia Nervosa, Atypical Anorexia Nervosa, Bulimia Nervosa, Atypical Bulimia Nervosa.
[j] Weighted numbers; numbers of single diagnoses exceed numbers of aggregated groupings if comorbid.
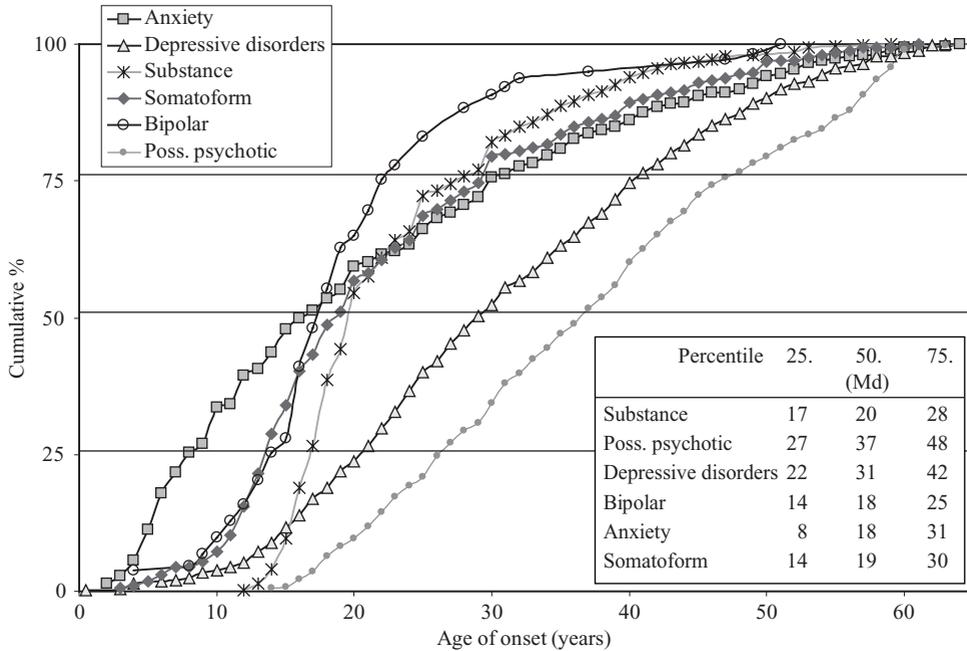[k] Weighted percentages and standard errors.

Percentile	25.	50. (Md)	75.
Substance	17	20	28
Poss. psychotic	27	37	48
Depressive disorders	22	31	42
Bipolar	14	18	25
Anxiety	8	18	31
Somatoform	14	19	30

FIG. 1.   Age of onset distributions.

Co-morbidity

Table 2 reveals rates for 12-month co-morbidity. 60·5 % of the diagnosed subjects had a single diagnosis and 39·5 % were co-morbid (4-week: 36·3 %; lifetime: 43·1 %; not shown in Table 2). 10·3 % were highly co-morbid (>3 disorders; 4-week: 10·3 %; lifetime: 10·5 %; not shown in Table 2). It has to be mentioned that these results on co-morbidity are cross-sectional. Taking lifetime co-morbidity into account, the co-morbidity rate of respondents with a given 4-week diagnosis is shifted from 36 % to 64 % and for 12-month diagnoses from 39 % to 53 % (not shown in Table 2).

Table 2, left section, shows proportions of 'pure' disorders and one/two/three or more additional diagnoses per disorder. A total of 2321 diagnoses were assigned to the 1301 respondents with at least one disorder. Pure disorders in the past 12 months were quite rare. Only 786 12-month diagnoses assigned were pure, whereas 1327 diagnoses were co-morbid (mean over all diagnoses: 66 %). Proportions of co-morbidity (at least one co-morbid condition) ranged from 44 % for alcohol abuse/dependence to 94 % for generalized anxiety disorder. The rate for highly co-morbid disorders (>3 disorders) was lowest in substance use disorders (12·9–14·4 %) and highest in possible psychotic disorder (40 %), panic disorder (49 %), generalized anxiety disorder (53 %) and obsessive compulsive disorder (63 %).

