

Original contribution

Can gender differences in the prevalence of mental disorders be explained by sociodemographic factors?

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Summary

Background and aims: Epidemiological studies throughout the world consistently reported higher rates of depression and anxiety disorders in women, whereas men consistently show higher rates of substance and antisocial disorders. The present study examined factors potentially contributing to these gender differences using general population data.

Methods: The sample was drawn from population registries (N = 4181) and can be regarded as representative for the adult German population aged 18–65. Mental disorders (DSM-IV) were assessed with a diagnostic interview (CIDI) carried out by clinically trained interviewers. A range of sociodemographic variables was analysed within men, within women, and between genders.

Results: The prevalence of common mental disorders (mood, anxiety, substance use and somatoform disorders) is higher among females, with the exception of substance use disorders. Young age was related to substance disorders both in women and in men. Not being married and being unemployed were associated with increased rates of mental disorders in both sexes, but in men stronger than in women. Being retired was associated with depression only in women, whereas belonging to a higher social class, working fulltime and having children appeared to be protective factors for men only. Other sociodemographic factors (concerning education, employment and family status) were not associated with increased rates of mental disorders both in women and men.

Conclusion: Overall the emotional advantages or disadvantages of marital status, employment status, number of children, parenthood and social class apply equally to men and women. We cannot explain the female preponderance in most mental disorders by detecting specific unfavourable patterns of sociodemographic correlates, suggesting that determinants of gender differences in common mental disorders are still far from being understood.

Keywords: Gender differences; mental disorders; DSM-IV; CIDI; risk factors.

Introduction

Epidemiology findings from the 1980s and 90s based on representative community surveys (e.g. from the US, Northern Europe and England as well as from Canada, New Zealand and Australia) suggested that women and men differ strikingly in the prevalence, incidence and morbidity risk of specific mental disorders. The importance of gender differences in mental health is usually illustrated in significantly different prevalences and incidence rates of major depression, whereas the explanations for these findings remain poorly studied. Despite the wide variations in lifetime prevalence estimates of major depression across countries and studies, the roughly 2:1 sex ratio is consistent cross-culturally.

Moreover, findings from epidemiological and clinical samples suggest that the increased risk for women can be shown for various disorders: affective disorders (Weissman et al., 1993; Kessler et al., 1994a; Meltzer et al., 1995; Bebbington, 1998; Gater et al., 1998; Wittchen et al., 1998; Andrews et al., 1999; Jacobi et al., in press), anxiety disorders (Bekker, 1996; Weissman et al., 1997; Gater et al., 1998; Lewinsohn et al., 1998; Yonkers et al., 1998; Wittchen et al., 1999; Merikangas et al., 2002) and somatoform disorders (Piccinelli and Simon, 1997; Lieb et al., 2000; Smith et al., 2001). In contrast, men have consistently higher rates of substance and antisocial disorders than women (Kessler et al., 1993; Gili et al., 1998; Nelson and Wittchen, 1998; Bijl et al., 2000; Spauwen et al., 2003). Table 1 provides an

Table 1. Comparison of 12-months prevalence rates of common mental disorders by gender in four population based surveys

Study	Any mood disorder			Any anxiety disorder			Any substance use disorder		
	% (SE)		gender ratio ¹	% (SE)		gender ratio ¹	% (SE)		gender ratio ¹
	male	female		male	female		male	female	
GHS_MHS (Germany) ²	8.5 (0.7)	15.4 (0.8)	1.8	9.2 (0.6)	19.8 (0.9)	2.2	7.2 (0.6)	1.7 (0.2)	0.2
NCS (USA) ³	8.5 (0.8)	14.1 (0.9)	1.6	13.4 (0.7)	24.7 (1.5)	1.8	16.1 (0.7)	6.6 (0.4)	0.4
NEMESIS (Netherlands) ⁴	5.7 (0.4)	9.7 (0.5)	1.7	8.3 (0.5)	16.6 (0.6)	2.0	14.1 (0.6)	3.5 (0.3)	0.3
ANSMH (Australia) ⁵	4.2 (0.5)	7.4 (0.4)	1.8	7.1 (0.5)	12.0 (0.6)	1.7	11.1 (0.7)	4.5 (0.4)	0.4

¹ Crude gender ratio: female/male.

² this Survey: German National Health Interview and Examination Survey, age: 18–65; Jacobi et al. (2002).

³ National Comorbidity Survey, age: 18–54; Kessler et al. (1994).

⁴ Netherland Mental Health Survey and Incidence Study, age: 18–64; Bijl et al. (1998).

⁵ The Australian National Survey of Mental Health and Well-Being, age: 18–99; Andrews et al. (1999).

overview of 12-months prevalence rates of mood, anxiety and substance use disorders by gender in several recent population-based studies using the same assessment methods, including findings from our survey.

According to Gater et al. (1998), the relative consistency of these findings does not support the assumption that gender differences in rates of mental disorders are caused only by local psychosocial effects that can be expected to vary from one society to another. Instead, findings seem to be more compatible with speculations that biological or psychosocial factors might be responsible that have similar effects across cultures, either interacting or working alone.

In general, biological, psychosocial and artefact explanations have been proposed to explain the predominance of most psychiatric disorders in women (for an extensive overview see Wilhelm and Parker, 1994; Macintyre et al., 1996; Piccinelli and Wilkinson, 2000; Waldron, 2000; Kendler et al., 2002), but none of these explanations has been consistently supported with empirical data (Bird and Rieker, 1999; Moller-Leimkuhler, 2002; Salokangas et al., 2002). This failure has been largely attributed to the fact that we still lack comprehensive aetiological models for these mental disorders (Bebbington, 1998).

