Estimating the prevalence of mental and somatic disorders in the community: aims and methods of the German National Health Interview and Examination Survey

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ABSTRACT *This paper outlines the principal aims and design of the German National Health Interview and Examination Survey, mental health supplement (GHS-MHS), the first nationwide, epidemiological study of both somatic* and *mental health in Germany on a representative sample of 4,181 subjects in the community. Both the broader context of the study – in particular its methodological relation to the social and somatic core survey of the German National Health Interview and Examination Survey (GHS-CS) – and the internal methodology of the mental health supplement (GHS-MHS) are presented. The study's strategies and method are derived from a consideration of important theoretical issues arising from epidemiological studies in the field of public health. The main instrument used to assess diagnoses of mental disorders was a standardized diagnostic interview for mental disorders (following DSM-IV (CIDI)) applied by clinically trained interviewers. This diagnostic interview was supplemented by modules on comorbidity, help seeking, treatment and impairment. Somatic health diagnoses were made using an integrated approach including self-report measures, a standardized clinical interview, and laboratory measures.*

Findings on sampling, response rate, weighting and sample characteristics are presented. Critical issues are discussed, including the scientific objectives that have been achieved by the study. Overall, the GHS core survey and its mental health supplement provide the mental health research community with complex data that allow for high-quality analysis of mental disorders and associations with somatic disorders.

Key words: German National Health Interview and Examination Survey (GHS-MHS), epidemiological methods, Composite International Diagnostic Interview (CIDI), prevalence, comorbidity, somatic disorders, mental disorders, public health, impairment

Introduction

Population-based, representative data about the national prevalence and distribution of somatic and mental disorders, associated impairments, disabilities and handicaps and the determination of met and unmet needs are of core importance for healthcare policy-makers and providers. They assist the development of programmes to improve the structure and the quality of care as well as access to appropriate healthcare. Further, such data are relevant for studying issues of health economics and provide some guidance in developing more appropriate and cost-efficient allocation and financing models. More generally, representative community surveys that describe patterns of health and morbidity are helpful in educating the public and politicians about the scope and the consequences of somatic and mental disorders.

With regard to somatic health, most countries, including Germany, have some tradition of national surveys (for example, in the US: NHANES, National Center for Health Statistics, 2001; Plan and operation of the Third National Health and Nutrition Examination Survey 1988–94, 1994; Center for Disease Control and Prevention, 1996).

In the former West Germany, for example, the health status of the adult population was investigated in the years 1984–6, 1987–9, and 1990–1 (for example, see Forschungsgruppe Gesundheitsberichterstattung, 1990; von Troschke et al., 1998). There also was a survey based on a similar design and methodology in the former East Germany (1991–2) after the German reunification (Hoffmeister and Bellach, 1995). In other countries, however, these routine health surveys are usually confined to selected somatic disorders that have significant public health implications. Another limitation, especially of studies that use no laboratory tests or medical examinations, is that they are confined to indicators for illnesses as assessed by more-or-less comprehensive questionnaires or, less frequently, structured interviews. They therefore depend heavily on the subjects' self-reports. This methodological constraint might lead to an overestimation of disorders of which the subject is already aware, or that are associated with significant subjective suffering on the one hand, and an underestimation of medically undetected, untreated or 'silent' disorders (such as cancer in its early stages) that are not already associated with subjective complaints.

Another significant deficit of past community surveys of this sort has been the neglect of mental disorders. Historically, this deficit can be explained by the fact that, until the late 1980s, no explicit diagnostic criteria for specific forms of mental disorders were in place. The landmark Epidemiological Catchment Area (ECA) study, conducted in the early 1980s (Regier et al., 1984; Robins and Regier, 1990) was the first study to demonstrate that mental disorders can be assessed by use of standardized diagnostic interviews, with a level of reliability, validity and accuracy similar to surveys of somatic disorders. Thus, before the mid 1980s, almost all nationwide morbidity surveys in the community were unable to provide reliable estimates of the prevalence of specific mental disorders, with a few noteworthy exceptions in which trained psychiatrists were used to conduct interviews (Sartorius et al., 1989). At best some crude measures of selected symptoms and syndromes of psychopathology were included – in general health surveys, for example – based on self-report measures such as the CES-D (Radloff, 1977), D-Scale, or the BL-Scale (Von Zerssen and Koeller, 1976), or questions relating to treatment or interventions for known neuropsychiatric disorders.

Thus, most national health surveys usually provide fairly detailed information about the somatic morbidities in the community, but not about mental health and specific mental disorders. In the US, and some other countries, this deficit has been compensated for by fairly regular nationwide mental health surveys, such as the Epidemiological Catchment Area Program and the National Comorbidity Survey (NCS) (Kessler et al., 1994), in Australia the ANMHS (Henderson et al., 2000; Andrews et al., 2001), in the UK the NPMS and OPCS (Meltzer et al., 1995; Mason et al., 1996; Jenkins et al.; 1997a,b), in Canada the NPHS (Statistics Canada, 2001), and in the Netherlands, NEMESIS (Bijl et al., 1998; Vollebergh et al., 2001). Germany and other European countries have been slow to recognize the importance of addressing mental health issues on a national level in greater detail. The Depression Research in European Society (DEPRES) survey (Lepine et al., 1997), the first pan-European study, is limited by its restriction to depression and for other reasons (for example, low response rates). Primary care surveys (Ormel et al., 1994; Spitzer et al., 1995; Linden et al., 1996) provide information about the magnitude of psychological problems in a society but comparability with general population studies is also limited.

With the exception of one older nationwide mental health survey in the 1980s in the former West Germany – the Munich Follow-up Study (Wittchen and Von Zerssen, 1985) – and a few smaller regional epidemiological studies (Fichter et al., 1983; Becker et al., 2000; Lieb et al., 2000), no nationwide estimates of mental disorders in Germany are available.

