Eur Arch Psychiatry Clin Neurosci (1992) 241:222–230

European Archives of Psychiatry and Clinical Neuroscience

The Zurich Study

XII. Sex Differences in Depression. Evidence from Longitudinal Epidemiological data*

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Received February 8, 1991

Summary. A prospective study of depressive syndromes and diagnoses was performed among a young adult Swiss population with three interviews over 7 years. Different definitions of depressive states were used: on the one hand, depressive syndromes including mood disturbances of any severity, on the other, well-defined diagnoses of depression. Women were consistently overrepresented among subjects with depressive syndromes of some length and among those with DSM-III major depressive disorder. Both sexes appeared equally affected by brief recurrent depressions with work impairment. Between the ages of 20 and 30 years, men as a group in contradistinction to women showed depressive syndromes with decreasing frequency, whereas, for diagnoses, the sex rates remained quite constant. For identical syndromes, women at each interview reported a greater number of symptoms. DSM-III-R symptoms of melancholia were not reported more often by women than by men. When syndromes or diagnoses were controlled, women and men suffered to an equal rate from subjective impairment at work. Womens' syndromes were more recurrent. Among women, a diagnosis of depression was more often associated with disturbances of appetite and with phobias than among men. The importance of differential recall for sex differences in prevalence is discussed. Sex differences may have different weight and different causes with regard to depressive syndromes and to a diagnosis of depression.

Key words: Sex differences – Depressive syndromes – Major depression – Prevalence – Recurrent depression – Comorbidity

Introduction

In clinical psychiatry and psychiatric epidemiology, it is generally accepted that women more often have a history of depression and depressive symtpoms, treatment for unipolar affective disorder and less severe depression, and suicide attempts. Excellent review have been given by Weissman and Klerman (1977; 1985), von Zerssen and Weyerer (1980), Weissman et al. (1984), Nolen-Hoeksema (1987) and Bebbington (1988).

In recent large studies of untreated cases in the general population, a sex ratio for unipolar depression of about 2:1 was found, whereas for bipolar depression it approached unity (Bebbington et al. 1981; Weissman et al. 1984; Bland et al. 1988). Scores on depression scales with a cut-off for caseness lead to a similar sex ratio (Bebbington et al. 1981; Nolen-Hoeksema 1987).

There have been, however, several studies of selected groups within the general population that did not find a female predominance among depressives: Henderson et al. (1979) found no sex difference in the prevalence of depression in Canberra; Parker (1979), and Wilhelm and Parker (1989) found no differences in the prevalence of depressive symptoms and of diagnosed depression among male and female teacher postgraduates; Hammen and Padesky (1977) found no difference by sex in the Beck Depression Inventory among college students, and Oliver and Simmons (1985), using the same measure, found none among a sample of the general population recruited by the dialling method. Similarly, three epidemiological studies from developing countries reported no sex difference in minor psychiatric morbidity (Orley and Wing 1979; Bash and Bash-Liechti 1987; Hollifield et al. 1990).

These contradictory findings may either be attributed to differences in sampling, or in the definition of depression, or to both. There is also the possibility that in comparison with earlier cohorts men's vulnerability to depression may be increasing, and/or women's vulnerability decreasing (Murphy et al. 1986).

In the present study, several methodological features enabled us to examine these explanations for differences in the sex ratio in depression. Because of the prospective longitudinal design, we were able to investigate changes in sex ratio over time. To the data of each interview several diagnostic criteria and algorithms were applied to

*This project was supported by grant 32-9502/3.873-0.88 from the Swiss National Science Foundation

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define depressive syndromes and diagnoses; this strategy allowed us to establish sex ratios for mood disturbances of varying severity at each interview between 20/21 and 27/28 years of age (see Method).

Method

We investigated a cohort of young men and women from the Kanton Zurich, born in 1957/58. Subjects were interviewed prospectively between age 20/21 and 29/30 years in 1979, 1981, 1986, and 1988. The present study uses data from the 1986 interview and reanalyses data from 1979 and 1981 (Angst and Doubler-Mikola 1984). Preliminary data of the 1988 interview are used to discuss sex differences in recurrence.