Artefact explanations assume that much of the observed differences in prevalence rates may be produced by gender-related bias or even artefacts such as differences in help-seeking behaviour and symptom-reporting patterns (Kessler et al., 1981; Nolen-Hoeksema, 1990; Loewenthal et al., 1995; Bekker, 1996; Kessler, 1998), quality and quantity of symptoms (symptom profile; Young et al., 1990; Silverstein, 1999; Moller-Leimkuhler, 2002), recall bias (Ernst and Angst, 1992; Wilhelm and Parker, 1994), definitions of cases in

epidemiological studies (threshold for caseness; Angst and Dobler-Minolka, 1984; Wilhelm and Parker, 1994; Piccinelli and Wilkinson, 2000), or even gender-biased casefinding measurements (Salokangas et al., 2002). It has been suggested that these artefactual factors may contribute to the female preponderance in several mental disorders to some extent, yet gender differences still seem to be genuine and can be shown even after these are accounted for (Nazroo et al., 1998; Piccinelli and Wilkinson, 2000).

Biological theories have proposed differences in brain structure and functioning between men and women, including neurotransmitter, neuroendocrine and circadian rhythms, as well as genetic factors and reproductive functioning (Joffe and Cohen, 1998; Kornstein, 1997; Paykel, 1991; Pajer, 1995). These attempts, however, were predominantly focussed on depressive disorders (Schneider, 2002; Leibenluft, 1999). Furthermore, although attractive, explanations in biological terms face a number of difficulties. If higher rates in mental disorders in women are due to a universal biological vulnerability, the sex ratio ought to be unaffected by, for example, sociodemographic attributes. There is no convincing evidence for this, however (e.g. Bebbington, 1998). Thus, biological explanations alone are not sufficient. This inevitably moves the focus of interest to psychosocial hypotheses for gender differences in mental disorders.

From a psychosocial perspective, several possible explanations for gender differences have been suggested (Pajer, 1995; Bekker, 1996; Kornstein, 1997; Bebbington, 1998; Bird and Rieker, 1999; Leibenluft, 1999; Ihle et al., 2000; Piccinelli and Wilkinson, 2000), e.g. that women, in general, have a lower socio-economic status. Surveys since the 70/80s indi-

cated a higher prevalence of mental disorders in the lower social classes, though perhaps only for women (Weissman and Myers, 1978; Brown and Harris, 1978; Surtess et al., 1983; Robins et al., 1991; Kessler et al., 1994b). Higher rates for women may also reflect issues related to the fact that they may be subject to more significant, or more upsetting stressful life events or chronic difficulties (Brown et al., 1987; Bebbington et al., 1991; Nazroo et al., 1997; Wilhelm et al., 2002), low social support (Brown and Andrews, 1986; Fuhrer et al., 1992; Agrawal et al., 2002), victimization and adverse experiences in childhood (e.g. sexual or physical abuse or parental separation/divorce with resulting lack of child-care in early years; Cutler and Nolen-Hoeksema, 1991; Rodgers, 1994; Bebbington, 1998; Rennison and Welchans, 2000), and maladaptive coping styles (Hobfoll et al., 1994; Nolen-Hoeksema et al., 1994). Other issues suggested to contribute to a higher risk of common mental disorders among women have been social roles, such as marital and employment status (unequal adult gender role stresses; Vazquez-Barquero et al., 1992; Cramer, 1993; Kessler et al., 1993; Dennerstein, 1995; Loewenthal et al., 1995; Bekker, 1996; Daradkeh et al., 2002; Kendler et al., 2002). Yet, in light of contradictory findings, the reason for these differences remains unclear.

A particular problem of gender research in the field of mental disorders is the widespread neglect of direct comparisons between women and men: for example, a finding of an increased rate of mental disorders in single mothers from low social classes (e.g. Brown and Moran, 1997) does not in itself tell us if this association is gender-specific or due to the combination of single parenthood and low social class that applies for men as well.

The purpose of this paper is to investigate whether sociodemographic factors such as age/birth cohort, marital status or social class are differentially associated with mental disorders by gender, or whether these factors apply for women and men equally.

Specific research questions addressed are: (1) Which sociodemographic factors (univariate and stratified) are significantly associated with the prevalence of mental disorders in men? (2) Which sociodemographic factors (univariate and stratified) are significantly associated with the prevalence of mental disorders in women? (3) Do the factors examined act differentially in women and men (interaction between correlates and gender)?

Methods

Sample

Findings are based on the Mental Health Supplement of the German National Health Interview and Examination Survey (GHS-MHS) in 1999. The GHS sample was drawn from population registries (N = 4181) and can be regarded as representative according to the age, sex and community type criteria for the adult German population aged 18–65. The GHS consisted of a core survey (GHS-CS) and several supplemental surveys including the Mental Health Supplement (GHS-MHS). For financial and logistical reasons, the data for mental disorders in the GHS-MHS were gathered using 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 administration of a complete, structured, clinical interview used to obtain DSM-IV mental disorder diagnoses to all from the core survey who screened positive for a mental disorder and 50% of those who screened negative. Due to the resulting over sampling of screen positives in the GHS-MHS, data were weighted in the later analyses. Further detailed description of aims, design, reasons for non-participation, analyses of non-respondents, and methods of the GHS-MHS is available elsewhere (Bellach et al., 1998; Thefeld et al., 1999; Jacobi et al., 2002). The sociodemographic characteristics of the sample are shown in Table 2.

Assessment

The assessment of mental disorders (namely the DIA-X-M-CIDI, Wittchen, 1994; Wittchen and Pfister, 1997; Jacobi et al., 2002) is based on a modified version of the World Health Organization CIDI (Version 1.2; WHO, 1997). The DIA-X-M-CIDI is a fully structured interview that allows the assessment of symptoms, syndromes, 4-week-, 12-month-, and selected lifetime-diagnoses of a wide range of mental disorders according to DSM-IV (APA, 1994) and ICD-10 (WHO, 1991). The present paper focused on the following aggregated diagnoses: Substance use disorders, mood disorders, anxiety disorders, and somatoform disorders.

