

## ORIGINAL PAPER

J. Angst · A. Gamma · M. Gastpar · J.-P. Lépine · J. Mendlewicz · A. Tylee

# Gender differences in depression

## Epidemiological findings from the European DEPRES I and II studies

Received: 19 April 2002 / Accepted: 12 August 2002

**Abstract** *Background* While there is ample evidence that the prevalence rates for major depressive disorder (MDD) in the general population are higher in women than in men, there is little data on gender differences as regard to symptoms, causal attribution, help-seeking, coping, or the consequences of depression. *Method* The large DEPRES Study dataset covering representative population samples of six European countries (wave I: 38,434 men and 40,024 women; wave II: 563 men and 1321 women treated for depression) was analyzed for gender differences. *Results* In wave I marked gender differences were found in the six-month prevalence rate for major depression but less so for minor depression; the gender differences for major depression persisted across all age groups. Even after stratification by clinically significant impairment and paid employment status, men reported fewer symptoms than women; as a consequence, men reached the diagnostic threshold less often. In wave II there were clear gender differences in causal attribution and in coping. Men coped by increasing their sports activity and consumption of alcohol and women through emotional release and religion. Women felt the effects of depression in their quality of sleep and general health, whereas men felt it more in their ability to work. *Limitations* The second wave of the study comprises treated depressives only and may be less representative than the first wave.

**Key words** depression · prevalence · gender · coping · quality of life · comorbidity

### Introduction

Gender differences in depression are of great psychosocial and medical interest, especially differences in prevalence rates, symptom profile, severity, distress/suffering, impairment, coping, help-seeking and prescribed treatments.

Most clinical and epidemiological studies of depression have found higher prevalence rates among females: in community studies the point and lifetime prevalence rates of major depressive disorder (MDD) across cultures were approximately twice as high in females as in males despite varying total prevalence rates (Weissman et al. 1996), which was also confirmed by a large survey in Great Britain (Meltzer et al. 1995, Bebbington et al. 1998b). Comprehensive reviews of the literature have been published in a WHO monograph (Piccinelli et al. 1997), as well as by Piccinelli and Wilkinson (2000), Maier (1999) and Merikangas (2000). A similar, albeit less pronounced, female preponderance was found for other subtypes of depression such as dysthymia, minor depression and recurrent brief depression (see reviews of Angst 1997, 1998, Bebbington 1998). No sex difference was reported in any of the following specific sub-populations: the Amish in the USA (Egeland and Hostetter 1983), African Americans in the USA (Brown et al. 1995), Southeast Asians in Canada (Beiser et al. 1993), trainee teachers (Wilhelm and Parker 1994) and university students in Australia (Wilhelm and Parker 1989), executive officers in England (Jenkins 1985), Jews in the Epidemiologic Catchment Area study of the USA (Levav et al. 1993), in a specific age group (age 55–64) of the large National Survey of Psychiatric Morbidity in Britain (Jenkins and Meltzer 1995, Bebbington et al. 1998a) or in the Stirling County Study using a restricted definition of depression (Murphy 1995).

Since treated samples are heavily biased by the fact that females seek treatment more frequently, generalizable results can only be derived from community studies. A suitable study for answering specific gender-re-

J. Angst (✉) · A. Gamma · M. Gastpar · J.-P. Lépine · J. Mendlewicz · A. Tylee  
Zurich University Psychiatric Hospital  
Lenggstrasse 31  
P. O. Box 68  
8029 Zurich, Switzerland  
Tel.: +41-1/3 84-26 11  
Fax: +41-1/3 84-24 46  
E-Mail: jangst@bli.unizh.ch

lated questions is the two-wave European DEPRES (Depression Research in European Society) investigation of large population samples from six countries: Belgium, France, Germany, the United Kingdom, Spain and the Netherlands (Tylee 1996, Lépine et al. 1997). No detailed analyses of gender differences have so far been published on the basis of the DEPRES Study.

The purpose of this paper is to present data on gender differences in relation to certain aspects of depression: prevalence, symptoms, severity, social consequences (wave I of the study) quality of life, causal attribution, coping, somatic comorbidity and treatment-seeking (wave II of the study, the treated subsample).

## Method

### ■ Sample

In a first wave of the DEPRES Study carried out in 1995, a representative sample of 78 458 randomly selected subjects (38,434 males and 40,024 females) from six European countries: Belgium (N=8,076), France (N=14,517), Germany (N=16,184), The Netherlands (N=7,811), Spain (N=7,811) and the United Kingdom (N=15,743); the sample frame was the same in each country. The subjects were interviewed in their households by omnibus market-research interviewers using the depression section of the MINI screening interview (Sheehan et al. 1998a) and a specially designed depression questionnaire. The MINI was shown to have a sensitivity of 0.94 and a specificity of 0.79 in identifying major depressive disorder, as defined by DSM-III-R (American Psychiatric Association 1987) criteria and validated with CIDI diagnoses (Composite International Diagnostic Interview, World Health Organization 1990). Other studies demonstrated good validity and reliability (Lecrubier et al. 1997, Sheehan et al. 1997, 1998b). The MINI allows diagnoses on different levels including DSM-IV major depression (American Psychiatric Association 1994).