We also determined the most frequent combinations of seven aggregated diagnostic groups [any substance use disorder, any possible psychotic disorder, any depressive disorder, any bipolar disorder, any anxiety disorder, any somatoform disorder, any eating disorder; 12-month diagnoses] among the co-morbid cases ($n = 514$). Fifty-two different combinations out of the logically possible 127 ($2^7 - 1$) occurred at least one time, among them five relatively frequent patterns that accounted for 60 % of all co-morbid patterns: depression-anxiety (19 %), anxiety-somatoform (12 %), depressive-anxiety-somatoform (11 %), anxiety-anxiety (10 %), and depressive-somatoform (8 %).

Health care utilization

Only 40 % of respondents with at least one 12-month mental disorder received at least a 'minimal intervention' for their condition

Table 2. *Co-morbidity and health care utilization in subjects with at least one 12-month DSM-IV disorder*[a]

Disorders (DSM-IV)[c]	Proportions with				Health care utilization: proportions of cases with at least minimal intervention[b]				
	Pure disorder %	One additional diagnosis %	Two additional diagnoses %	Three or more additional diagnoses %	Total %	Pure disorder %	One additional diagnosis %	Two additional diagnoses %	Three or more additional diagnoses %
Any mental disorder due to general medical condition	18·8	38·1	13·7	29·5	59·6	58·8	60·0	76·9	51·7
Any substance disorder	55·1	22·8	7·8	14·3	35·5	22·9	33·6	63·0	67·2
Alcohol abuse/dependence	55·7	23·3	6·7	14·4	34·4	22·3	36·2	56·7	68·1
Any illicit substance abuse/dependence	45·3	29·0	12·9	12·9	32·7	25·2	14·3	72·5	60·9
Possible psychotic disorder	27·1	19·8	13·3	39·9	56·6	30·3	45·1	50·1	82·4
Any mood disorder	38·8	21·8	15·7	23·7	52·5	41·0	40·6	61·6	76·2
Any depressive disorder	39·3	20·8	15·8	24·1	53·5	41·2	42·1	62·4	77·8
Any bipolar disorder	25·7	24·6	14·9	34·9	51·8	42·2	42·4	58·8	62·4
Any anxiety disorder	37·9	26·5	14·2	21·3	47·0	27·1	46·7	57·5	75·6
Panic disorder	11·7	26·9	12·4	49·0	75·4	54·3	51·4	79·0	92·6
Any phobia	39·8	25·4	13·7	21·2	45·3	25·2	45·7	56·4	75·7
Generalized anxiety disorder	6·4	15·5	24·7	53·3	68·8	55·6	69·1	56·1	76·2
Obsessive compulsive disorder	14·9	12·3	9·6	63·2	68·2	20·7	66·1	39·5	84·1
Any somatoform disorder/syndrome	45·7	21·2	14·7	18·5	42·5	27·2	42·4	53·9	71·3
SSI4.6	34·2	22·1	19·2	24·5	49·6	32·9	47·7	58·9	67·1
Pain disorder	43·5	22·0	14·7	19·7	40·0	25·0	35·6	51·7	69·6
Any eating disorder	34·8	21·1	30·8	13·3	47·0	49·1	—	85·2	27·5
Any mental disorder	60·5	20·3	9·0	10·3	40·5	30·6	43·5	59·6	76·1

[a] 2321 diagnoses were assigned to $n=1301$ respondents with at least one diagnosis out of $n=4181$ (total sample GHS-MHS).
[b] Health care utilization is presented in form of a variable 'at least minimal intervention', a combination of items asking for having ever been seeking treatment due to psychological, mental, addictive or psychosomatic problems, or been recommended by a doctor to do so. The so-defined overall treatment rate was % in respondents with at least one diagnosis and % in respondents with no diagnosis.
[c] For detailed information on included disorders see notes to Table 1.