Psychometric properties of the CIDI were found to be acceptable to very good (Wittchen, 1994; Lachner et al., 1998; Reed et al., 1998). In addition, the interview contained further assessment modules, including questions on sociodemographic variables. It is important to note that no evidence of sex differences in reliability or validity of the CIDI diagnosis has been reported (Kessler, 1998). The social class index used is calculated from information on education, current job status, and household net income (Winkler-Schicht-Index; Winkler and Stolzenberg, 1998).

Analytic strategy

Psychiatric diagnoses reported below are based on DSM-IV (weighted data). Univariate and multivariate logistic regressions with odds ratios (OR) were used for binary response to describe the association between gender, mental disorders and their correlates (controlling for confounding variables

Table 2. Sociodemographic correlates for women and men (GHS-MHS; N = 4181; men: 50.3%, women: 49.7%); Prevalence and Odds ratios¹

	Total		Men	Women	OR ²	95% ci
	N	%	%	%		
Age						
18–34	1441	34.5	35.0	33.9	0.9	0.82–1.10
35–49	1421	34.0	34.3	33.7	1.0	0.84–1.12
50–65	1319	31.6	30.7	32.4	1.1	0.93–1.25
Marital status						
married	2625	64.1	63.6	64.5	1.1	0.92–1.22
single	1021	24.9	28.8	21.0	0.7*	0.56–0.77
separated/divorced/widowed	452	11.0	7.6	14.5	2.1*	1.65–2.64
School						
<i>Hauptschule</i> (9 years)	1584	38.6	40.2	37.0	0.9	0.77–1.03
<i>Realschule</i> (10 years)	1336	32.6	29.4	35.8	1.4*	1.17–1.57
<i>Abitur</i> (12–13 years)	1007	24.6	26.9	22.2	0.8*	0.67–0.93
other	60	1.5	1.2	1.7	1.4	0.79–2.57
(still) no school education completed	113	2.8	2.3	3.2	1.4	0.94–2.19
Employment status³						
employed						
fulltime	2043	49.8	69.5	30.1	0.2*	0.17–0.23
15–34 h/week	330	8.1	1.4	14.8	12.6*	8.15–19.3
<15 h/week	195	4.8	0.6	8.9	17.0*	8.14–35.5
not employed						
school/student	232	5.7	6.5	4.8	0.7	0.54–1.10
retired	398	9.7	9.9	9.5	0.9	0.75–1.24
unemployed	265	6.5	6.5	6.4	1.0	0.75–1.28
homemaker	296	7.2	0.1	14.3	128*	32.0–523
Family status						
no children	2442	59.5	60.4	58.6	0.9	0.82–1.09
1 child	772	18.2	17.9	19.8	1.1	0.95–1.36
2 + children	889	21.7	21.7	21.7	1.0	0.85–1.19
single parent ⁴	232	14.0	11.5	16.3	1.5*	1.10–2.02
employed (fulltime) + children ⁵	845	41.5	47.6	27.2	0.4*	0.32–0.51
employed (part time) + children	293	55.9	22.9	58.6	4.7*	2.19–10.3
Social class⁶						
low	782	19.1	17.5	20.8	1.3*	1.05–1.49
medium	2359	57.6	57.9	57.3	1.0	0.86–1.14
high	952	23.3	24.6	21.9	0.9	0.73–1.04

¹ Data weighted for nonresponse and design factors in all analyses.

² Odds ratios (OR) from logistic regression and 95% confidence intervals between gender (higher 1: more frequent in women, lower 1: more frequent in men); * p < 0.05.

³ “Other” employment status (e.g. Maternity leave, military or civil service) excluded from analyses.

⁴ Single parent: having no partner (married or not married) and having at least one child in the household; reference group: parent with partner (married or not married).

⁵ Reference group: employment (fulltime) without children; N = 1193, 58.5%; employment (parttime) without children; N = 232, 44.1%.

⁶ Index of social class (Winkler and Stolzenberg, 1998) derived from information on education, income and current (job) position.

such as age). Since our main interest was to examine the differences between males and females with regard to mental disorders, the analyses were performed for males and females separately and jointly (i.e. tested for interaction effects between gender and correlates). Analyses were performed using Stata software package, release 7.0 (StataCorp., 2001). All odds ratios reported below are statistically significant at the 5% level.

Results

Figure 1 shows associations between sociodemographic factors and the diagnosis of any investigated mental disorder by gender (note that only significant odds ratios are shown; reference groups see Tables 3 and 4). Men show a reduced risk for any mental disorder in higher

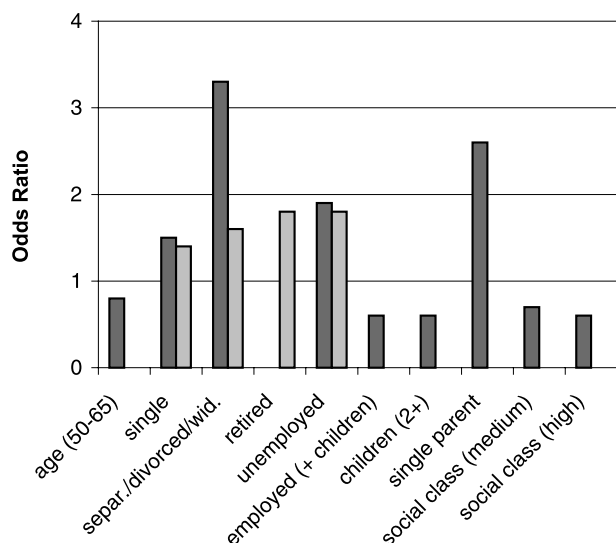


Fig. 1. Associations between sociodemographic factors and the diagnosis of any mental disorder by gender; only significant ($p < 0.05$) odds ratios are shown (< 1 reduced and > 1 elevated risk for any investigated disorder; ■ men, □ women; reference groups see Tables 3 and 4); GHS-MHS, $N = 4181$

age (< 50), when having children, or belonging to a higher social class. Both women and men show an increased association with any mental disorder when being single or separated/divorced/widowed, or unemployed. Being retired is associated with a higher rate of any mental disorder only in women, whereas being a single parent is associated with a higher rate of any mental disorder only in men.