In a pilot study of a total of 221 depressed subjects from all participating countries, the validity of the use of the MINI by lay-interviewers was tested (Lépine et al. 1997). In addition a feasibility study on the open questions was conducted in all countries; no study on the inter-rater reliability was carried out.

Special attention was paid to ensure the representativeness of the study: the subsample from each country was found to match with the actual national population for gender, age, social class, occupation, paid employment, income, area of residence, size of household and number of children. Comparisons of the interviewed samples with the total populations were published earlier (Lépine et al. 1997).

For the second wave of the study, which was conducted 6–12 months later, only the treated subjects (N=1884) were chosen for further investigation (Tylee et al. 1999). The following inclusion criteria applied for subjects in wave II: during the previous six months subjects had to 1) have suffered from depressive symptoms as classified by the MINI, and 2) have consulted a doctor, counsellor, psychologist or nurse about their depressive symptoms. The male subsample of wave II may be skewed by the fact that some males tend to use acting-out coping strategies (e.g., sport or alcohol). Further methodological details can be found in previous papers (Tylee 1996, Lépine et al. 1997, Tylee et al. 1999).

### ■ Statistics

The two interview waves were analyzed separately for this paper, and the results will be presented in separate sections. Prevalence rates between groups were compared using Chi<sup>2</sup> tests. The Mann-Whitney U-test was applied to ordinal variables. A logistic regression was used to assess the dependence of the DSM diagnostic threshold of 5 or more

criteria symptoms of depression on gender, impairment and employment status. Bonferroni correction was applied whenever appropriate.

## Results of wave I

### ■ Six-month prevalence rates of depression

Table 1 demonstrates the well-established higher prevalence of the criteria depressive symptoms among females (22.4%) than among males (13.9%). This finding is true for the two stem questions and for the other 7 criteria depressive symptoms.

Of some interest are the following findings (not listed in Table 1): 1) A positive response to both stem items (sad/depressed/down and loss of interest/joy) was twice as prevalent in females (15.8%) than males (8.7%); 2) depressed mood “only” was also more prevalent in females (3.9%) than males (2.6%); 3) but interestingly enough the difference was clinically insignificant with regard to loss of interest and/or joy “only” (2.7% in females vs. 2.6% in males,  $\chi^2 = 1.47$ ,  $p < 0.06$ ), which unfortunately were not assessed separately.

Table 2 shows 6-month prevalence rates by gender for the diagnostic threshold of 5 or more criteria symptoms, impairment, and both together; the gender ratio F/M is almost always in favor of females (1.5–1.9). In minor depression, defined by the presence of 2–4 symp-

**Table 1** Sex-specific prevalence rates: depressive symptoms and impairment

First interview	Males	Females	p ( $\chi^2$ )
Total sample	38,434	40,024	
Prevalence	%	%	
Stem questions:			
Sad, depressed	11.29	19.69	0.001
Loss of interest/joy	11.33	18.52	0.001
Either stem question	13.90	22.40	0.001
Symptoms:			
Appetite/weight	5.53	11.40	0.001
Sleep	8.75	15.67	0.001
Agitation	7.08	12.58	0.001
Tired, no energy	9.61	17.66	0.001
Worthlessness, guilt	5.28	10.01	0.001
Concentration	5.38	10.11	0.001
Suicidal symptoms	2.09	3.84	0.001
Impairment <sup>a</sup>	6.86	10.96	0.001
Relative proportion of impaired subjects	49.35	48.92	n. s.

<sup>a</sup> Substantial interference with work or social activities

**Table 2** Major and minor depression without and with impairment

First interview	Males	Females	p ( $\chi^2$ )	Ratio F/M
Total sample	38,434	40,024		
Prevalence	%	%		
5+ Symptoms	7.60	14.91	0.001	1.96
5+ Sx & Impairment	5.02	8.75	0.001	1.74
2–4 Symptoms	5.47	6.67	0.001	1.22
2–4 Sx. & Impairment	1.86	1.77	n. s.	0.95
Treated professionally	6.42	12.89	0.001	2.01

toms, the gender ratio is much narrower ( $F/M = 1.2$ ), and the gender difference disappears if impairment is included in the definition ( $F/M = 0.95$ ).

If we look at individual totals of the 9 diagnostic symptoms, there are marked differences between males and females. There was a preponderance of males among subjects with 1–5 symptoms and of females among those with 6–9 symptoms. This gender difference persisted after stratification by paid employment status without significant impairment or with significant impairment (results not shown).

Table 3 compared males and females with significant impairment, assessed by the question: “Have any of these things substantially interfered with your work or social activities?”; males were more prevalent at the lower symptom level. Nonetheless the proportion of subjects with depressive symptoms who suffered from impairment was the same for both sexes: males 49.35 %, females 48.2 % (Table 1).

### ■ Diagnostic threshold in relation to age, impairment, gender and paid employment

Table 4 presents the 6-month prevalence rates for major depression, defined in the first place by the presence of

5 + of the 9 criterial symptoms and then by the inclusion of clinically significant impairment (DSM-IV criteria, American Psychiatric Association 1994). Independent of case definition (i.e., without or with impairment), the rates were lower among the 65 + year-olds of both sexes. Nonetheless the gender ratios showed a rather constant two-fold preponderance of females across all age groups; this was especially true in subjects aged 55 or older and was replicable across all six countries. When impairment was taken into account, the gender ratio tended to be slightly lower but remained independent of age. It is remarkable that in the 16–54 age group, males with 5 + criterial symptoms showed consistently higher impairment rates than females (66–70 % vs. 60–61 % (not shown in Table 4).