(having ever sought any kind of treatment due to mental health problems or having been recommended by a doctor to do so). It should be noted that if a co-morbid case was treated this treatment is shown for every co-morbid disorder, because in the present analysis it cannot be determined for which disorder(s) this person was treated; therefore numbers in Table 2 for specific disorders exceed the overall participant's treatment rate (i.e. 'any mental disorder'). Treatment rates increase fairly steadily by number of co-morbid conditions. For example, in panic disorder, the most frequently treated disorder, 54 % of the pure and 93 % of the highly co-morbid cases report an at least minimal intervention. Substance use disorders – the less frequently treated disorders – show treatment rates from 23 % (pure cases) to 67 % (highly co-morbid cases). Co-morbidity (in a model with sex, age and three dummy variables for the number of diagnoses) had the same predictive value (area under the ROC curve = 0·72) as the presence of the different diagnoses (in a model with sex, age and 12 dummies for the different diagnoses).

Correlates of mental disorders

Sociodemographic and health-related correlates of 12-month disorders are shown in Table 3 with odds ratios (OR) and confidence intervals (CI).

The significant sex differences have been mentioned above: women have a lower risk of having a substance use disorder (OR 0·2), but a higher risk of having a mood disorder (OR 2·0), an anxiety disorder (OR 2·4) or a somatoform disorder (OR 2·3). Their average number of diagnoses is about 70 % higher than in men (not shown in Table 3). No sex differences were found in possible psychotic disorders.

Age effects played only a minor role, except for substance use disorders, where respondents older than 34 years of age had significantly fewer disorders than respondents aged 18–34 (35–49 years: OR 0·4; 50–65 years: OR 0·3).

Marital status is a significant correlate of all mental disorders (except for somatoform disorders): being never married, separated, divorced or widowed increases the probability of a diagnosis substantially (OR 1·5–2·9). The separated/divorced or widowed respondents have 80 % more diagnoses than the married ones (singles: 50 % more diagnoses; not shown in Table 3). Respondents from the lower social class have significantly higher prevalences of substance use disorders, mood disorders, and anxiety disorders compared with a higher social class (OR 0·5–0·8 for medium or upper social class). With regard to somatoform disorders, only the upper social class has a lower prevalence rate than the low social class. Unemployed and retired people in particular have elevated risks for having a mental disorder (OR 1·5–2·3, except for possible psychotic disorder, where associations were slightly insignificant). So the presented GHS-MHS data support the view that rates of most mental disorders decline with increasing social status. The social class index used (Winkler–Schicht Index; Winkler & Stolzenberg, 1998) is calculated from information on education, current job status and household net income; differential data on education and employment status is also given in Table 3.

Concerning physical illness (assessed by MDs with a clinical structured computer assisted interview; Jacobi *et al.* 2002), poor health status is strongly associated with all mental disorders (OR 1·9–4·0).

DISCUSSION
Design and sampling issues

This paper presents prevalence estimates of the first nationwide German mental health survey conducted after the reunification of former East and West Germany and thus provides for the first time ever comprehensive data about the prevalence of mental disorders and their burden in Germany. The conduct of this survey as part of the regular national somatic health survey is a significant step forward to an integrated national health report system in Germany. The joint assessment of mental disorders and physical morbidities along with data on disability, work disability, service utilization and treatment within one modular study offers unique cross-comparisons between these domains that will be dealt with in subsequent steps of the analyses. Before highlighting the major findings a few comments with regard to design and methods will be given.