The lack of coordinated survey data simultaneously addressing mental and somatic health in most countries can be considered as a significant deficit for various reasons. First, both single somatic or single mental health surveys provide only a limited overall picture of ill health in the population. The resulting data might have significantly reduced value, for example, for health service utilization, policy decisions and planning purposes. Second, the lack of such coordinated assessments and analyses prevents us from studying possible comorbidity relationships between somatic and mental health disorders, which might be of special importance for a better understanding of the health and service

utilization profile of a community or nation (Bijl and Ravelli, 2000). Recent international studies have repeatedly emphasized that mental disorders are often associated with somatic illness. Comorbidity may play a role in both the manifestation and maintenance of additional disorders and, therefore, in the prognosis and the extent of psychosocial impairment and disability (Meltzer et al., 1995; Sartorius et al., 1995; Wittchen, 1996). This idea is also advocated in several epidemiological studies that have highlighted, for example, the effect of depression on cardiovascular and other conditions (Pennix et al., 1998; Carney et al., 1999; Cohen et al., 2001). Third, the concentration on somatic disorders and the lack of information on mental disorders leads to an unfortunate misconception among the public and healthcare policymakers, that mental disorders are neither serious nor scientifically based. Help seeking and use of services for mental disorders should be investigated in a comprehensive epidemiological survey (Regier et al., 1993; Bland et al., 1997; Katz et al., 1997; Kessler et al., 1997; Andrews and Henderson, 2000; Bijl and Ravelli, 2000b). Finally, this situation has led in the past to a dramatic underestimation of the true costs of mental disorders in terms of healthcare expenditure and their burden on society (Rice and Miller, 1998). In fact, it was the Global Burden of Disease Study (Murray and Lopez, 1996) that highlighted for the first time that mental disorders are among the top 10 most impairing and disabling conditions worldwide.

Against this background, in 1997 the German government commissioned a comprehensive nationwide morbidity and health survey in the community to describe simultaneously the prevalence of somatic and mental disorders in the adult German population. The German National Health Interview and Examination Survey (GHS) described in this paper is the first national survey to collect data in both eastern and western Germany with the same methodology, under the same conditions, and at the same time (Bellach et al., 1998; Wittchen et al., 1998). The study is remarkable for various reasons:

- as far as we are aware this is the first nationwide community study that evaluates mental and somatic morbidities with the same or a similar degree of detail within one study;
- the GHS covers a much broader range of somatic and mental disorders than did previous studies;
- it includes medical appraisals and laboratory tests in addition to self-report measures and standardized clinical diagnostic interviews for the assessment of mental disorders according to DSM-IV criteria (APA, 1994) or ICD-10 (WHO, 1993);
- it allows for the analysis of patterns of comorbidity as well as evaluation of associated impairments of quality of life, disabilities and service use.

Aims

This paper describes the design and methods used in the GHS and provides some background information about the concepts, procedures and instruments used. The sampling process, fieldwork, completion rates and data analysis strategies are described and discussed. The focus is on both the description of the core survey, which emphasizes somatic disorders and conditions and impairment issues (GHS-CS) and on the embedded mental health supplement (GHS-MHS).

The objectives of the mental health supplement are

- to provide prevalence estimates (four-week, 12-month, lifetime) of a broad range of mental disorders in addition to prevalence estimates for somatic disorders in the general population;
- to describe patterns of comorbidity between mental disorders and patterns of comorbidity between mental and somatic disorders;
- to examine associations between physical health and mental health;
- to describe quality of life as well as patterns of impairments and disability, in particular to generate nationwide awareness of the severity of mental disorders as particularly indicated by individuals' impairment caused by specific mental disorders;
- finally, crude estimates of met and unmet needs and service utilization patterns were gathered in order to analyse health care in the area of mental illness in the adult population aged 18–65.

Design and methods

Commissioned by the German Ministry of Science, Research and Education, and the Robert-Koch-Institute (Berlin), the GHS is designed in a modular way to provide representative nationwide data about the prevalence of major somatic and mental disorders, their comorbidity, impairments and healthcare

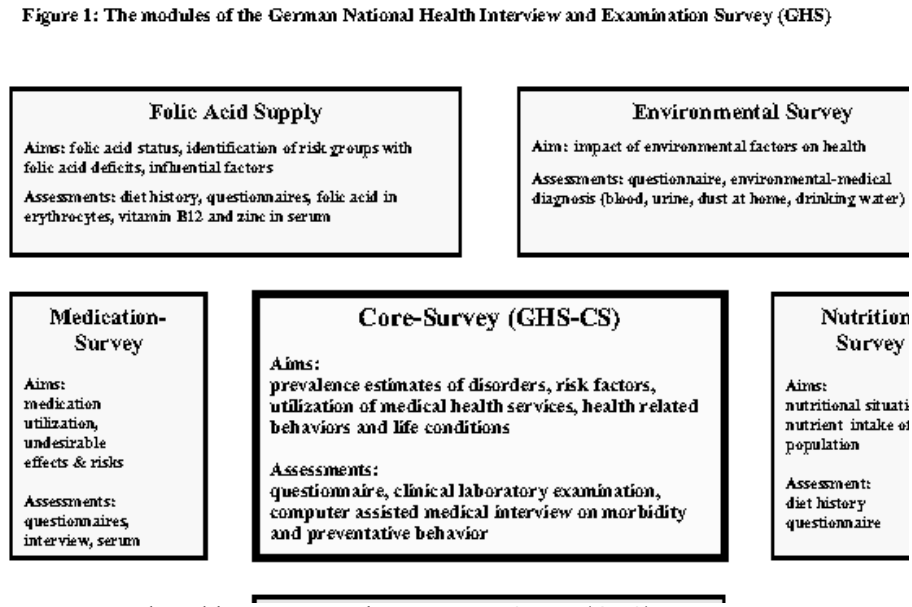

Figure 1. The modules of the German National Health Interview and Examination Survey (GHS).

utilization patterns. This first German nationwide survey should provide information about regional differences with particular emphasis on health issues in the former eastern versus western German regions.

Figure 1 gives an overview of the modular structure of the GHS. For the mental health supplement, and partly also for other supplements, it uses a two-stage design and consists of:

- the *core survey* (GHS-CS), which encompasses a major comprehensive self-report element, a structured clinical interview conducted by a trained medical doctor, a series of laboratory assessments, and a screening for mental disorders (see below); and
- several *separate or linked supplementary surveys* (pharmacological, nutrition, environmental health and so forth) that were clustered around this core survey component and were only given to subsamples of the total sample.

Among those separate additional components, the *mental health supplement* (GHS-MHS) was a major one that, because of its length, comprehensiveness and detail, was administered separately from the core survey.

The core survey (GHS-CS)

Sampling and response rates in the core survey (GHS-CS)

Sampling in the core survey The core survey sample was drawn from the population registries of subjects aged 18–79 living in Germany in the year 1997. It consisted of a stratified random sample from 113 communities throughout Germany with 130 sampling units. The first sampling step was the selection of communities according to region (Bundesland, eastern/western Germany) and community size. The second step included the selection of the sampling units. One sampling unit represented communities of up to 50,000 inhabitants. Within communities of 50,000 to 100,000 inhabitants, one district of the community was randomly chosen as a sampling unit, and cities bigger than 100,000 inhabitants had several randomly chosen election districts as sampling units. The third step included the selection of the inhabitants by drawing from the local registration offices the same number of addresses by age group in every sampling unit. Hospitalized residents were excluded from the selection. As a result of the initial sampling a nationally representative gross sample of 13,222 people was in principle eligible for

participation according to the age, sex and community type criteria.