Table 5 gives the 6-month prevalence rates for minor depression (with 2–4 criterial symptoms); the preponderance of females is smaller than in major depressive syndromes but present across all age groups and does not diminish after age 55. Fig. 1. summarizes the female preponderance for both major and minor depression together.

During the preceding 6 months, 46.12 % of the total sample had paid employment status (54.66 % of males and 37.92 % of females). In the age group from 25–54, 77.6 % of males and 51.5 % of females were in paid em-

**Table 3** Total number of criterial symptoms among depressives with significant impairment

First interview Impaired subsample Σ of symptoms	Males 2,638 %	Females 4,211 %
1	0.0	0.0
2	2.77	1.28
3	9.14	4.77
4	15.13	10.78
5	19.64	16.62
6	18.76	20.45
7	16.68	21.37
8	11.98	16.00
9	5.91	8.12

$p < 0.001 (\chi^2)$

**Table 5** Age and prevalence rates of subjects with minor depression (2–4 criterial symptoms)

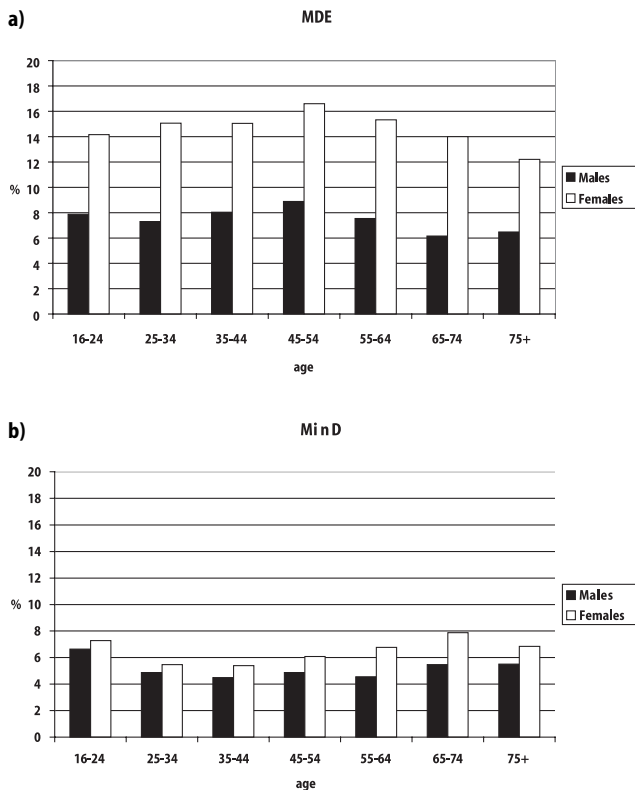
First interview	Males	Prevalence	Females	Prevalence	Ratio F/M
Age	N	%	N	%	
16–24	5,840	6.64	5,841	7.28	1.10
25–34	7,987	4.87	9,011	5.48	1.13
35–44	7,303	4.48	8,219	5.39	1.20
45–54	5,611	4.87	5,734	6.09	1.25
55–64	5,276	4.55	4,941	6.76	1.49
65–74	4,272	5.48	4,021	7.88	1.44
75+	1,760	5.51	1,941	6.85	1.24
Total <sup>a</sup>	38,434	5.09	40,029	6.28	1.23

<sup>a</sup> including subjects with missing age data

**Table 4** Age and 6-month prevalence rates of subjects with major depression (5 + of 9 criterial symptoms) without and with impairment (imp)

First interview	Males	Females	Prevalence Males 5+/9 sx	Prevalence Females 5+/9 sx	Ratio F/M	Prevalence Males 5+/9 sx + imp	Prevalence Females 5+/9 sx + imp	Ratio F/M
Age	N	N	%	%		%	%	
16–24	5,840	5,841	7.88	14.16	1.80	5.26	8.54	1.62
25–34	7,987	9,011	7.30	15.07	2.06	5.03	9.21	1.83
35–44	7,303	8,219	8.04	15.06	1.87	5.55	9.04	1.63
45–54	5,611	5,734	8.89	16.60	1.87	6.29	10.10	1.61
55–64	5,276	4,941	7.54	15.34	2.03	4.70	8.44	1.80
65–74	4,272	4,021	6.16	14.00	2.27	3.18	7.56	2.38
75+	1,760	1,941	6.48	12.21	1.88	3.58	5.56	1.55
Total <sup>a</sup>	38,434	40,029	7.60	14.91	1.96	5.01	8.75	1.75

<sup>a</sup> including subjects with missing age data



**Fig. 1** Gender-specific prevalence rates of major (a) and minor (b) depression for different age classes

ployment. (Note that the rate of those not in paid employment is considerably larger than the usually reported unemployment rate since it also includes students, housewives and their male counterparts.) Among depressed subjects the rates of those in paid employment differed markedly by sex: 5,534 (41.4%) of 13,559 depressed subjects were in paid employment (males 51.1%; females 25.9%). Subjects without paid employment reported depressive symptoms slightly more often than those in paid employment (19.85% vs 16.35%;  $p < 0.001$ ).