More detailed information (disorder specific, including percentages and confidence intervals, also for non-significant factors) are provided in Table 3 (women) and Table 4 (men); the interaction between gender and correlates of mental disorders is shown in Table 5.

Age/cohort

Except for substance disorders, where females from older birth cohorts reported a significantly lower prevalence ($OR = 0.2$; Table 3), age effects played only a minor role in the prevalence of mental disorders for women. Males revealed significantly lower rates of any mental disorders in the older age cohorts ($OR = 0.8$; Fig. 1), mostly apparent among substance-use disorders ($OR = 0.3$; Table 4), less so for depressive disorders (n.s.). In contrast, higher rates of somatoform disorders were found among older males ($OR = 1.6$). The comparison between men and women (Table 5) showed no significant interaction of sex and cohort effects. Gender differences in the reported age

of first onset were also examined, revealing no change over time (not shown in tables). In the younger cohorts, both men and women similarly report an earlier first onset of mental disorders.

Marital status

For men, being separated, divorced or widowed is associated with a significantly increased likelihood of any mental disorders, compared with being married (ORs from 1.6 to 4.2).

Single, separated, divorced or widowed women also have significantly higher prevalences of having any mental disorders (except for somatoform disorders) compared to married women (ORs from 1.4 to 6.0). Furthermore, separated, divorced or widowed men have an elevated risk of having a mood disorder (women vs. men: $OR = 0.5$) or a somatoform disorder ($OR = 0.5$) compared to the counterpart women (Table 5). Thus being separated, divorced or widowed is associated with increased likelihood of mental disorders in both women and men, but this effect is much stronger in men (e.g., depression in married vs. separated/divorced/widowed men: 8% vs. 20%; women: 16% vs. 22%). A closer analysis of age-related heterogeneity in odds ratios over the age groups in men and women revealed that, among women only, the associations between not being married and mental disorders were considerably lower in the older age cohorts.

Employment status

Among men, unemployment was associated with an elevated risk of mental disorders (ORs from 1.9 to 3.1, except for substance disorder, where associations were marginally insignificant; Figure 1, Table 4) compared with working fulltime. The same trend emerged among women (ORs from 1.8 to 2.1, except for substance and somatoform disorders; Figure 1, Table 3). Being retired is associated with increased rates of depression only in women ($OR = 3.4$; interaction between gender and retired: $OR = 2.6$). Being retired is generally associated with less children at home and with a reduced number of significant others in general, but there is no interaction with gender.

Table 5 shows that there are no further significant gender differences in any of the other employment categories compared with fulltime employment. We found no remarkable differences in odds ratios across age groups in males and females.

Table 3. Sociodemographic correlates of major diagnostic subgroups (12-month) for women (GHS-MHS, N = 2079; N = 769 women with at least one diagnosis): Prevalence and Odds ratios¹

	Any substance disorder ⁷			Any depressive disorder ⁸			Any anxiety disorder ⁹			Any somatoform disorder ¹⁰		
	%	OR ²	95% ci	%	OR ²	95% ci	%	OR ²	95% ci	%	OR ²	95% ci
Age												
18–34	2.9			13.4			20.0			14.9		
35–49	1.7	0.6	0.3–1.2	16.8	1.3	0.9–1.7	19.4	1.0	0.7–1.2	15.2	1.0	0.8–1.4
50–65	0.6	0.2*	0.1–0.6	15.9	1.2	0.9–1.6	19.9	1.0	0.8–1.3	14.9	1.0	0.7–1.3
Marital status												
married	0.7			13.1			17.7			14.4		
single	3.7	2.7*	1.2–6.4	17.3	1.2	0.9–1.8	23.0	1.4*	1.1–1.9	15.0	1.1	0.8–1.7
separated/divorced/ widowed	3.6	6.0*	2.4–15.0	23.2	1.9*	1.4–2.7	23.7	1.4*	1.1–1.9	15.4	1.1	0.7–1.5
Employment status³												
employed												
fulltime	1.3			12.9			17.2			14.5		
15–34 h/week	2.1	2.1	0.7–6.0	11.0	0.9	0.6–1.5	20.8	1.3	0.9–1.9	16.5	1.2	0.8–1.8
<15 h/week	0.5	0.5	0.1–4.0	14.9	1.3	0.8–2.2	16.1	1.0	0.6–1.5	9.8	0.6	0.4–1.2
not employed												
school/student	5.3	2.0	0.6–6.9	17.5	1.1	0.6–2.1	20.6	1.0	0.6–1.8	13.7	0.9	0.5–1.7
retired	1.1	3.2	0.4–25.9	26.0	3.4*	2.0–5.7	23.8	1.7	0.9–3.2	20.3	1.6	0.9–2.7
unemployed	2.6	2.3	0.7–7.7	21.3	2.1*	1.3–3.4	27.3	1.9*	1.2–2.9	17.7	1.3	0.8–2.1
homemaker	0.7	0.8	0.2–3.8	17.5	1.8*	1.2–2.8	19.5	1.3	0.9–1.9	10.8	0.7	0.5–1.1
Family status												
no children	1.6			15.8			18.8			17.8		
1 child	1.9	0.8	0.3–1.9	16.1	1.0	0.8–1.5	21.7	1.2	0.9–1.6	17.2	1.2	0.9–1.7
2 + children	2.2	1.0	0.4–2.2	14.0	0.9	0.6–1.3	19.9	1.0	0.8–1.4	12.4	0.8	0.6–1.2
single parent ⁴	6.9	6.8*	2.7–16.9	20.0	1.5	0.9–2.5	25.6	1.4	0.8–2.7	12.9	0.8	0.5–1.5
employed (fulltime) + children ⁵	0.0	1.0	0.9–1.0	13.2	1.2	0.7–2.2	16.7	1.0	0.6–1.5	15.7	1.1	0.6–1.9
employed (part time) + children	2.4	12.2	0.3–546	13.5	0.7	0.4–1.5	23.2	1.8	0.9–3.1	15.6	1.9	0.9–4.0
Social class⁶												
low	3.0			20.1			21.8			16.2		
medium	1.3	0.4*	0.2–0.9	15.6	0.7	0.5–1.0	20.2	0.9	0.7–1.2	14.3	0.9	0.6–1.2
high	1.4	0.5	0.2–1.4	11.1	0.5*	0.3–0.7	16.6	0.7	0.5–1.0	14.2	0.9	0.6–1.3

¹ Data weighted for nonresponse and design factors in all analyses; DSM-IV hierarchy rules were dropped; age distributions available on request.