All subjects from this gross sample who were not eligible were subsequently excluded. Subjects were not eligible if:

- they had died before they could be included in the study;
- they moved to an unknown address;
- they were hospitalized;
- they possessed insufficient German language skills.

These exclusion criteria can be regarded as relatively conservative when compared to other studies (Stolzenberg, 2000) and foreign residents are underrepresented. The cleared gross sample for the survey consisted of 11,601 subjects, who were approached and invited to participate after giving informed consent.

Response rate in the core survey The response rate (completing the core survey assessment) was 61.41%, which led to a total of 7,124 participants, between 18 and 79 years of age. Note that the response rate including subjects completing only parts of the assessment was 77.8% – the number of subjects who did not participate at all in the survey was only 2,575 (22.2% of the cleared gross sample).

This represents 0.011% of the total German adult population. Reasons for non-participation were:

- refusal (for example due to protection of data privacy) (2.6%);
- unavailability at the time of assessment (time constraints or being out of town) (2.8%);
- illness (2.3%);
- unable to be contacted by field team (3.4%);
- other reasons (1.7%);
- no information about non-participation (9.4%).

The response rate of 61.4% was slightly less than in the group originally targeted (65%). This might be due partly to the complex assessment with its technical requirements for interviews in the study centres (which took up to five hours, the mean time being three hours). This can be considered as a marked time burden for participating subjects. However, one needs to acknowledge that studies with similar sampling procedures in Germany and elsewhere usually do not arrive at higher response rates (Koch, 1998).

Non-participation interviews A total of 1,860 subjects (16.0% of the cleared gross sample) who refused to participate in the survey nevertheless completed a short questionnaire that asked about some sociodemographic and health-related variables. Non-responder analyses revealed tolerable differences concerning age and sex between responders and non-responders (women aged between 70 and 79 were underrepresented in the survey sample – Stolzenberg, 2000). There were also no differences in the prevalence of smoking and in overall self-perceived health status (as measured on a five-point rating scale). The Body Mass Index, which measures a known risk factor for several medical states, produced lower scores among non-responders. This might be due to the different assessment methods used (objective measurement of height and weight by study doctors in the core survey, subjective report in the non-responder analysis – Bergmann et al., 1995).

Weighting and sample representativeness In order to adjust the net sample to German age, sex and community distributions, data were weighted corresponding to the national administrative statistics of December 1997 (Stolzenberg, 2000; for overall weighting issues see Lee et al., 1989, and below). Overall the net sample of 7,124 participants can be regarded as sufficiently representative; further information on sampling, and on sample and non-responder analyses of the core survey is provided by Schroeder et al. (1998), Winkler et al. (1998), Thefeld et al. (1999), and Stolzenberg (2000). Information about sample representativeness is provided below.

Fieldwork procedures in the core survey (GHS-CS) The fieldwork in the core survey took place between October 1997 and March 1999. Four teams were created to carry out the examinations at the sampling units' examination centres. Each team consisted of a workforce sufficiently trained to provide high-quality data. Every workforce included a study doctor (team leader, carrying out the physical examination, the interview, and the exploration of subjects' medication utilization), one field co-ordinator in charge of preparing the conduct of the examination (contacting subjects, arranging times of examinations, handing over test tubes, general preparation of examination centres provided by communities), one non-medical interviewer (welcoming subjects, organizing a smooth procedure

within the centre, handing over and checking of the questionnaire), two additional specialist interviewers for the sections regarding nutrition and the environmental survey, and a medical technician (laboratory tests, dispatch of blood and urine probes). Examination centres were situated in rooms provided by the respective local authority or local public health department. Study procedures and assurance of confidentiality were explained to respondents at the time of the core survey examination, and written consent was obtained for the core survey and all its supplements.

The quality of the study's execution was ensured by internal and independent external quality control measures. The examination teams were visited regularly by members of the project's management who checked the quality of every single work process with a special checklist. Visits were carried out by employees of an external institute that provided additional professional quality control. Overall, no major problems affecting the validity of data were detected; a detailed summary of this study component is available on request (Potthoff et al., 1999).

The core survey (GHS-CS) assessment and instruments: somatic disorders and generic measures

Briefly, the core survey assessment consisted of

- a self-report questionnaire;
- a standardized computer assisted clinical medical interview (CAPI);
- a laboratory assessment, administered by the field teams described above; and
- a screening for mental disorders, which served as the first stage of the mental health supplement (see below).

Table 1 presents the domains, instruments and measures used in the core survey. The examination started with a self-report questionnaire to evaluate subjects' current and past somatic symptoms and complaints, current and past medical treatment history, psychosocial factors, healthcare utilization, impairments and disabilities. The German version of the Medical Outcomes Study Short Form-36 Health Survey (SF-36; Brazier et al. 1992; McHorney et al., 1992, 1993; Bullinger, 1995; Bullinger and Kirchberger, 1998), a quality-of-life questionnaire that measures health functioning and wellbeing across several domains, was also included in the self-report packet. This instrument measures a broad range of health concepts that are neither disease nor treatment specific (in eight domains) and meets the psychometric standards of validity and reliability (Ware and Sherbourne, 1992).

The parts of the questionnaire that focus on health service utilization collect specific data on occurrence and number of subjects' utilization of various health services within the past 12 months and on the subjects' satisfaction with those services. Subjects were presented with a list of 18 doctor subspecialities, and asked to mark whether they had used those kinds of doctors within the last 12 months and, if so, how often they did so and if they felt satisfactorily informed and treated. Furthermore, the questionnaire asked how many nights subjects had spent at a hospital for inpatient treatment during the last 12 months.

Completion of the questionnaires was followed by a structured clinical computer-assisted interview in order to re-examine and refine the data from the self-report packet. For these purposes study doctors used the information given by study participants in the self-report questionnaire about health status as indicators of the disorders from which the subjects might be suffering. If significant information about diseases was present in the self-report questionnaire, a specific exploration was carried out with regard to the disorder's diagnostics, therapy, and effects on the subject's quality of life. In contrast to the information obtained from self-report questionnaires, each study doctor's interview resulted in a clinical decision as to whether or not a specific disorder had been present during the last four weeks, within the last year, or any time before. Diagnoses were then supplemented and revised on the basis of the laboratory test data, which became available several months later. A condensed list of the somatic diagnoses covered by this assessment is presented in Table 2. Specific diagnoses were grouped on the basis of clinical and group size considerations.