A diagnosis of MDD requires the presence of at least 5 criterial symptoms. We carried out a logistic regression analysis taking this diagnostic cut-off as a dependent variable in order to check the effects of gender, impairment and paid employment status together. The effect on the diagnostic symptom threshold was greatest for impairment (OR = 3.52, C. I. 3.3–3.8) and female gender (OR = 1.73, C. I. 1.6–1.9). In the age groups from 25–54 years, the effect of impairment was comparable in both sexes: males OR = 3.58 (C. I. 3.20–4.24) and females OR = 3.88 (C. I. 3.38–4.44). The effect of a ‘lack of paid employment’ was smaller but still significant (OR 1.12, C. I. 1.0–1.2); and this effect was larger in the age groups between 25 and 54 with the highest employment rates: OR = 1.32 (C. I. 1.2–1.5). When the analysis was restricted to subjects with 5 or more criterial symptoms plus clinically significant impairment, the results were comparable: gender OR = 1.79 (C. I. 1.59–2.02), ‘lack of paid employment’ OR = 1.15 (C. I. 1.02–1.290).

## Seeking help and treatment

Table 6 describes treatment seeking in the subsample of 5,343 males (6.4%) and 8,966 females (12.9%) of wave I, who manifested any kind of depressive symptoms on the basis of the two stem questions; severity of depression is not taken into account. More males (52%) than females (41%) sought no treatment. In most cases it was the general practitioner, family doctor or internist who was consulted.

Interestingly an equal proportion of males and females consulted psychiatrists or neurologists. As expected, a slightly higher percent of females (20.78%) than males (15.2%) received prescribed medication.

Table 7 shows rates of professional treatment and prescribed medication for depression presented separately by gender for the total population and for the four subsamples suffering from 1) any depressive symptoms, 2) 5 or more criterial symptoms, 3) significant impairment or 4) both. In all 4 diagnostic subcategories, females consistently received more professional treatment and prescription drugs (antidepressants, tranquillizers and other drugs). The difference was most pronounced for the prescription of tranquillizers and may be linked with the elevated prevalence of panic attacks in females, which was found in wave II of the study (Table 8). There was a systematic increase of treatment rates with severity of depression.

## Results of wave II

### Further symptoms of depression and anxiety

Wave II of the study dealt with treated depressives only (563 males and 1,321 females). Twenty-seven symptoms of depression and anxiety were assessed systematically (Tylee et al. 1999). Table 8 lists symptoms for which sex differences were found or could be expected on the basis of the literature. Significantly more women reported a lack of energy, reduced sleep, appetite changes, palpitations and being emotional and tearful. Men felt a greater need to consume alcohol during these periods.

**Table 6** Help-seeking and treatment

First interview	Males	Females	p ( $\chi^2$ )
Total sample of depressives	5,343 %	8,966 %	
1. GP/Family doctor/internist	40.20	51.43	0.001
2. Psychiatrist/neurologist	8.29	8.76	n. s.
3. Other medical specialist	12.50	10.90	0.01
4. Psychologist/counsellor	6.94	8.23	0.02
5. Nurse	3.78	4.75	0.05
1–5	46.21	57.54	0.001
6. Others: pharmacist, priest, etc.	1.80	1.81	n. s.
None of 1–6	51.99	40.65	0.001
Thought about help-seeking	5.75	5.50	n. s.
Prescribed medication	15.20	20.78	0.001

**Table 7** Help-seeking and treatment in relation to severity of depression

	Subjects	% professional treatment <sup>a</sup>	% treated Anti-depressants	% treated Tranquillizers	% treated Other drugs	% treated All drugs
Total population						
Males	38,434	6.42	0.78	0.87	0.95	2.11
Females	40,024	12.89	1.77	2.36	1.88	4.65
All depressives						
Males	5,343	46.21	5.58	6.25	6.85	15.20
Females	8,966	57.54	7.91	10.52	8.39	20.78
5+ symptoms						
Males	2,922	57.77	8.45	9.10	8.35	20.70
Females	5,967	66.35	10.52	13.81	9.92	26.01
Impaired subjects						
Males	2,638	59.25	8.64	8.64	9.14	21.23
Females	4,211	70.10	11.37	14.32	11.21	27.62
5+ sx & impairment						
Males	1,925	62.29	10.70	10.29	9.45	24.16
Females	3,502	72.04	12.79	15.88	11.45	29.58

<sup>a</sup> defined as categories 1 to 5 in Table 6

**Table 8** Gender differences in symptoms of depression and anxiety<sup>a</sup>

Second interview	Males	Females	p ( $\chi^2$ )
Subjects	563	1,321	
Symptoms	%	%	
Depressed	72.3	77.7	0.012
Anxious/nervous/... fearful	53.8	59.0	0.038
Tired/no energy	66.3	75.5	0.001
Less sleep	54.4	66.3	0.001
Emotional/crying	35.9	69.1	0.001
Tremor/shaking	17.9	22.0	0.043
Change in appetite	31.8	43.3	0.001
Needing more alcohol	14.4	8.8	0.001
Panic attacks	14.1	19.3	0.008
Palpitations	26.6	37.2	0.001
Worthlessness	38.7	40.2	0.549
Guilt	26.1	29.7	0.117

<sup>a</sup> not assessed: oversleeping, overeating, weight changes, libido

On the whole the magnitude of the differences was not large, except for the symptom of “emotional/cry a lot/want to cry”, which was twice as frequent among females. It is of interest that feelings of worthlessness and guilt were not significantly more frequent among treated depressed females than males. Some symptoms (oversleeping, overeating, weight gain, mood reactivity, rejection oversensitivity and leaden paralysis), which are characteristic of atypical depression and which differed in prevalence by gender in another study (Angst et al. 2002), were not assessed here.