The high conditional response rate of almost 90 % for the mental health supplement can be regarded as satisfactory in light of the non-response interview findings. Additional

Table 3. *Sociodemographic and health related correlates of major diagnostic subgroups and comorbidity (12-month)*[a]

	Distribution of correlate in sample %	Any substance disorder			Any possible psychotic disorder			Any mood disorder			Any anxiety disorder			Any somatoform disorder		
		%	OR[b]	95% CI	%	OR[b]	95% CI	%	OR[b]	95% CI	%	OR[b]	95% CI	%	OR[b]	95% CI
Sex																
Men	50·3	7·2			2·6			8·5			9·2			7·1		
Women	49·7	1·7	0·2*	0·2–0·3	2·6	1·0	0·7–1·5	15·4	2·0*	1·6–2·4	19·8	2·4*	2·0–3·0	15·0	2·3*	1·8–2·8
Age																
18–34	34·5	7·7			2·9			11·3			13·9			10·2		
35–49	34·0	3·5	0·4*	0·3–0·6	2·6	0·9	0·5–1·5	12·6	1·1	0·9–1·4	14·6	1·1	0·9–1·3	11·2	1·1	0·9–1·4
50–65	31·6	2·1	0·3*	0·2–0·4	2·2	0·7	0·5–1·2	11·8	1·0	0·8–1·3	14·9	1·1	0·9–1·3	11·7	1·2	0·9–1·5
Marital status																
Married	64·1	2·7			2·0			9·8			13·2			10·6		
Single	24·9	8·8	1·9*	1·2–3·1	3·6	1·8*	1·1–2·8	13·2	1·6*	1·2–2·3	15·1	1·4*	1·1–1·8	9·7	1·0	0·8–1·4
Separated/divorced/ widowed	11·0	5·6	2·9*	1·8–4·6	3·8	1·9	0·9–4·1	22·6	2·5*	1·9–3·3	20·2	1·5*	1·1–1·9	15·0	1·3	0·9–1·8
Employment status[c]																
Employed																
Full time	49·8	4·7			2·6			9·1			10·8			9·0		
15–34 h/week	8·1	2·3	1·5	0·7–3·3	0·8	0·3*	0·1–0·8	11·0	0·9	0·6–1·3	19·9	1·3	0·9–1·8	15·1	1·1	0·8–1·6
<15 h/week	4·8	0·5	0·4	0·1–2·6	0·5	0·2*	0·1–0·8	14·2	1·2	0·7–1·9	15·8	1·0	0·6–1·5	9·7	0·7	0·4–1·2
Not employed																
Retired	9·7	3·0	1·9	0·9–4·4	1·6	0·6	0·3–1·6	16·3	2·1*	1·4–3·1	17·2	1·5*	1·1–2·2	13·8	1·4	0·9–2·1
School/student	5·7	10·3	1·7	0·9–3·0	3·8	1·4	0·7–3·1	12·1	1·2	0·7–1·9	12·2	1·0	0·6–1·6	7·2	0·7	0·4–1·2
Unemployed	6·5	6·3	2·0*	1·2–3·6	3·1	1·2	0·5–2·7	20·0	2·3*	1·6–3·2	23·2	2·2*	1·6–3·0	16·0	1·6*	1·1–2·4
Homemaker	7·2	0·7	0·6	0·1–2·6	4·1	1·6	0·7–3·4	17·8	1·5*	1·0–2·2	19·4	1·2	0·8–1·7	11·1	0·7	0·5–1·1
Social class[d]																
Low	19·1	6·6			3·5			16·4			18·6			13·5		
Medium	57·6	4·2	0·6*	0·4–0·9	2·4	0·7	0·4–1·1	12·0	0·7*	0·6–0·9	14·4	0·8*	0·6–0·9	10·6	0·8	0·6–1·0
High	23·3	3·7	0·6*	0·4–0·9	2·2	0·6	0·3–1·2	8·8	0·5*	0·4–0·7	11·3	0·6*	0·4–0·8	9·3	0·7*	0·5–0·9
Somatic health status[e]																
Good	29·3	4·9			1·7			7·5			10·1			5·3		
Medium	45·7	4·7	1·4	0·9–2·1	2·5	1·6	0·9–3·0	12·0	1·6*	1·2–2·1	12·5	1·2	0·9–1·5	10·6	2·1*	1·5–2·8
Poor	24·7	3·6	1·9*	1·2–3·2	3·7	2·9*	1·7–5·0	17·2	2·5*	1·8–3·4	23·2	2·5*	1·9–3·3	18·8	4·0*	2·8–5·6