An extensive description of the screening of the birth cohort was given elsewhere (Angst et al. 1984). For the longitudinal study a subsample of 591 persons was selected, which consists of high scorers (two thirds) and low scorers (one third) on the SCL-90R (Derogatis 1977). In 1986, 75.8% of the original sample was seen. The interviews were conducted by psychologists at the subjects' homes.

The instrument used was SPIKE, a semistructured interview created for the Zurich study. Information was collected on 28 psychiatric and psychosomatic syndromes that include depression. The assessment of depression started with the probe question: "During the last 12 months did you ever feel as if you couldn't enjoy anything, as if you didn't have any energy or did you feel blue?". Then a list of symptoms based on DSM-III symptom criteria for depression was read to the subject. In 1979, the list included six symptoms, in 1981 eight, in 1986 23. For depression and for all other syndromes, duration, frequency, subjective degree of work impairment, and treatment were assessed for the last 12 months before the interview. The subjects also reported whether they had suffered from depressive symptoms at any time since the last interview or since the screening.

The growing influence of DSM-III and DSM-III-R resulted in several changes of definition concerning the diagnosis DSM-III major depressive disorder (MDD) and recurrent brief depression (RBD). For both diagnoses since 1981 the criteria of four symptoms (not three as before) were required and since 1986 for MDD a duration of at least 2 weeks.

Angst and Dobler-Mikola (1989) showed that notwithstanding these changes, the reliability between diagnoses of depression diagnosed in 1979 and in 1981 was excellent.

Recurrent brief depression, RBD, (Angst et al. 1990) was defined by the same number of symptoms as MDD, but by a duration of less than 2 weeks and at least 1 day, by a frequency of at least once a month over 1 year and by work impairment. Besides DSM-III diagnostic criteria and our own criteria for RBD, we also applied to the data gathered at each interview other, less exacting criteria, thus cutting off "syndromes" as opposed to "diagnoses". The syndrome DE ("depressive symptoms") corresponds to the largest definition of negative mood; it was assigned to all subjects who gave a positive answer to the probe question. The syndrome EDE ("extended depressive episode") was defined by a positive answer to the probe question and a duration of negative mood of 2 weeks or more. BDE ("brief depressive episode") was defined by a positive answer and a duration of negative mood of less than 2 weeks. This syndrome may be recurrent, i.e. appearing at least monthly during 1 year ("recurrent brief depressive episode", RBDE), or non-recurrent ("non-recurrent brief depressive episode", NRBD).

The cut-offs for these syndromes and diagnoses ranged from mild to severe disturbance: EDE by definition includes the more severe MDD, and RBDE the more severe RBD. The relationship of syndrome to diagnosis may best be visualized in the form of concentric circles. The diagnostic classes of MDD-DSM-III and RBD, on the other hand, are mutually exclusive. If subjects fulfilled criteria for two syndromes (e.g. EDE *and* NRBD, MDD *and* RBD) they were assigned to the group with the longer lasting syndrome. The statistical methods used were χ^2 tests and two-sided Wilcoxon tests.

Results

Our data refer to the stratified sample of the Zurich Study. The ratios of males and females that were interviewed each year changed very little. In the following paragraphs it will be shown that the sex ratio of 1-year rates of depression is a function of the definition of depression.

1 Depression defined by the presence of dysphoric mood not otherwise specified (Probe question DE)

Males and females were significantly different in the rate reporting DE at age 20/21 years (69.2% vs 78.8%). DE then decreased with age quite sharply in both sexes, *but more so in males* (42.7% vs 56.5% at age 28/29). The sex ratio slightly increased in favour of females (1.14 to 1.33; Table 1).

2 Changing the definition of depression by introducing length of episode (Extended depressive Episode, EDE)

In 1979, EDE occurred slightly more often (n.s.) in females than in males (19.5% vs 14.1%). Over time males reported less and less EDE while the rate of females showed little change (males 7.6% vs females 16.4% in 1986). The sex ratio increased sharply from 1.39 to 2.16 and reached significance (Table 1).

3 Changing the definition of depression by introducing recurrence of episodes (Recurrent brief depressive episode, RBDE)

From age 20/21 years to age 27/28 years there was a sharp decrease in the rate both of men and women reporting NRBD.