### ■ Causal attribution of depression

Of the subjects, 90% attributed the onset of depression to a number of stressors (Table 9), the most important of which were physical illness/problems, especially among men; men also more frequently attributed the onset of their depression to problems at work and unemploy-

ment than females did; females were characteristically more distressed by relationship problems and illness or death in the family. In 6.8% of the females pregnancy and giving birth were precipitants of depression. These findings were largely independent of paid employment status.

### ■ Consequences of depression, quality of life

Consequences of depression and quality of life were assessed by a 10-point scale, the highest value signifying an extreme effect of depression (Table 10). The main effects for both sexes were problems relating to loss of optimism, general health, sleep, work and the ability to lead a normal life. Relationships with partners, children and friends were less impaired. Men perceived the impairment of their ability to work more, while women rated their quality of general health and sleep lower than men did.

### ■ Coping

The subjects frequently sought the support of family and friends, a behavior slightly, but not significantly more common among females (Table 11). More females than males found relief in emotional outlets (laughing/crying/shouting) and also more often relied on religion. The consumption of alcohol and participating in sports were more characteristic coping mechanisms among male depressives.

### ■ Illness behavior and help-seeking

Overall there were no gender differences in illness behavior (Table 12). Half of all depressives sought treat-

**Table 9** Subjects' causal attribution of depression

Second interview	Paid employment			No paid employment			Paid vs. no paid employment	
	Males (N = 254) %	Females (N = 471) %	p ( $\chi^2$ ) <sup>a</sup>	Males (N = 309) %	Females (N = 850) %	p ( $\chi^2$ ) <sup>a</sup>	Males p ( $\chi^2$ ) <sup>a</sup>	Females p ( $\chi^2$ ) <sup>a</sup>
Causes of depression								
Stress	45.7	45.4	NS	30.1	30.3	NS	0.001	0.001
Physical illness/problems	32.3	25.1	NS	47.3	33.3	0.001	0.01	0.02
Problems at work	39.0	27.8	0.02	12.6	4.0	0.001	0.001	0.001
Unemployment	9.1	7.4	NS	21.4	10.9	0.001	0.001	NS
Financial problems	22.1	23.1	NS	23.0	20.2	NS	NS	NS
Relationship problems	30.3	36.7	NS	21.4	32.4	0.003	NS	NS
Illness/death in family	14.6	25.7	0.005	20.4	31.8	0.002	NS	NS
Pregnancy, giving birth	1.2	8.5	0.001	0.0	5.9	0.001	NS	NS
Can't cope any more	14.2	19.1	NS	17.8	16.5	NS	NS	NS
It just happened	9.5	8.3	NS	12.0	11.1	NS	NS	NS

<sup>a</sup> after Bonferroni corrections**Table 10** Consequences of depression and quality of life<sup>a</sup>

Second interview	Males		Females		p <sup>b</sup>
	N	mean (s)	N	mean (s)	
Quality of sleep	560	5.86 (3.51)	1306	6.66 (3.31)	0.0001
Ability to maintain friendships	550	3.86 (3.46)	1286	3.83 (3.51)	0.7886
Marriage/partner	446	4.38 (3.55)	1018	4.61 (3.71)	0.283
Ability to work	383	5.94 (3.40)	751	5.23 (3.44)	0.0009
Relationship with children	392	3.46 (3.30)	1069	3.61 (3.31)	0.4126
General health	557	5.38 (3.23)	1315	5.92 (3.09)	0.0011
Optimism	562	6.22 (3.28)	1312	6.36 (3.16)	0.5548
Ability to lead a normal life	561	5.62 (3.10)	1315	5.55 (3.10)	0.6338

<sup>a</sup> assessed by an analogue scale from 0 to 10; a high score means an extreme negative effect of depressive symptoms<sup>b</sup> Kruskal-Wallis-Test**Table 11** Coping behavior

Second interview	Males (563) %	Females (1321) %	p ( $\chi^2$ )
Friends, family	66.3	70.9	0.043
Sport, hobbies	31.8	17.5	0.001
Going out/socializing	30.9	32.6	0.464
TV, radio, films	35.5	32.4	0.188
Cigarettes	31.1	26.4	0.035
Coffee	16.5	14.8	0.254
Alcohol	19.4	11.0	0.001
Reading	23.5	27.4	0.074
Laughing/crying	19.0	31.3	0.001
Religion	13.1	18.2	0.007
Relaxation tapes/methods	9.1	10.0	0.531
Support groups/self-help groups	7.6	5.2	0.036

ment within the first two weeks of the onset of their episodes. The reasons for delay in treatment seeking (after two weeks) were the same in both genders: two-thirds thought that the critical depressed period would "go away" or that they would get over it; whereby 19% did not want to take medication.