Including the laboratory testing period (for urine, blood samples, blood pressure, pulse, body weight, body height, hip and waist measurement), the mean period of the overall assessment was three hours.

Although the core survey used a crude symptom list for symptoms of mental morbidity, as well as a clinical

Table 1: Assessments of the GHS core survey (in chronological order of administration)

Self-report questionnaire

1. *Somatic disorders*
Presence of disorders (lifetime, 44 items that served as basis information for the medical interview; list of finally assigned diagnoses: see Table 2).

2. *Bodily pain*
Presence of bodily pains during the last seven days and last 12 months (including severity rating).

3. *Impairment, quality of life, disabilities*
German version of the Medical Outcomes Study Short Form-36 Health Survey (SF-36; Bullinger, 1995; Ware and Sherbourne, 1992). Measures physical and mental quality of life. Consists of 36 items that represent eight health concepts; two summary scores can be calculated.

Beschwerdenliste (von Zerssen, 1976). Rating scale for the assessment of clinical complaints. Consisting of 24 items that represent general complaints, bodily complaints and mental complaints. A summary score can be calculated.

Restrictions of everyday activities during last 12 months due to illness, handicap, occupational disease, bad eyesight or difficulty in hearing.

4. *Utilization of health services*
Consultations with a health service provider/ medical doctor (when most recently, kind of provider, cause of utilization, satisfaction).

For 18 doctor sub-specialities (including psychotherapist): how often consulted during last 12 months, satisfaction.

5. *Health related behaviour*
Modules on smoking behaviour, eating and drinking behaviour, physical exercise.

6. *Contentedness and social relations*
Overall contentedness with life and with nine important life domains such as family life and financial situation (rating scales).

Social support. ('How many people do you know – your family included – that you can absolutely rely on in case you are stuck in real trouble.')

7. *General socio-demographic information, social class index*
Age, nationality, marital status, insurance status, income, education, and work.

An index of social class (Winkler, 1998) derived from information on education, income and current (job) position (components are scored from 1 to 7, total score ranges from 3–21). Total scores from 3–8 represent 'low social class' scores from 9–14 'medium social class', and scores from 15–21 'high social class'.

8. *Other topics*
Poisoning and injuries, environment and environmental strains, childhood and adolescence, and overseas travelling.

A) Clinical laboratory assessments

1. *Body measures:*
Six body measures were obtained: blood pressure, pulse, body weight, body height, hip and waist circumferences.

2. *Laboratory measures*
Analyses of more than 50 measures: hematological parameters, enzymes, metabolites, electrolytes, trace elements, hormones, medication, antibodies, allergens, serum/plasma und urine.

B) Medical interview

1. *Prevalences of somatic disorders*
Study doctors conducted computer-assisted interviews (CAPI). Taking into account the information on somatic disorders provided by the self-report questionnaire they established lifetime prevalences, 12-month prevalences, and point prevalences (four weeks) of somatic disorders (list of finally assigned diagnoses: see Table 2).

2. *Other topics*
For significant somatic disorders (for example, cardiac infarct) specific explorations with regard to formerly undergone diagnostics, therapy, and effects on quality of life.

Utilization of medication, health prevention activities and inoculation status.

C) Screening for mental disorders

Munich-Composite International Diagnostic-Screener (CID-S)
CID-S, a 12-item self-report screening questionnaire for mental disorders (Wittchen et al., 1999). Questions are modelled after the standard lifetime symptom stem questions of the World Health Organization Composite International Diagnostic Interview (CIDI; WHO, 1997) and represent essential DSM-IV and ICD-10 criteria.

Table 2. Somatic disorders covered in the core survey

Hypertension	hypertension
Cardiac diseases	heart circulation disturbances, narrowing of the coronary vessels, angina pectoris, cardiac infarct, heart weakness, heart insufficiency
Cerebrovascular diseases	stroke, brain circulation disturbance
Other vascular diseases	leg circulation disturbances, artery occlusion, varicose veins, vein thrombosis
Chronic-obstructive pulm. (COP)	asthma, chronic bronchitis
Ulcers, gastritis stomach	lining inflammation, gastritis, gastric ulcer or ulcus duodeni, ulcus pepticum
Gall bladder, liver disease	gall bladder inflammation or gallstones, shrinking liver, cirrhosis, liver inflammation, hepatitis, infectious jaundice
Endocrine disorders	thyroid gland disease, osteoporosis
Diabetes	diabetes with insulin treatment, diabetes without insulin treatment
Metabolic syndromes	high triglyceride level, high cholesterol level, gout or increase of uric acid
Renal diseases	kidney infection, pyelonephritis, renal colic, kidney stones
Cancer	cancer, malignant tumors
Neurological diseases	migraine, epilepsy, Parkinson's disease, multiple sclerosis, meningitis
Musculo-skeletal diseases	wear and tear type of arthritis, arthritis of the knee or hip, spinal arthritis, inflammatory diseases of the joints or spinal column, low back pain
Allergies	hay fever, allergic conjunctivitis, allergic eczema, neurodermatitis, food allergy, allergic hives, other allergies
Gynecological diseases	diseases of uterus, ovaries or oviduct

A complete list of the 44 disorders assessed in the self-report questionnaire and coded in the medical interview is available on request.

rating for treated mental disorders (assessed by the physician during the medical interview), the core survey did not incorporate any serious attempt to assess the presence or absence of specific mental disorders. However, an additional important element in the core survey assessment was the administration of a brief screener for mental disorders (CID-S – Wittchen et al., 1999a). Items in this questionnaire are modelled after the standard lifetime symptom stem questions of the World Health Organization Composite International Diagnostic Interview (CIDI) (Wittchen, 1994; World Health Organization, 1997). Screening questions represent essential DSM-IV and ICD-10 criteria that must be fulfilled for the diagnosis of the respective disorder. The CID-S mean administration time is 3.5 minutes. The test-retest reliability of the 12 CID-S items is satisfactory, with kappa values ranging from 0.64 to 0.92. The CID-S has been found to have an overall sensitivity of 85.3% for the disorders included in the questionnaire. The results of this questionnaire were used as a first-stage screening measure for the second, more detailed mental health assessment (see below).