12-month prevalence if correlate present

[a] GHS-MHS, weighted data, $n = 4181$.
[b] Odds ratios (OR) from logistic regression and 95% confidence intervals (CI), controlled for age and sex; reference groups: not having the disorder under consideration; * $p < 0.05$.
[c] 'Other' employment status (e.g. maternity leave, military or civil service) excluded from analyses.
[d] Index of social class (Winkler & Stolzenberg, 1998) derived from information on education, income and current (job) position.
[e] Crude indicator derived from the amount of somatic diseases assessed in the GHS-CS. Good: no somatic diseases within past 12 months; medium: 1–2 somatic diseases within past 12 months; poor: 3 or more somatic diseases within past 12 months.

checks for limited representativeness as compared to the total population provided no evidence for any major systematic sample bias (Jacobi *et al*. 2002).

Retrospective data on age of onset are notoriously unreliable, but may be useful in the absence of other data. In the present cross-sectional study, probes were embedded in the interviews in order to reduce recall bias. Yet, this cannot rule out systematic under-reporting due to embarrassment or fear of discrimination (Kessler, 2000).

We want to emphasize that this first prevalence publication reports predominantly diagnostically aggregated data. Findings on specific subtypes and disorders will be dealt with in separate follow-up publications.

Particular strengths of the study are as follows. (1) It is largely built on standardized assessment instruments with an established reliability allowing for direct comparisons with other studies. (2) It includes a considerably larger number of specific mental disorders according to DSM-IV criteria than previous studies. (3) Unlike other community surveys using the same instrument, we focused on 12-month and 4-week estimates of symptoms and diagnoses of mental disorders to increase precision and reliability and to obtain straightforward 12-month symptom counts. Lifetime disorders not present in the 12-month were only assessed for mood, psychotic and selected other disorders once the 12-month assessment was completed. Not relying only on recency information of lifetime diagnoses when determining 12-month diagnoses provides greater accuracy. Yet, the 12-month orientation means that those without a current disorder are less likely to report a lifetime disorder, resulting in an over-representation of chronic cases with an increased likelihood of early onset that has to be considered in future analyses dealing with lifetime diagnoses. (4) Interviews were conducted by clinically trained interviewers, since the use of lay interviewers has often been mentioned as a limitation of previous large-scale nationwide surveys. This also allowed for the inclusion of both psychotic syndromes, as well as general medical factors.

Prevalence

Turning to the main findings, the study confirms that mental disorders are highly prevalent, affecting a substantial proportion of the adult German population aged 18–65, with a total 12-month prevalence of 31%, a 4-week prevalence of 20% and a lifetime prevalence of 43%.

The GHS-MHS covers a relatively wide range of more than 60 mental disorders, allowing for a high degree of specification within seven diagnostic groupings.

It is important to note that the rates of morbidity shown in this study are not easily comparable to findings from other community studies due to different diagnostic criteria (ICD-10 *v*. DSM-III-R *v*. DSM-IV), different age ranges (e.g. higher prevalences of substance use disorders in younger samples), and in particular due to the inclusion of different diagnoses. Some studies included additional diagnoses (e.g. post-traumatic stress disorder and antisocial personality in the NCS) or a more restricted range of disorders (e.g. neglect of somatoform disorders in most previous studies; Faravelli *et al*. 1997). This selection has some effect on the total prevalence estimated. Regarding the frequency of DSM-IV-disorders in our study, as an example, the exclusion of somatoform disorders lowers the overall lifetime prevalence from about 43% to 37% (mostly due to 200 respondents with a pure somatoform pain disorder).