**Table 12** Reasons for delayed help-seeking

Second interview	Males (562) %	Females (1319) %	p ( $\chi^2$ )
First consultation within 2 weeks (no delay)	50.89	50.49	0.975
Subsample with delayed consultation	N = 276	N = 653	0.812
Reasons for delay	%	%	
Would go away	63.4	68.5	0.135
Medication not needed	14.1	17.9	0.158
Don't want to take medication	18.2	20.1	0.494
Afraid of visiting a doctor	12.0	12.3	0.900
Didn't think doctor could help	20.3	17.2	0.256
Negative attitude to ward doctor	5.8	4.3	0.322
Didn't realize anything could be done	10.1	11.3	0.256
No insurance	1.1	2.1	0.272

### Other medical conditions

Of treated depressives of both sexes, 65% suffered from some kind of medical condition. Twelve specific syndromes were assessed systematically and are listed separately by sex in Table 13. Males manifested significantly more heart disease and diabetes, females more migraine

**Table 13** Medical conditions

Second interview	Males	Females	
Total sample	563	1321	$p(\chi^2)$
Subsample with other medical conditions	365 (64.8%)	855 (64.7%)	n. s.
	%	%	
Heart	22.5	13.8	0.001
Stroke	2.2	1.2	0.175
Asthma	10.1	9.7	0.818
Diabetes	10.4	6.3	0.013
Blood pressure	27.1	28.0	0.767
Parkinson's disease	2.5	0.7	0.010
Arthritis	16.2	15.7	0.829
Migraine	9.9	19.2	0.001
Cancer	4.4	3.3	0.342
Thyroid problems	2.5	8.5	0.001
Premenstrual Sx.	—	8.4	—
Backache	30.1	33.0	0.330
Other medical conditions	53.4	53.5	0.993

and thyroid problems; 8.4% of females suffered from significant premenstrual symptoms (PMS). There was no distinct relationship between any of the somatic diagnoses and 4 groups of depression (major depression and minor depression and their subgroups with impairment); this result was also negative if computed separately by sex. An exception was the higher frequency of PMS in women with major depression (5.9%) than with minor depression (2.7%) ( $p < 0.05$ ).

## Discussion

This representative study on depression in the community is unique in sample size, comprising 78,458 subjects from six European countries. For analyses of gender differences 38,434 males and 40,024 females were available from wave I and 563 males and 1,321 females from wave II. The depressed subsample of wave II includes more females because it was selected on the basis of treatment-seeking, which is much rarer in males. Males who tend to cope by acting out may be underrepresented in wave II to an unknown extent.

The results of our study are compatible with those of many others. Gender differences in depression are marked, important and of complex causation. Our study reconfirms the higher female prevalence rates for major depression but found no gender difference for minor depression when impairment was included as a diagnostic criterion. An earlier analysis of this sample found depression to be less prevalent in younger (under 25) and older subjects (75+) (Lépine et al. 1997); our reanalysis shows that the 6-month prevalence rates for major depression were lower among the 65+ year-olds of both sexes. Nonetheless the gender ratio shows a rather constant almost two-fold preponderance of females across all age groups and this result was replicable across all six countries. A smaller female preponderance was also pre-

sent in minor depression across all age groups. This result does not confirm the impressive change in the sex ratio after age 55 mainly because of a reduction in the female prevalence of depression found in the National Survey of Psychiatric Morbidity in Great Britain (Bebbington et al. 1998b) and is incompatible with the hypothesis that the high F/M ratio is restricted to the period of female fertility (Jorm 1987, Bebbington 1998).

An important result of our analysis is that the gender difference in the prevalence of major depression may be dependent on the total number of depressive symptoms reported. If it is true that depressed men report consistently fewer symptoms than depressed women (Wilhelm et al. 1998), a diagnostic threshold applying an identical total number of symptoms (for instance 5 or more) would then contribute to the preponderance of females. This was already suggested some 15 years ago by another epidemiological study (Angst and Dobler-Mikola 1984), which described how, even after stratification by work impairment, males still reported fewer symptoms than females and therefore less frequently met the diagnostic threshold. The DEPRES study shows the same phenomenon: after stratification by 'clinically significant impairment', depressed males reported significantly fewer symptoms of depression than depressed females (Tables 3 and 4 and Fig. 1). One can also interpret this finding in the sense that males show impairment at lower symptoms levels than females (Hurley et al. 1983, Bebbington et al. 2000). Overall males and females who met either of the stem questions for depression manifested the same proportion of impairment (49%). This finding is compatible with the cross-cultural WHO study in primary care (Maier et al. 1999), which found that depression with severe social disability was nearly as common among males as females and that gender ratios depended on the severity of depression; the authors also found that, after controlling for the number of criterial symptoms of depression, mean social disability was higher in men than women.

A possible explanation of this finding could be a lower threshold for perceiving impairment in subjects in paid employment, and men were much more frequently in paid employment than women. The logistic regression analyses confirmed that subjects in paid employment had a slightly lower risk of reaching the diagnostic threshold of major depression in both sexes. However, stratified by paid employment and impairment, the gender differences still persisted significantly (Tables 3 and 4) and therefore cannot be explained by these social factors.

Independent of the tested social factors men report fewer symptoms of depression, suggesting that different symptom thresholds should be applied for the definition of clinically relevant depression in males and females (Angst and Dobler-Mikola 1984, Blehar 1995).