The mental health supplement (GHS-MHS)

Overall design issues For financial and logistical reasons, the data for mental disorders were gathered by use of a two-stage design. The first stage entailed the administration of a screening questionnaire for mental disorders at the end of the medical examination for the core survey described above. The second stage involved the separate administration of a complete, structured, clinical psychopathological interview to all those from the core survey who were screened positive for a mental disorder and to a random sample of 50% who screened negative. Most interviews took place within two to four weeks of the core

survey medical examination in order to justify relating data from the two examinations.

The mental health supplement included only persons aged from 18 to 65 years. Core survey participants between 66 and 79 years of age were excluded because the psychometric properties of the CIDI, the interview used in the study, have not been yet satisfactorily established for use in older populations (Knäuper and Wittchen, 1994).

Sampling and response rates in the mental health supplement (GHS-MHS) Subjects who marked at least one of the CID-S screening items positive, or rated one of the items in the core survey self-report package concerning past drug use or psychiatric illness positively, were defined as screen positive; all other participants were considered as screen negative. Of those subjects in the core survey net sample between 18 and 65 years of age (N = 6,159), all screen positives (N = 3,474) and a random sample of almost 50% of the participants who screened negative (N = 1,301) were asked to participate in the second-stage assessment. Some of the participants (N = 71) refused to complete the screener for mental disorders administered in the core survey. The conditional response rate was 87.6%: a total of 4,181 respondents, 18 to 65 years of age, completed the second stage of the GHS-MHS (Figure 2). Non-response was due mainly to refusal to participate (8.8%) and inability to reach the selected respondents (2.7%). Rates of non-response and reasons for non-response did not differ significantly between screen-negative and screen-positive respondents from the core survey.

As a result of the stratified sampling design, data were first weighted to reflect the screen-positive/screen negative sampling scheme (screen negatives received twice the weight of screen positives; average weight was set to 1). The weighting scheme also accounts for non-response according to age, gender, and geographic location to match the distribution of the sampling frame. To account for the weighting scheme as well as the stratified sampling design by screening status, confidence intervals were calculated by the Huber-White sandwich method (Royall, 1986; Binder, 1983; Woodruff, 1971). This was carried out with the Stata software package, version 7.0 (StataCorp, 2001). Alternatively, one could address the weighting by applying resampling methods such as the jackknife and bootstrap (Efron and Tibshirani, 1993; Carpenter and Bithell, 2001). The advantage of the latter is that it addresses the random nature of the statistical weight because it depends on the distributions in the sample, but it requires much more computing time than the sandwich method. For huge studies, the first point can be viewed as insignificant. As the number of calculations in the current study was high (as is typical for epidemiological studies) it was decided, for reasons of computational effort, to use the sandwich method. A weight variable was also created, based only on main effects and pairwise interactions of the CID-S screening items on completing the second stage (disregarding sociodemographic characteristics); prevalence results remained essentially the same.

Table 3 presents the demographic distribution of respondents to the GHS and a comparison of the

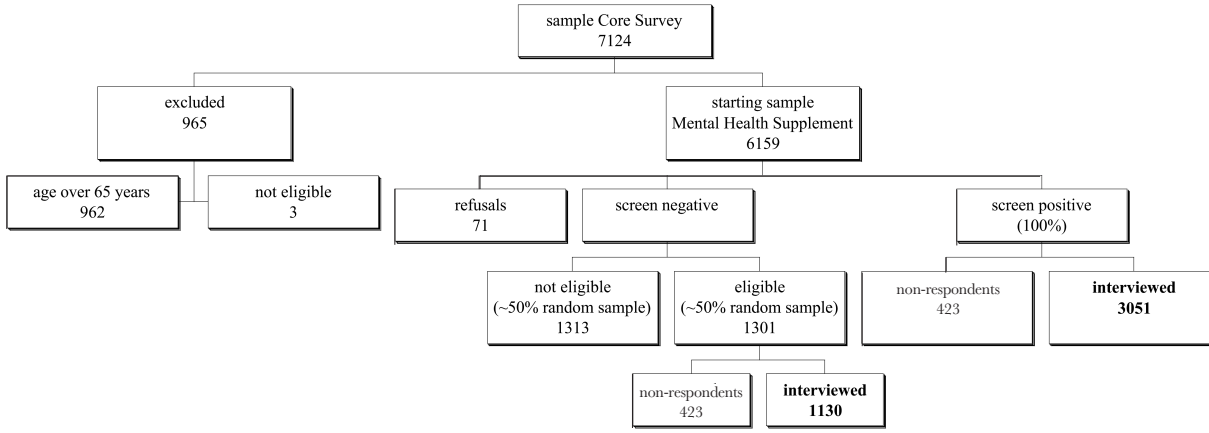

Figure 2. Distribution of respondents and non-respondents.

weighted respondent distribution to the distribution of Germany.

As reflected in Table 3, the mental health supplement sample after the adjustment provides a good to almost perfect representation of the German population in terms of the selected biosocial variables chosen.

Fieldwork in the mental health supplement (GHS-MHS) Almost all of the interviews of the second stage of the mental health supplement were conducted in the homes of the respondents between November 1997 and April 1999. Only in exceptional cases was the interview conducted by telephone. The computer-assisted interviews were conducted by 24 trained interviewers, most of whom had already worked in other CIDI studies during the previous five years. The average interviewer worked in eight sampling units and conducted 174 interviews. Interviewers had the following professional backgrounds: 18 had graduate degrees in psychology, two had graduate degrees in sociology, two were graduate students in psychology, one was a medical doctor, and one was a health professional. Interviewers completed a three-day training session for the GHS-MHS. As the computerized version of the interview is more flexible, easier to use and more free from errors than the paper-and-pencil version of the CIDI, this training focused on the administration of the interview by application of the portable computers. Interviewers were also required to attend CIDI refresher courses every three months throughout the field period.

Interviewers were closely monitored throughout the field period by trained M-CIDI clinical editors, who regularly checked all interviews according to a standard procedure. Feedback was given to every interviewer to avoid errors in later interviews, and interviewers promptly recontacted subjects by telephone whenever missing data, unclear responses, or errors were found. A final quality-control stage eliminated eight interviews from the sample due to missing or inconsistent datasets. For further information on interviewer training and fieldwork organization (for example, coordination with core survey teams) see Wittchen (1999).

Instruments and domains of the second stage assessment of the GHS-MHS Psychopathological and diagnostic assessments were based on the computer-assisted version of the Munich Composite International Diagnostic Interview (DIA-X/M-CIDI) (Wittchen and Pfister, 1997; Wittchen et al., 1999b). The DIA-X/M-CIDI is a modified version of the World Health Organization CIDI, version 1.2, supplemented by questions to cover DSM-IV and ICD-10 criteria. The DIA-X/M-CIDI is a fully structured interview that allows for the assessment of symptoms, syndromes, and four-week-, 12-month-, and (for some disorders) lifetime diagnoses of DSM-IV mental disorders along with information about onset, duration and severity for threshold and subthreshold definitions. Table 4 provides an overview of the assessment domains of the second stage assessment.