Nevertheless our results show a relatively strong concordance with most comparable studies (e.g. those reported by Kessler *et al*. 1994; Bijl *et al*. 1998; Andrade *et al*. 2000; Andrews *et al*. 2001). The overall 12-month prevalence in the GHS-MHS is 31·1% for the reported seven diagnostic DSM-IV groupings (and 25·7% when excluding somatoform disorders, eating disorders and mental disorders due to a general medical condition which were not assessed in most other studies). These rates are comparable to the USA (29·5%), The Netherlands (23·2%), most of the other ICPE surveys (Brazil, Canada, Mexico, Turkey; 8·4–24·4%), and Australia (20·3%).

Rates for anxiety and mood disorders (14·5% and 11·9%) are also relatively similar to the USA (17·2% and 11·3%), slightly higher than in The Netherlands (12·4% and 7·6%) and most of the other ICPE surveys (4·0–12·4% and 4·2–7·1%), whereas in Australia remarkably lower rates were found (5·6% and 6·6%).

Substance use disorders were diagnosed less often (4·5%, with the vast majority of alcohol related disorders) than in the USA (11·3%), The Netherlands (8·9%), most other ICPE surveys (0·0–10·5%) and Australia (7·9%). As mentioned above, when comparing these rates internationally it is important to take into account differences in the instruments (e.g. the UM-CIDI in the NCS is particularly sensitive; Kessler *et al.* 2000), and age of the sample (e.g. including only age 18–54 as in the NCS the GHS-MHS prevalence of any substance use disorder is shifted to 5·2%). Yet, the low prevalence is surprising since alcohol consumption, according to the WHO world drink trends reports, is comparatively high in Germany. An explanation could be the fact that diagnostic criteria focus more on (culturally and socially determined) inadequacy of drinking behaviour than on absolute quantity of consumption. Therefore, as an example, it is easier to qualify for alcohol abuse in the USA where the consumption of 1·5 litres of beer is labelled as 'binge drinking' compared to wide parts of the German society, where this amount is consumed several times a week without further negative social consequences. In particular, young people are more likely to receive a diagnosis of alcohol abuse in the USA where drinking in public is illegal until the age of 21 (Germany: 16 years).

Age of onset/persistence

The GHS-MHS findings also provide some further evidence that most mental disorders begin early. The median of the reported first onset of anxiety, somatoform, bipolar mood and substance use disorders is below 20 years of age. The median of depressive disorders and possible psychotic disorders is in young adulthood (31 *v.* 37 years), and only about 25% of the affected subjects develop their first disorder after their early 40s. The different characteristics match the average shapes of the cross-national ICPE-results (Andrade *et al.* 2000). Data on age of first onset were gathered retrospectively, and information on the course of a disorder between first onset and recent manifestation was not assessed. Since we have no longitudinal data on these issues, interpretations from this study on course of disorders, longitudinal comorbidity relevant for aetiological aspects of mental

disorders, or persistence are definitely limited. However, there are some clues that might be interpreted as indirect estimates of the chronicity of mental disorders. The average time between reported age of onset and age of the participants with the respective current diagnosis at the interview ranged from 10 to 20 years. Three quarters of all lifetime diagnoses were still present in the last 12 months; the prevalence ratios between time frames (4-week 12-month; 4-week lifetime; 12-month lifetime) suggest that mental disorders are often stable and call into question older statements that mental disorders are characterized by high remission rates.

Co-morbidity

We also confirmed that co-morbidity is a common phenomenon in almost all mental disorders. By the way, this also appears to be true for co-morbidity among somatic illnesses. Since the patterns of co-morbidity are of a very complex nature due to the coverage of the high number of included disorders (Wittchen, 1996*a, b*), results on co-morbidity were presented in two relatively crude ways: number of disorders per participant and amount of co-morbidity per disorder. Regarding again the 12-month frame, about 40% of the diagnosed participants have more than one single disorder. In this context, it should be noted that co-morbidity rates depend heavily on the definition of co-morbidity. From the perspective of disorders, a total of 2321 diagnoses were assigned to 1301 subjects. All disorders were highly to extremely co-morbid, ranging from 44% (alcohol abuse/ dependence) to 88% (panic disorders) and 94% (generalized anxiety disorder).