These findings are also interesting for the concept of a "male depressive syndrome" as proposed by Walinder and Rutz (2001), which was characterized by acting out behavior, low impulse control, antisocial behavior, sub-

stance abuse, low stress tolerance, irritability, restlessness, dissatisfaction, depressive thought content and hereditary loading (depression, alcoholism, suicide).

Compatible with that concept is the hypothesis of Nolen-Hoeksema (1987, 1994, 1997) of gender differences in coping with depression; men try to ignore the problem, to cope through physical activities (sport, etc.) and alcohol consumption, whereas females internalize the problem, search for causes, blame themselves and thus induce a vicious circle with lower self-esteem.

In this regard, the data of wave II of the DEPRES Study are of great interest, too, but may be less conclusive, because they deal exclusively with treated depressives. The study demonstrates qualitative gender differences in the causal attribution of depression, with men tending to ascribe it more to physical, and work- and employment-related problems and females to relationship problems. Gender differences in coping behaviors were also compatible with Nolen-Hoeksema's hypothesis: depressed men did more sport and consumed more alcohol; depressed women sought relief for depression through emotional outlets (crying/laughing) and religion (Table 8). However, our finding that there was no gender difference in the rates of feeling worthless and guilty (Table 8) is not fully compatible with the concept of a specifically male depressive syndrome; on the basis of prospective data from the Zurich cohort study it has already been shown that low self esteem is not exclusively characteristic for females and does not predict depression (Ernst and Angst 1992).

Both social factors (Wilhelm and Parker 1989) and biological factors still need to be considered as potential sources of the sex differences in depression, despite the recent contention of Bebbington (1998, p. 5) regarding "the failure of genetic factors to account for the difference". In the Zurich cohort study the presence of an atypical depressive syndrome was a powerful explanation of the sex differences in the prevalence of major and minor depression (Angst et al. 2002), and there is evidence from twin studies (Kendler et al. 1996) and a family study (Stewart et al. 1997) that genetic factors are involved in that syndrome. Regrettably the atypical syndrome was not assessed in the DEPRES Study.

■ **Limitations of the study.** The sample examined in the second wave is only representative for a treated population and not for all depressives; in addition males who 'act out' may be underrepresented. This is especially true for the findings on causal attribution, coping behavior and quality of life, which were only assessed in wave II.

## References

1. American Psychiatric Association (1987) Diagnostic and Statistical Manual for Mental Disorders (DSM-III-R). American Psychiatric Association, Washington DC
2. American Psychiatric Association (1994) Diagnostic and statistical manual of mental disorders (DSM-IV). American Psychiatric Association, Washington DC
3. Angst J (1997) Epidemiology of depression. In: Honig A, Van Praag HM (eds) *Depression: Neurobiological, Psychological and Therapeutic Advances*. John Wiley & Sons, Chichester, pp 17–29
4. Angst J (1998) The prevalence of depression. In: Briley M, Montgomery SA (eds) *Antidepressant Therapy at the Dawn of the Third Millennium*. Martin Dunitz Ltd, London, pp 191–212
5. Angst J, Dobler-Mikola A (1984) Do the diagnostic criteria determine the sex ratio in depression? *J Affect Disord* 7:189–198
6. Angst J, Gamma A, Sellaro R, Zhang H, Merikangas K (2002) The validity of atypical depression in the community: results of the Zurich Cohort Study. *J Affect Disord* 72:125–138
7. Bebbington P, Brugha T, Meltzer H, Farrell M, Ceresa C, Jenkins R, Lewis G (2000) Psychiatric disorder and dysfunction in the UK National Survey of Psychiatric Morbidity. *Soc Psychiatry Psychiatr Epidemiol* 35:191–197
8. Bebbington P, Dunn G, Jenkins R, Lewis G, Brugha T, Farrell M, Meltzer H (1998a) The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *Psychol Med* 28:9–19
9. Bebbington PE (1998) Sex and depression. *Psychol Med* 28:1–8
10. Bebbington PE, Dunn G, Jenkins R, Lewis G, Brugha T, Farrell M, Meltzer H (1998b) The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *Psychol Med* 28:9–19
11. Beiser M, Johnson PJ, Turner RJ (1993) Unemployment, underemployment and depressive affect among Southeast Asian refugees. *Psychol Med* 23:731–743
12. Blehar MC (1995) Gender differences in risk factors for mood and anxiety disorders: implications for clinical treatment research. *Psychopharmacol Bull* 31:687–691
13. Brown DR, Ahmed F, Gary LE, Milburn NG (1995) Major depression in a community sample of African Americans. *Am J Psychiatry* 152:373–378
14. Egeland JA, Hostetter AM (1983) Amish Study I: affective disorders among the Amish 1976–1980. *Am J Psychiatry* 140:56–61
15. Ernst C, Angst J (1992) The Zurich Study: XII. Sex differences in depression. Evidence from longitudinal epidemiological data. *Eur Arch Psychiatry Clin Neurosci* 241:222–230
16. Hurry J, Sturt E, Bebbington P (1983) Sociodemographic association with social disablement in a community sample. *Soc Psychiatry* 18:113–121
17. Jenkins R (1985) Sex differences in minor psychiatric morbidity. *Psychol Med monograph (Suppl 7)*
18. Jenkins R, Meltzer H (1995) The National Survey of Psychiatric Morbidity in Great Britain. *Soc Psychiatry Psychiatr Epidemiol* 30:1–4
19. Jorm AF (1987) Sex and age differences in depression: a quantitative synthesis of published research. *Austr New Zeal J Psychiatry* 21:46–53
20. Kendler KS, Eaves LJ, Walters EE, Neale MC, Heath AC, Kessler RC (1996) The identification and validation of distinct depressive syndromes in a population-based sample of female twins. *Arch Gen Psychiatry* 53:391–399
21. Lecrubier Y, Sheehan DV, Weiller E, Amorim P, Bonora I, Harnett Sheehan K, Janavs J, Dunbar GC (1997) The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. *Eur Psychiatry* 12:224–231
22. Lépine J-P, Gastpar M, Mendlewicz J, Tylee A (1997) Depression in the community: the first pan-European study DEPRES (Depression Research in European Society). *Int Clin Psychopharmacol* 12:19–29
23. Levav I, Dohrenwend BP, Shrout PE, Skodol AE, Schwartz S, Link BG, Naveh G (1993) An epidemiological study of mental disorders in a 10-year cohort of young adults in Israel. *Psychol Med* 23:691–707
24. Maier W, Gansicke M, Gater R, Rezaki M, Tiemens B, Florenzano Urzua R (1999) Gender differences in the prevalence of depression: a survey in primary care. *J Affective Disord* 53:241–252
25. Meltzer H, Gill B, Petticrew M, Hinds K (1995) The prevalence of psychiatric morbidity among adults living in private households. OPCS Survey of psychiatric morbidity in Great Britain. HMSO, London