The version of the DIA-X/M-CIDI used in the GHS-MHS contained sections to assess the following groups of DSM-IV disorders: mental disorders due to general medical condition; schizophrenia and possible psychotic disorders (screening without further differential diagnosis); substance-related disorders (nicotine, alcohol, and drug); depressive disorders and bipolar disorders; anxiety disorders; obsessive compulsive disorder; somatoform disorders (and the abridged somatization syndrome SSI4,6; Escobar et al., 1989); and eating disorders. Subthreshold diagnoses could also be assessed (Carter et al., 2001). The interview also contained additional assessment modules to evaluate impairments, mental health services utilization and treatment history (Wittchen and Jacobi, 2001), as well as a module to assess associations between current and lifetime medical disorders and psychopathology. Diagnoses were assessed mainly within a 12-month time frame along with information about the age at first onset, course, duration and persistence. For some disorders (affective, psychotic, eating disorders and some anxiety disorders) lifetime history was assessed as well.

The DIA-X/M-CIDI was supplemented by a separate respondent's booklet that included cognitive aids to assist the respondent in dating symptom onset and recency, answering complicated symptom questions, and identifying course patterns. Several additional scales and questionnaires were integrated into the respondents' booklet, such as the Pittsburgh Sleep Quality Index, a self-report questionnaire that assesses sleep quality and disturbances (Buysse et al., 1989), and the WHO disablement screening instrument (Rehm et al., 1999).

The mean period to complete the computerized DIA-X/M-CIDI, including additional questionnaires, was 63 minutes. The test-retest reliability of

Table 3. Demographic distribution of the German population, the respondents of the core survey and the respondents of the mental health supplement unweighted (N, %) and weighted (Nw, %w)

	German population 31. Dec. 1997		GHS-Core Survey (GHS-CS)		GHS-Mental Health Supplement (GHS-MHS)										
					Screen positive 1			Screen negative [1]			Total				
Total Age	N	%total	N	%total	N	%total	% GHS-CS	N	%total	%pos	N	%total	%neg	Nw	%w
Total	48,623,582	100.0	6159	100.0	4181	100.0	67.9	3051	100.0	87.8	1130	100.0	43.2	4181	100.0
18-19	1,555,877	3.2	267	4.3	181	4.3	67.8	131	4.3	88.5	50	4.4	42.7	134	3.2
20-24	3,726,957	7.7	454	7.4	296	7.1	65.2	215	7.0	82.1	81	7.2	43.5	320	7.7
25-29	5,120,766	10.5	562	9.1	374	8.9	66.5	251	8.2	86.6	123	10.9	47.1	440	10.5
30-34	6,429,299	13.2	755	12.3	513	12.3	67.9	369	12.1	89.1	144	12.7	43.1	553	13.2
35-39	6,162,182	12.7	800	13.0	555	13.3	69.4	396	13.0	90.2	159	14.1	44.9	530	12.7
40-44	5,408,909	11.1	668	10.8	460	11.0	68.9	347	11.4	88.5	113	10.0	42.6	465	11.1
45-49	4,992,542	10.3	644	10.5	454	10.9	70.5	331	10.8	88.3	123	10.9	47.5	429	10.3
50-54	4,156,613	8.5	561	9.1	399	9.5	71.1	296	9.7	90.0	103	9.1	45.0	357	8.5
55-59	5,577,400	11.5	795	12.9	525	12.6	66.0	406	13.3	85.5	119	10.5	37.9	480	11.5
60-64	4,745,123	9.8	601	9.8	389	9.3	64.7	284	9.3	88.5	105	9.3	38.6	408	9.8
65	747,914	1.5	52	0.8	35	0.8	67.3	25	0.8	86.2	10	0.9	43.5	64	1.5
Men, total	24,450,239	50.3	3034	49.3	1913	45.8	63.1	1255	41.1	85.9	658	58.2	42.7	2102	50.3
18-19	796,858	1.6	142	2.3	94	2.2	66.2	60	2.0	88.2	34	3.0	45.9	69	1.6
20-24	1,902,813	3.9	242	3.9	152	3.6	62.8	100	3.3	80.0	52	4.6	46.0	164	3.9
25-29	2,613,438	5.4	262	4.3	165	3.9	63.0	99	3.2	86.8	66	5.8	46.2	225	5.4
30-34	3,276,986	6.7	372	6.0	230	5.5	61.8	152	5.0	86.4	78	6.9	40.4	282	6.7
35-39	3,129,616	6.4	395	6.4	254	6.1	64.3	165	5.4	86.8	89	7.9	44.1	269	6.4
40-44	2,740,595	5.6	320	5.2	215	5.1	67.2	146	4.8	90.7	69	6.1	45.7	236	5.6
45-49	2,521,729	5.2	310	5.0	199	4.8	64.2	126	4.1	86.3	73	6.5	45.3	217	5.2
50-54	2,071,472	4.3	288	4.7	190	4.5	66.0	128	4.2	87.1	62	5.5	44.0	178	4.3
55-59	2,751,744	5.7	387	6.3	234	5.6	60.5	158	5.2	81.0	76	6.7	40.2	237	5.7
60-64	2,292,016	4.7	290	4.7	165	3.9	56.9	109	3.6	87.2	56	5.0	34.6	197	4.7
65	352,972	0.7	26	0.4	15	0.4	57.7	12	0.4	85.7	3	0.3	25.0	30	0.7
Women, total	24,173,343	49.7	3125	50.7	2268	54.2	72.6	1796	58.9	89.2	472	41.8	44.0	2079	49.7
18-19	759,019	1.6	125	2.0	87	2.1	69.6	71	2.3	88.8	16	1.4	37.2	65	1.6
20-24	1,824,144	3.8	212	3.4	144	3.4	67.9	115	3.8	83.9	29	2.6	39.7	157	3.8
25-29	2,507,328	5.2	300	4.9	209	5.0	69.7	152	5.0	86.4	57	5.0	48.3	216	5.2
30-34	3,152,313	6.5	383	6.2	283	6.8	73.9	217	7.1	91.2	66	5.8	46.8	271	6.5
35-39	3,032,566	6.2	405	6.6	301	7.2	74.3	231	7.6	92.8	70	6.2	46.1	261	6.2
40-44	2,668,314	5.5	348	5.7	245	5.9	70.4	201	6.6	87.0	44	3.9	38.6	229	5.5
45-49	2,470,813	5.1	334	5.4	255	6.1	76.3	205	6.7	89.5	50	4.4	51.0	212	5.1
50-54	2,085,141	4.3	273	4.4	209	5.0	76.6	168	5.5	92.3	41	3.6	46.6	179	4.3
55-59	2,825,656	5.8	408	6.6	291	7.0	71.3	248	8.1	88.6	43	3.8	34.4	243	5.8
60-64	2,453,107	5.0	311	5.0	224	5.4	72.0	175	5.7	89.3	49	4.3	44.5	211	5.0
65	394,942	0.8	26	0.4	20	0.5	76.9	13	0.4	86.7	7	0.6	63.6	34	0.8

[1] screen positive: At least one CID-S-item or one of the core survey items concerning past drug use or psychiatric illness rated positive; all other participants were considered as screen negative.