² Odds ratios (OR) from logistic regression and 95% confidence intervals among women, controlled for age; reference groups: first category of the respective correlate, not having the disorder under consideration; *p < 0.05.

³ “Other” employment status (e.g. Maternity leave, military or civil service) excluded from analyses.

⁴ Single parent: having no partner (married or not married) and having at least one child in the household; reference group: parent with partner (married or not married).

⁵ Reference group: employment (fulltime) without children.

⁶ Index of social class (Winkler and Stolzenberg, 1998) derived from information on education, income and current (job) position.

⁷ Abuse or dependence (without nicotine).

⁸ Major Depressive Disorder, Dysthymic Disorder, Bipolar I Disorders, Bipolar II Disorders, single hypomanic episode.

⁹ Without Posttraumatic Stress Disorder.

¹⁰ Somatization Disorder, Undifferentiated Somatization Disorder, Somatic Symptom Index SSI4,6 (Escobar et al., 1989), Hypochondriasis, Pain Disorder.

Number of children

The presence of children in the subject’s household has little impact on a female subject’s rate of mental disorders (Table 3). Men with two or more children are less

likely to fulfil diagnostic criteria for mental disorders compared to men without children. This is the case particularly for mood disorders (OR = 0.6). The comparison between men and women (Table 5) reveals that there are no significant gender differences in the association

Table 4. Sociodemographic correlates of major diagnostic subgroups (12-month) for men (GHS-MHS, N = 2102; N = 532 men with at least one diagnosis): Prevalence and Odds ratios¹

	Any substance disorder ⁷			Any depressive disorder ⁷			Any anxiety disorder ⁷			Any somatoform disorder ⁷		
	%	OR ²	95% ci	%	OR ²	95% ci	%	OR ²	95% ci	%	OR ²	95% ci
Age												
18–34	12.3			9.4			7.9			5.7		
35–49	5.3	0.4*	0.3–0.6	8.5	0.9	0.6–1.4	10.0	1.3	0.9–1.9	7.3	1.3	0.8–2.0
50–65	3.6	0.3*	0.2–0.5	7.6	0.8	0.5–1.2	9.7	1.2	0.8–1.8	8.6	1.6*	1.1–2.4
Marital status												
married	4.7			6.4			8.7			6.7		
single	12.6	1.8	1.1–3.3	10.2	1.6	1.1–2.7	9.4	1.2	0.7–1.8	5.9	1.0	0.6–1.7
separated/divorced/ widowed	9.5	2.1*	1.1–3.9	21.4	4.2*	2.5–7.0	13.3	1.6*	1.1–2.7	14.4	2.4*	1.4–4.0
Employment status³												
employed												
fulltime	6.1			7.5			8.1			6.6		
15–34 h/week	3.8	0.7	0.1–5.4	10.6	1.7	0.4–7.7	9.4	1.2	0.4–4.1	0.0		
<15 h/week	0.0			2.7	0.4	0.1–3.4	11.6	1.6	0.3–9.5	9.2	1.3	0.2–10.6
not employed												
school/student	14.0	1.4	0.7–3.0	8.1	0.9	0.3–2.3	6.0	0.7	0.3–1.4	2.4	0.4	0.1–1.2
retired	4.8	1.7	0.8–3.8	6.8	1.1	0.5–2.3	10.9	1.6	0.8–3.0	7.6	1.0	0.5–2.0
unemployed	9.9	1.8	0.9–3.5	18.7	3.1*	1.8–5.2	19.2	2.8*	1.7–4.5	14.4	2.3*	1.3–4.1
homemaker	0.0			46.8	12.9	0.8–98	0.0			46.8	2.3	0.7–195
Family status												
no children	7.3			9.7			9.9			7.9		
1 child	7.3	0.8	0.5–1.4	7.4	0.7	0.4–1.1	8.8	0.9	0.6–1.4	5.5	0.7	0.4–1.2
2 + children	7.4	0.9	0.6–1.4	6.7	0.6*	0.4–0.9	7.6	0.7	0.5–1.1	5.7	0.8	0.5–1.2
single parent ⁴	14.9	2.6*	1.3–5.0	14.7	2.7	1.2–5.8	10.6	1.4	0.7–2.8	6.7	1.2	0.5–3.2
employed (fulltime) + children ⁵	6.4	1.0	0.6–1.6	5.4	0.5*	0.3–0.8	7.3	0.8	0.5–1.2	5.2	0.7	0.4–1.1
employed (part time) + children	11.7	1.0	0.9–1.1	15.4	4.6	0.6–36.8	3.5	0.7	0.1–2.9	0.0		
Social class⁶												
low	10.8			11.9			14.9			10.3		
medium	7.0	0.7	0.5–1.1	8.5	0.6*	0.4–0.9	8.7	0.5*	0.4–0.8	7.0	0.6	0.4–1.0
high	5.7	0.7	0.4–1.3	6.7	0.5*	0.3–0.8	6.5	0.4*	0.2–0.6	4.9	0.4*	0.2–0.7

¹ Data weighted for nonresponse and design factors in all analyses; DSM-IV hierarchy rules were dropped; age distributions available on request.

² Odds ratios (OR) from logistic regression and 95% confidence intervals among men, controlled for age; reference groups: first category of the respective correlate, not having the disorder under consideration; * $p < 0.05$.