26. Merikangas KR (2000) Epidemiology of mood disorders in women. In: Steiner M, Yonkers K, Eriksson E (eds) *Mood Disorders in Women*. Martin Dunitz Ltd, London, pp 1–14
27. Murphy JM (1995) What happens to depressed men? *Harvard Rev Psychiatry* 3:47–49
28. Nolen-Hoeksema S (1987) Sex differences in unipolar depression: evidence and theory. *Psychol Bull* 101:259–282
29. Nolen-Hoeksema S, Girgus JS (1994) The emergence of gender differences in depression during adolescence. *Psychol Bull* 115:424–443
30. Nolen-Hoeksema S, McBride A, Larson J (1997) Rumination and psychological distress among bereaved partners. *J Personality Soc Psychol* 72:855–862
31. Piccinelli M, Gomez Homen F, Tansella M (1997) Gender differences in the epidemiology of affective disorders and schizophrenia. World Health Organisation, Geneva
32. Piccinelli M, Wilkinson G (2000) Gender differences in depression. *Br J Psychiatry* 177:486–492
33. Sheehan DV, Janavs J, Baker R, Harnett-Sheehan K, Knapp E, Sheehan M, Lecrubier Y, Weiller E, Hergueta T, Amorim P, Bonora LI, Lépine J-P (1998a) MI. NI. Mini International Neuropsychiatric Interview. English Version 5.0.0, DSM-IV. *J Clin Psychiatry* 59 (Suppl 20):34–57
34. Sheehan DV, Lecrubier Y, Harnett-Sheehan K, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC (1998b) The Mini-International Neuropsychiatric Interview (MI. NI.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 59 (Suppl 20):22–33
35. Sheehan DV, Lecrubier Y, Harnett-Sheehan K, Janavs J, Weiller E, Keskiner A, Schinka J, Knapp E, Sheehan MF, Dunbar GC (1997) The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *Eur Psychiatry* 12:232–241
36. Stewart JW, Tricamo E, Mcgrath P, Quitkin FM (1997) Prophylactic efficacy of phenelzine and imipramine in chronic atypical depression: likelihood of recurrence on discontinuation after 6 months' remission. *Am J Psychiatry* 154:31–36
37. Tylee A (1996) Depression Research in European Society (DEPRES) study. *Int J Meth Psychiatr Res* 6:S33–S37
38. Tylee A, Gastpar M, Lépine J-P, Mendlewicz J (1999) DEPRES II (Depression Research in European Society II): a patient survey of the symptoms, disability and current management of depression in the community. *Int Clin Psychopharmacol* 14:139–151
39. Walinder J, Rutz W (2001) Male depression and suicide. *Int Clin Psychopharmacol* 16 (Suppl 2):S21–24
40. Weissman MM, Bland RC, Canino GJ, Faravelli C, Greenwald S, Hwu H-G, Joyce PR, Karam EG, Lee C-K, Lellouch J, Lépine J-P, Newman SC, Rubio-Stipec M, Wells E, Wickramaratne PJ, Wittchen H-U, Yeh E-K (1996) Cross-national epidemiology of major depression and bipolar disorder. *JAMA* 276:293–299
41. Wilhelm K, Parker G (1989) Is sex necessarily a risk factor to depression? *Psychol Med* 19:401–413
42. Wilhelm K, Parker G (1994) Sex differences in lifetime depression rates: fact or artefact? *Psychol Med* 24:97–111
43. Wilhelm K, Parker G, Asghari A (1998) Sex differences in the experience of depressed mood state over fifteen years. *Soc Psychiatry Psychiatr Epidemiol* 33:16–20
44. World Health Organisation (1990) Composite International Diagnostic Interview (CIDI), version 1.1. WHO, Geneva