Table 4. The DIA-X/M-CIDI DSM-IV diagnoses assessed in the GHS mental health supplement, and other diagnostic and non-diagnostic modules and features of the second stage assessment

A) DSM-IV diagnoses

1. Mental disorders due to general medical condition

2. Substance-related disorders

Nicotine dependence
Alcohol abuse
Alcohol dependence
Drug[1] abuse
Drug dependence

3. Schizophrenia and other psychotic disorders (unspecific screening)

4. Affective disorders

Bipolar affective disorders (including subtypes)[2]
Major depression, single episode (including subtypes)[3]
Major depression, recurrent (including subtypes)[3]
Dysthymia

5. Anxiety disorders[4]

Panic disorder with and without agoraphobia.
Agoraphobia without the history of panic disorder.
Social phobia
Specific phobia
- animal type
- environmental type
- blood/injury type
- situational type
- other

Anxiety disorder NOS
Generalized anxiety disorder

6. *Obsessive-compulsive disorder*

7. Somatoform disorders

Somatization disorder
- somatization disorder
- undifferentiated somatization disorder
- somatic symptom index SSI4/6

Hypochondriasis
Pain disorder

8. Eating disorders

Anorexia
- Anorexia nervosa
- Atypical anorexia nervosa

Bulimia
- Bulimia nervosa
- Atypical bulimia nervosa

B) Other diagnostic and non-diagnostic modules and features

Sleep habits and sleep disorders:
Penn State Sleep Quality Index (PSQI; Buysse et al., 1989)

Impairments and disabilities:
- WHO/DAS (January 1999) Rehm, IJMPR, 1999
- impairment days (within past four weeks) due to psychological/psychosomatic problems, alcohol/drug intake or medication

Help-seeking behaviour due to psychological problems (lifetime):
- inpatient: seven types of institutions
- outpatient: psychiatrist, psychotherapist (four types), general practitioner, counsellor (eight types), other institutions (seven types)
- kind of treatment (medication, behaviour therapy, other psychotherapy, none of these)

Onset and course of mental and somatic problems:
Comorbidity module on the relation between mental and somatic disorders

Clinical and other interviewer observations
- Brief psychiatric rating scale (BPRS)
- Module on interview setting and quality of administration, participant´s behaviour and features

1 The interview covered the following substances in the abuse/dependency section: opioids, cannabioids, sedatives/hypnotics/anxiolytics, cocaine, amphetamines and other stimulants, hallucinogens, inhalants.

2 Both 'bipolar I' and 'bipolar II' disorders covered 19 subdiagnoses.

3 Both MDE single and MDE recurrent covered four subdiagnoses.

4 For anxiety disorders (including OCD) no lifetime diagnoses except for panic disorders.

the DIA-X/M-CIDI DSM-IV diagnoses (over a mean interval of 38 days) was found to be acceptable to good, with kappa values ranging between 0.56 and 0.81 for the main diagnostic categories. Procedural validity of the M-CIDI diagnoses as compared to independent clinical consensus diagnoses by treating physicians in a sample of 68 randomly chosen patients was found to be acceptable to very good (kappa values range between 0.50 and 0.96, excluding psychotic disorders (0.21)). Further details of the psychometric properties of the CIDI have been presented elsewhere in greater detail (Wittchen, 1994; Lachner et al., 1998; Reed et al., 1998).

Sociodemographic characteristics of the GHS-MHS sample

Table 5 shows the sociodemographic characteristics of the sample interviewed in the Mental Health Supplement (GHS-MHS).

Consistent with the national statistics for the German population, 62.8% of the sample were married. The educational status was higher than in the overall German population; this can be explained by an age effect due to the restriction to subjects younger than 65 years of age in the study (older cohorts have lower education). With regard to participants' educational levels and employment status, there are significant differences between the former West Germany and the former East Germany. These differences may be accounted for by different educational systems in the past and by the current economic situation in Germany, with the former West Germany still having the stronger economy overall.

Considering those participants who were employed at the time of the survey, there is a higher proportion working less than 15 hours a week in West Germany than in East Germany, where such a working schedule was found to be rare. Among those who were not employed, a lower proportion was retired and unemployed in West Germany than in East Germany, whereas a higher proportion of homemakers was observed in West Germany compared to East Germany. The latter finding can be explained by a traditionally higher proportion of working women in East Germany.

The index of social class (Winkler, 1998) is derived from information on education, income and current (job) position. The subsample from West Germany tends to belong to the highest social class more often, and the subsample from former East Germany tends to belong to the median social class more often.

Discussion and conclusion

The aim of this paper was to provide a comprehensive overview of the design and methods used in the GHS core survey and its second-stage mental health supplement. Data from these two sources enabled public health researchers to investigate mental health on a representative national level for the first time ever and, therefore, to compare it with representative international data. Given the complexity of the overall study with its various modules and the associated time burden on the part of study participants, the overall response rate of 65% and particularly 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. These additional checks provided no evidence for any major systematic sample bias. It is acknowledged, however, that the interviewed sample did not include any respondents currently hospitalized because of major somatic or mental illnesses.

Overall, the GHS with its core and supplementary modules has demonstrated that it is possible to explore somatic and mental health simultaneously within one study. In particular, previous reservations about the inclusion of mental disorders on the basis that mental health assessment modules and questions might lower the response rate dramatically were not substantiated. The mental health supplement was, in fact, found to be more acceptable to respondents than the quite complex laboratory-, questionnaire- and interview-based core survey that focused on somatic health. In order to investigate associations between mental and somatic health it is most crucial to assess the respective disorders without too long a delay. This requirement represents a considerable logistical problem that, in general, was mastered successfully in this study. Whereas more than 80% of the study participants went through the core survey and the supplement within eight weeks of each procedure (~60% of the study participants within two to four weeks), there was a delay of more than eight weeks between both assessments for the remaining subjects. Analyses of associations between mental and somatic health must pay special attention to this latter subgroup and perhaps exclude these subjects from analyses combining the core survey and mental health supplement.