³ “Other” employment status (e.g. Maternity leave, military or civil service) excluded from analyses.

⁴ Single parent: having no partner (married or not married) and having at least one child in the household; reference group: parent with partner (married or not married).

⁵ Reference group: employment (fulltime) without children.

⁶ Index of social class (Winkler, 1998) derived from information on education, income and current (job) position.

⁷ For detailed information on included disorders see footnotes Table 3.

between number of children and the prevalence of mental disorders. Further, no consistent pattern in interactions with age groups in males and females was found.

Single parenthood

12% of the fathers and 16% of the mothers in our sample were single parents. Among them, 17% of the women

were separated (men: 11%), 56% single (men: 82%), 19% divorced (men: 4%) and 8% widowed (men: 4%; not shown in tables). Single mothers tend to be more likely to report the presence of mental disorders than non-single mothers, but these differences do not reach statistical significance (Table 3). In contrast, single fathers have significantly higher rates of substance use disorders (OR = 2.6) and mood disorders (OR = 2.7),

Table 5. Interaction between gender and correlates of major diagnostic subgroups (12-month; GHS-MHS; N = 4181)¹

	Any mental disorder ⁶			Any substance disorder			Any depressive disorder			Any anxiety disorder			Any somatoform disorder		
	w < m	w = m	w > m	w < m	w = m	w > m	w < m	w = m	w > m	w < m	w = m	w > m	w < m	w = m	w > m
Age															
18–34															
35–49		X			X			X		X			X		
50–65		X			X			X		X			X		
Marital status															
married															
single		X			X			X							
separated/divorced/widowed	X				X			X		X			X		
Employment status²															
employed															
fulltime															
15–34 h/week		X			X			X		X			X		
< 15 h/week		X			X			X		X			X		
not employed															
school/student		X			X			X		X			X		
retired		X			X			X		X			X		
unemployed		X			X			X		X			X		
homemaker		X			X			X		X			X		
Family status															
no children															
1 child		X			X			X		X			X		
2 + children		X			X			X		X			X		
single parent ³		X			X			X		X			X		
employed (fulltime) + children ⁴		X			X			X		X			X		
employed (part time) + children		X			X			X		X			X		
Social class⁵															
low															
medium		X			X			X		X			X		
high		X			X			X		X			X		

¹ Differential associations with regard to correlates and disorders between women and men (interaction gender * correlate); w < m: OR (women vs. men) is significantly < 1.0, w = m: no significant OR (women vs. men), w > m: OR (women vs. men) is significantly > 1; OR's and 95% confidence interval available on request.

² "Other" employment status (e.g. Maternity leave, military or civil service) excluded from analyses.

³ Single parent: having no partner (married or not married) and having at least one child in the household; reference group: parent with partner (married or not married).

⁴ Reference group: employment (fulltime) without children.

⁵ Index of social class (Winkler, 1998) derived from information on education, income and current (job) position.

⁶ For detailed information on included disorders see footnotes Table 3.

compared to not-single fathers (Table 4). Overall, being a single parent and having mental disorders does not have significant gender differences (interaction between gender and single parenthood; Table 5).

We also tested gender specific associations between employment status, number of children at home and mental disorders. Working fulltime without children compared to working fulltime and having children was associated with elevated odds of having a mood disorder for men. The Odds Ratio indicated that men with children are less likely to have a mood disorder (OR = 0.5) than men without children. Concerning gender differences, women working fulltime with children seem to be at a higher risk compared with their male counterparts, but these differences failed to reach significance. No significant interactions with age group were found in males and females. Note that these results do not depend on children's age (1–5 vs. 6–18 years, not shown in tables).

Social class

Men from the lower social class have significantly higher prevalences of all mental disorders compared to the middle and high social class (ORs from 0.4 to 0.6 for medium or upper social classes, except for substance disorders). Surprisingly, for women lower social class revealed a significant impact only on mood disorders (Table 3, OR = 0.5 for upper class compared to the lower social class). The analyses of interactions of social class with age group in males or females revealed no stable and meaningful differences across the categories of social class.

Multiple model

Besides the association of sociodemographic factors within and between genders, we examined the effect of these correlates and gender on the prevalence of having any mental disorder. In a multiple analysis including all factors, gender itself remains as a main effect. Females, even when all factors are controlled for, had significantly higher rates of mental disorders than males (e.g. for any mental disorders OR = 1.62, 95% confidence interval = 1.36–1.93).

Exposition to putative risk factors

Because not being married and being unemployed were associated with higher rates in both women and men, we investigated finally whether women or men tend to be

more exposed to these correlates. Women reported being separated, divorced or widowed more frequently than men do (14.5% vs. 7.6%), whereas men reported more often to be a single (28.8% vs. 21.0%). Unemployment was distributed equally in our sample among men and women.

Discussion

This paper examined the association between sociodemographic factors and mental disorders for men and women separately and the interaction between these factors and gender in order to assess the influence of sociodemographic factors on gender differences in the prevalence of mental disorders.

Sociodemographic factors matter – but they seem to work similarly in women and men!

Although sociodemographic factors are significantly associated with the prevalence of mental disorders, surprisingly, only few of the examined sociodemographic factors showed significant gender differences.

There are at least two plausible explanations for these findings. One might be that some older epidemiological studies with regard to gender differences are based on analyses which ignore the distribution (base rates) of the examined correlates within the sexes. In traditional gender-studies, women's role has been thought to be complementary to men's role (Parson and Bales, 1955). Modern approaches discussing methodological designs of "gender-studies" demand a detailed description of the differences within men (Courtenay, 2000) and within women (Doyal, 1995; Maschewsky-Schneider, 1996). "Boys will be 'boys' differently, depending upon their position in social structures and, therefore, upon their access to power and resources" (Messerschmidt, 1993, p.87) – and this is also true for "girls".