Health care utilization

Disregarding the noteworthy differences in base rate probabilities of specific diagnoses, it is fair to estimate that only about one third of pure disorders receive at least a minimal health care intervention, opposed to almost three out of four highly co-morbid subjects. For each disorder, the presence of co-morbid disorders is associated with a substantially higher rate of help seeking. This is consistent with previous findings from the USA and Canada (Kessler *et al.* 1994; Merikangas *et al.* 1996). This

replication in a German sample is remarkable, yet discouraging, as we expected a higher treatment rate due to the relatively well established German mental health care system. Unlike the USA and also to a lesser degree Canada, the German health care system is characterized by a fairly dense network of medical and psychological services that all provide mental health care (including drugs and psychotherapy) free of charge and without any major limitation of access and treatment duration. Patients can even bypass primary care physicians that usually maintain a core gatekeeper function for specialized mental health care in most other countries. Although we have no data in this study on speed of treatment entry after developing the first mental disorder, it appears that treatment is only likely whenever the patient already has developed complex co-morbid patterns. Future analyses should examine whether earlier targeted treatment reduces co-morbidity and associated burden in terms of disability and reduced quality of life.

Correlates

As in all comparable studies, women report higher mental morbidity than men except for substance use disorders (where men are diagnosed four times as frequently as women), and possible psychotic disorders (where no sex differences were found). There have been no significant age effects on prevalence except for substance use disorders (more frequent in younger age).

Also, other correlates of mental disorders are in line with existing knowledge (lower risk for married, and for higher social class). However, findings of this kind are limited, since risk factors of this sort are either not modifiable or not specific enough for developing intervention strategies (Kessler, 2000). Further analyses will focus on the role of co-morbidity in the prediction of (further) mental disorders, impairment and reduced quality of life since co-morbidity may be a modifiable risk factor for illness course, future impairment and quality of life that can be more easily targeted than sociodemographic correlates of mental morbidity. Of special interest in this context and suggesting need for further research are the presented high associations of mental disorders and poor somatic health status.

Conclusions for future analyses and studies

Further analyses will determine the impact of mental disorders both on individual suffering and health related quality of life, and on direct and indirect societal costs of disorders (health care costs, loss of work productivity). Future studies should be designed to investigate modifiable risk factors of illness onset and course in greater detail, including developmental and genetic aspects (Wittchen, 1996b; Kessler, 2000). Further research on determinants of help seeking and health care delivery is also needed since pathways to adequate mental health care seem not only to be disorder-specific or determined by severity of a condition, but also by other factors (e.g. knowledge about mental disorders in patients or in primary care physicians, or limitations within a health care system).

Kessler *et al.* (2002) suggest, on the basis of findings from the World Mental Health surveys on the distinction of generalized anxiety disorder from depression, that more comprehensive analyses within the complex area of co-morbidity are strongly needed in psychiatric epidemiology. A better understanding of patterns of comorbidity is relevant for diagnostic and nosological reasons and aetiological research on mental disorders on the one hand, and for the improvement of prevention and treatment strategies on the other hand, since co-morbidity affects onset, course and severity of the single disorders involved. In particular investigations on comorbidity with somatic conditions will enhance knowledge on health and illness as comprehensive concepts.

NOTE

Data of this study are available as Public Use File from the first author (manual and variable description in German language): Dr Frank Jacobi, Institute of Clinical Psychology and Psychotherapy, Chemnitzer Str. 46, D-01187 Dresden, Germany; e-mail: jacobi@psychologie.tu-dresden.de

For further information about the Core Survey (GHS-CS) and its Public Use File contact the Robert Koch-Institute, Dr Heribert Stolzenberg, Nordufer 20, D-13353 Berlin, Germany; e-mail: stolzenbergh@rki.de

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