Table 5. Distribution of sociodemographic variables in the Mental Health Supplement, unweighted (N, %) and weighted (Nw, %w)

	Total				West Germany				East Germany			
	N	Nw	%w	95% ci	N	Nw	%w	95% ci	N	Nw	%w	95% ci
Sex												
Men	1913	2102	50.3	48.6 – 52.0	1301	1669	50.2	48.2 – 52.2	612	434	50.6	47.7 – 53.6
Women	2268	2079	49.7	48.0 – 51.4	1512	1656	49.8	47.8 – 51.8	756	423	49.4	46.4 – 52.3
Age												
18-34	1357	1441	34.5	32.8 – 36.2	941	1153	34.7	32.7 – 36.7	416	288	33.6	30.8 – 36.6
35-49	1465	1421	34.0	32.4 – 35.6	978	1123	33.8	31.9 – 35.7	487	298	34.8	32.1 – 37.7
50-65	1359	1319	31.6	30.0 – 33.2	894	1049	31.6	29.7 – 33.5	465	270	31.6	28.9 – 34.3
Marital status												
married	2617	2625	62.8	61.1 – 64.4	1738	2085	62.7	60.7 – 64.7	879	540	63.0	60.1 – 65.9
separated	97	95	2.3	1.8 – 2.8	74	81	2.4	1.9 – 3.1	23	14	1.6	1.0 – 2.5
single	991	1021	24.4	23.0 – 25.9	695	815	24.5	22.8 – 26.3	296	205	24.0	21.4 – 26.7
divorced	277	244	5.8	5.1 – 6.6	168	182	5.5	4.7 – 6.4	109	62	7.2	5.9 – 8.8
widowed	119	114	2.7	2.2 – 3.4	82	90	2.7	2.1 – 3.5	37	23	2.7	1.9 – 3.9
missing	80	83	2.0	1.5 – 2.5	56	70	2.1	1.6 – 2.8	24	12	1.4	0.9 – 2.2
Education [1]												
Hauptschule	1453	1581	37.8	36.1 – 39.5	1190	1414	42.5	40.5 – 44.6	263	167	19.5	17.3 – 21.9
Mittlere Reife	1467	1322	31.6	30.1 – 33.2	756	875	26.3	24.6 – 28.1	711	447	52.3	49.3 – 55.2
Abitur	394	420	10.0	9.0 – 11.2	279	344	10.4	9.2 – 11.7	115	75	8.8	7.2 – 10.7
university	355	340	8.1	7.2 – 9.1	220	258	7.8	6.7 – 8.9	135	81	9.5	7.9 – 11.3
other	365	365	8.7	7.8 – 9.8	257	300	9.0	7.9 – 10.2	108	65	7.6	6.2 – 9.4
none	68	72	1.7	1.3 – 2.2	55	64	1.9	1.5 – 2.6	13	9	1.0	0.6 – 1.8
missing	79	81	1.9	1.5 – 2.5	56	69	2.1	1.6 – 2.8	23	11	1.3	0.9 – 2.1
Employment status												
employed												
fulltime	1962	2043	49.8	48.1 – 51.6	1310	1617	49.7	47.6 – 51.8	652	426	50.4	47.4 – 53.4
15-34 h/week	361	330	8.1	7.2 – 9.0	262	275	8.4	7.4 – 9.6	99	56	6.6	5.3 – 8.2
<15 h/week	173	195	4.8	4.0 – 5.6	161	185	5.7	4.8 – 6.7	12	9	1.1	0.6 – 2.1
other [2]	190	178	4.3	3.7 – 5.1	130	138	4.3	3.5 – 5.1	60	40	4.7	3.6 – 6.2
no employment												
School/Student	226	232	5.7	4.9 – 6.6	167	193	5.9	5.0 – 7.0	59	39	4.6	3.4 – 6.2
retired	391	398	9.7	8.7 – 10.9	224	294	9.0	7.8 – 10.4	167	104	12.3	10.5 – 14.4
unemployed	334	265	6.5	5.7 – 7.3	131	146	4.5	3.7 – 5.4	203	119	14.0	12.1 – 16.2
Homemaker	282	296	7.2	6.4 – 8.1	258	282	8.7	7.6 – 9.8	24	14	1.7	1.1 – 2.6
other [3]	184	163	4.0	3.4 – 4.7	114	125	3.8	3.2 – 4.7	70	38	4.6	3.5 – 5.8
Social class [4]												
low	817	783	19.1	17.8 – 20.5	558	623	19.2	17.7 – 20.8	259	159	18.8	16.6 – 21.2
medium	2367	2359	57.6	55.9 – 59.4	1549	1847	56.8	54.8 – 58.9	818	513	60.7	57.7 – 63.6
high	912	952	23.3	21.8 – 24.8	645	779	24.0	22.3 – 25.8	267	173	20.5	18.1 – 23.1

1: Highest level of education completed by the proband: Hauptschule = mandatory basic school (9 years); Mittlere Reife = intermediate type of secondary school that allows qualification for specific university curricula (10 years); Abitur = secondary school that prepares for entrance to university (12-13 years); other: e.g. still in school, other secondary school qualification preparing for entrance to advanced technical college; none: left school without secondary school qualification

2: E.g. maternity leave

3: E.g. military or civil service

4: Index of social class (Winkler, 1998) derived from information on education, income and current (job) position

Another particular strength of the study is that it is largely built on standardized assessment instruments with an established reliability allowing for direct comparisons with other studies. Further, the GHS covers a much wider range of somatic and mental disorders than any previous survey of which we are aware. The wider scope in terms of morbidity types covered does allow for a considerably higher degree of specification. In future analyses that investigate the effect of ill health on wellbeing, quality of life, disabilities and service utilization, it is important to note that the overall rates of morbidity shown in this study are not easily comparable to findings from other community studies, which used a more restricted range of disorders. Similarly, the patterns of comorbidity assessed will be of a much more complex nature due to the coverage of a substantially higher number of disorders.

Further information

The data from this study are available as a Public Use File from the first author, 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) contact the Robert-Koch-Institute, Nordufer 20, D-13353 Berlin, Germany; e-mail: stolzenbergh@rki.de.

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