According to Simon (2002), a second explanation for the equity of putative risk factors in men and women (opposed to earlier findings) refers to cultural changes: there is currently greater involvement of women and men in both the family and workplace, as well as greater fluidity of e.g. marital status over the life course. Corresponding to these role-related changes are changes in the psychological meaning of the examined factors. Unfortunately, we cannot examine beyond the inquiry of age-cohort effects whether the presented evidence that the emotional consequences of examined sociodemographic correlates apply equally to men and women is due to

these social changes. The reported correlates and their interactions with gender did not differ consistently in younger and older birth cohorts – but this does not contradict the hypothesis that social changes have modified the consequences of the sociodemographic factors for men's and women's mental health because these changes are likely to affect both younger and older people.

Overall and stratified associations between specific sociodemographic factors and mental disorders

Age/cohort

True age effects cannot be validly separated from cohort effects in a cross-sectional design. Thus, the examined age variable rather represents birth cohort effects. Except for substance use disorders (more frequent in younger cohorts), there were no significant cohort effects both in men and women. The female vs. male ratios in the prevalence of mental disorders were very similar across the age groups. This is in line with previous findings (Kessler, 1998). Overall, in both males and females, no major and consistent differences in odds ratios were found between sociodemographic factors and diagnoses across age groups.

Marital status

Our data support results of studies which have reported gender equality in the emotional benefits of being married (Kessler and McRae, 1984; Horwitz et al., 1996; Waite and Gallagher, 2000). This result is in contrast to the sex-role theory of mental illness developed in the 1960/70's (Gove, 1972; Gove and Tudor, 1973). This theory still plays an important role in sociological research on gender and mental health; it argues that marriage is advantageous for men's mental health but disadvantageous for women. However, consistent with Gove's sex-role theory our data suggest that separated, divorced or widowed men are at higher risk of having a mood or a somatoform disorder than women.

Investigations which examined the impact of marital transition with longitudinal data are controversial: some studies report that divorced or widowed men suffer more from marital loss (Umberson et al., 1992) while others show reverse patterns whereby divorce or widowhood are more harmful for women (Aseltine and Kessler, 1993; Simon and Marcussen, 1999). Although there are some other theoretical approaches in this field (e.g.

emotional-socialization explanations; Simon, 2002), these controversial findings exemplarily reflect the difficulty finding sufficient explanations for gender differences in mental disorders.

(Single) parenthood

Surprisingly, single mothers do not show elevated prevalences in mental disorders as compared to mothers with a partner. In contrast, single fathers have elevated risks for having a substance disorder or mood disorder as compared to non-single fathers. This gender difference seems not to be explained by other adverse factors, since single fathers report less often to be divorced or widowed than women and have a higher income than single mothers. These findings appear to be contradictory to many studies where an association between single parenthood and mental health was particularly found in women (Brown and Harris, 1978; Roman-Clarkson et al., 1988).

Most evidence that single mothers suffer more than non-single mothers stems only from relatively few mostly clinical studies from the USA (Sieverding, 1995). But the best sources for assessing gender differences both within and between the sexes in mental disorders are generally community surveys (Bebbington, 1998). Patients in treatment settings usually represent a small and highly selective segment of the full spectrum of mental disorders. Thus, findings for putative risk factors might be biased by selection biases as well as the severity of the studied condition (Wittchen, 2001).

However, beyond methodological explanations, the impact of looking after children can be discussed concerning role hypothesis (Rodin and Ickovics, 1990). But since the patterns of social roles are of a very complex nature due to the coverage of the high number of possibly included variables (e.g. marital status, employment and the attitude to the work, parenthood and its quality, education, socio-economical variables), results on the impact of parenthood were presented in a relatively crude way.

Employment and family status

The negative impact of being unemployed compared with working fulltime in our study does not differ between women and men. As Loewenthal et al. (1995) and Bebbington (1996) have pointed out, employment has to be focused on in a differentiated way. Working full-time and having a family seem to be associated with

higher impairment, whereas working part-time and having a family seems to be associated with lower impairment. Working fulltime and having children compared to working fulltime without having children was significantly associated with a lower risk of having a mood disorder only for men. Being retired was more frequent in women and the only factor that acted more unfavourably in women compared to men. This might be mediated by the fact that retired women were more often separated/divorced/widowed (71% vs. 29%), but not by a reduced number of significant others or by less children at home since the latter associations applied equally for retired women and men.

The usual explanations for the associations between poor mental health, employment and family status are role conflict and overload (Elliot and Huppert, 1991; Bebbington, 1998). The finding that employed women with children do not show more mental disorders than employed women without children, suggests that there is at least no overload or role conflict which can explain a part of the excess of mental disorders in women. Some authors have stated a positive effect of multiple roles (Thoits, 1983; Nolen-Hoeksema and Rusting, 1999) for women that is also not in line with the present findings. Multiple roles (working fulltime and having children) were associated with a lower rate of mood disorders only for men. This possibly indicates positive social role experiences (e.g., having paid work and being a parent without the main burden of childcare; Matthews et al., 1998).

Social class

Surprisingly, our data suggest that a high social status is “protective” for men only. It has long been known that the social environment is of critical importance for mental health, but the role of gender has not been adequately investigated (Astbury, 1999). Variations in morbidity rates by social class are a consistent finding in epidemiology (Dohrenwend, 1990; Kessler et al., 1994b; Stansfeld et al., 1998). However, relevant factors for this association are considered to be more chronically stressful conditions, less experience of control and social support within people of lower classes. Our data suggest that these negative consequences of low social status seem to apply only for men.

Distribution of putative risk factors between genders

Even though putative risk factors apply for both men and women roughly the same, prevalence differences could

be due to differential exposition to these factors. Such differences were only found in marital status, indicating only a minor influence of social inequity between men and women on gender differences in the prevalences of mental disorders – at least for societies comparable to contemporary Germany.

Limitations

Sample size

Although the initial sample was relatively large, the sample size in some of the cells has been too small to detect gender-specific interactions. This is especially relevant for the following variables: “part time employment” (only 0.6% in men), “homemaker” (only 0.1% in men) and in comparisons regarding substance disorders (base rate only 1.7% in women).

Causal relationships

Significant associations between the investigated factors and mental disorders reflect that they are symptoms, maintaining factors or the consequences of having a mental disorder. Given that our findings are based on cross-sectional data (without retrospective data on putative risk factors or life events and their relationship to mental health problems), it is impossible to support either a social-causation hypothesis or the alternative social-selection hypothesis. We do not know, for example, whether men and women differentially select into and out of marriage on the basis of their mental health status. Thus, according to Kraemer et al. (1997) we preferred to use the terms “putative risk factors” or “correlates” rather than “risk factors”.

Restricted implications for treatment

Implications of the results are somewhat limited since the investigated putative risk factors are either not modifiable or not specific enough for developing (gender-specific) prevention or intervention strategies (Kessler, 2000). Future risk factor research should focus e.g. on the gender-specific role of comorbidity in the prediction, intervention planning and implementation with regard to mental disorders. Since comorbidity has a strong influence on impairment and reduced quality of life, it may be a modifiable risk factor for further illness course or future impairment that can be more easily targeted than sociodemographic correlates of mental morbidity.

Biological factors not included

As a review by Piccinelli and Wilkinson (2000) suggested, biological factors have only few direct effects in the emergence of gender differences in depression, but interactions are likely to exist between biological and psychosocial determinants (Kessler, 2003). These interactions could not be considered in the present study.

Restricted age range

The present results apply only for adults and do not solve problems concerning the lack of data in the field of mental health in children and adolescents. But future studies are already designed to satisfy the need for data in younger ages. The US NIMH has initiated a survey of adolescent mental health to begin collecting biological data on sex hormones and survey data on social context and mental disorders from a nationally representative sample of over 8000 adolescents in the age range 12–17 (Kessler, 2003). In Germany also, a child and adolescent survey is currently being carried out in a nationally representative sample (Robert Koch Institut, 1998).

Artefactual explanations for gender differences

Finally, we want to address artefactual explanations concerning gender differences in mental disorders. Although it is not possible to evaluate all artefactual possibilities here, it is unlikely that these factors play an important role in the present analyses. Findings are based on a general population sample (no help-seeking bias). The diagnostic interview which was used for assessment (DIA-X-M-CIDI; Wittchen, 1994) is a fully structured interview (minimizing diagnostic bias). According to recall bias (Ernst and Angst, 1992; Wilhelm and Parker, 1994), it was assumed that women recall emotional states better than men. In the present study, the sex ratio does not increase with increasing timeframe between diagnostic interview and assessed symptoms (4-week, 12-month but not in the last 4 weeks, more than 12-month). This can be regarded as (indirect) evidence against a gender-specific recall bias. Furthermore, a reporting bias might be responsible for their greater likelihood of meeting criteria for mental disorders. If it was true that women report more (psychological) symptoms than men, they should in particular report more symptoms than men who show a similar level of quality of life. A separate analysis did

not support this hypothesis: when women and men were parallelized by the subjective health-related quality of life (assessed with the mental component scores of the Medical Outcome Study Short Form-36 Health Survey; SF-36, Brazier et al., 1992; McHorney et al., 1993), the gender difference in the prevalence of mental disorders disappeared. However, this analysis does at least not really disprove the hypothesis, since women may also report worse quality of life, particularly on a self-report measure. Further and more detailed analyses that would allow us to evaluate the reporting bias are not possible with the present data set. Further research regarding this is clearly needed (Stone et al., 2000).

Generalization

The results are based on standardized assessment instruments with an internationally established reliability allowing for direct comparisons with other studies using the same assessment methods. Nevertheless the findings might not apply for other countries besides Germany, where the study was conducted. The fact that society-specific aspects can have a significant influence on the prevalence of mental disorders has, for example, been found in a separate analysis using the same data set: Jacobi et al. (in press) found that even former East and West Germany vary slightly but significantly regarding their prevalence (even after controlling for risk factors such as unemployment, which is much higher in East Germany). But despite all existing differences in social and medical systems, we still believe that the study's results can at least be applied to "Western" developed nations, e.g. according to the United Nations' classification of nations (United Nations, 2001), where Germany belongs to group "A", together with, e.g., Canada, U.S.A., United Kingdom, Italy, Australia, or New Zealand (on the basis of a mortality index). In those countries, sociodemographic characteristics as shown for this sample are quite comparable – presumably as well as their relation to rates of mental disorders. However, global cross-cultural similarities and differences do not necessarily reflect all the unique ethnic, sociodemographic, geographic, and other influences between and within each of these countries. Attitudes, beliefs, and value systems may be (sub-) culturally mediated, which, in turn, may play a role in the kinds of problems that men and women experience. Unfortunately, ethnicity cannot be investigated in our study since migrants and many foreigners had to be excluded due to language problems.

Conclusion

Gender differences in the prevalence of mental disorders cannot be explained by the examined sociodemographic factors

The emotional advantages or disadvantages of marital status, employment status, number of children, parenthood and social class overall apply equally to men and women. Also the hypothesis that women are more often exposed to the common risk factors could not be supported. Thus, our findings suggest that “female gender” in itself remains the strongest single predictor for mental disorders.

With regard to these results and the limitations described above, we support the idea that further epidemiological studies of gender differences in mental disorders concerning psychosocial correlates should focus on (1) interactions between gender and sociodemographic correlates with longitudinal data, (2) investigations of modifiable risk factors (e.g. comorbidity, coping or cognitive styles) in a (3) disorder-specific approach. Furthermore, the impact of DSM-IV diagnoses on impairments/disabilities and help seeking should be differentially investigated in women and men. Until then psycho-sociological determinants of gender differences in common mental disorders are still far from being understood.

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Note

Data of this study are available as Public Use File from the second author (manual and variable description in German language): Dr. Frank Jacobi, Institute of Clinical Psychology and Psychotherapy, Chemnitz 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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