RBDE behaved differently: over 7 years, men's rates decreased (25.7% to 16.9%), but womens' rates remained almost stationary (29.6% to 24.6%). Sex ratio increased with age from 1.16 to 1.63/1.46 and reached significance (Table 1).

4 Changing from syndromes to diagnoses by introducing a number of symptoms (Major Depressive Disorder, MDD)

In the next step, the full DSM-III criteria are introduced. MDD is defined by three criteria: at least one episode of dysphoric mood during the last 12 months, at least 2 weeks duration (more than 1 week in 1979 and 1981), and a minimum of four of eight symptoms regarded as criteria (three of six in 1979). The ratio of subjects reporting this more stringently defined form of depression remained remarkably stable over the years among males and females, and so did the sex ratio (2.25; 2.90; 2.44), indicating a strong, constant, and significant female surplus (Table 1).

Table 1. One year rates of depression by sex according to different definitions

	Sample	Males (n)	Females (n)	Sex ratio	$P \leq$
	1979	292	299	1.02	ns
	1981	220	236	1.07	ns
	1986	225	232	1.03	ns
		%	%	Sex ratio	$P \leq$
Unspecified dysphoria (symptoms/syndromes)					
DE (depressive symptoms)	1979	69.2	78.8	1.14	0.01
	1981	50.5	61.0	1.21	0.05
	1986	42.7	56.5	1.33	0.01
NRBD DE < 2 weeks	1979	29.5	29.6	1.00	ns
	1981	25.0	*18.7*	0.75	ns
	1986	18.2	*15.5*	0.86	ns
RBDE DE < 2 weeks at least monthly recurrence	1979	25.7	29.6	1.16	ns
	1981	14.6	23.7	1.63	0.05
	1986	16.9	24.6	1.46	0.05
EDE DE > 2 weeks	1979	14.1	19.5	1.39	ns
	1981	10.9	18.7	1.72	0.05
	1986	7.6	16.4	2.16	0.05
Diagnoses					
MDD (Major depressive disorder DSM-III)	1979	4.8	10.8	2.25	0.01
	1981	5.0	14.4	2.90	0.001
	1986	6.2	15.1	2.44	0.01
RBD (Recurrent brief depression)	1979	13.4	15.5	1.16	ns
	1981	9.1	14.0	1.54	ns
	1986	9.8	15.1	1.55	ns

ns = Not significant

At each interview women receiving the diagnosis of major depressive disorder reported longer lasting episodes the men. The difference, however, never reached statistical significance.

5 Changing from syndrome to diagnosis by introducing work impairment (Recurrent Brief Depression, RBD)

At all interviews, the rate of RBD among men and women remained constant. The sex ratio increased slightly (1.2 to 1.6); it was always lower than for MDD, and at no time statistically significant (Table 1).

6 Longitudinal changes in sex ratio

Differential regression to the mean by sex. Over a 7-year period, risk for depression by sex underwent a change. In men and women, lability of mood (DE, NRBD) decreased with age ($P \leq 0.001$ for both syndromes and both sexes between age 20/21 and 27/28 years).

RBDE and depressive states of at least 2 weeks duration (EDE) appeared at each interview with constant rates among females, while males' rates decreased ($P \leq 0.05$). This finding is confirmed by the course of sex differences in symptoms on the scales of the SCL-90R from age 19/21 years to age 27/28 years. Womens' symptoms, which started at a higher level at age 20 years, decrease more slowly (Table 2).

In both sexes the rates of probands with the more severe types of depression, which reach the threshold of diagnoses, remained remarkably constant.

7 Depressive symptoms

(a) Number of symptoms. At each interview women with any and those with longer-lasting depressive states (DE,

Table 2. Significance of sex differences in SCL-90R scales over 9 years

	Screening population 1978 19/20 years of age P^a	Sample 1979 20/21 years of age P^a	Sample 1981 22/23 years of age P^a	Sample 1986 27/28 years of age P^a
SCL-90R scales				
Somatization	0.0001	0.002	0.0000	0.002
Obsessive compulsive disorder	0.0001	ns	ns	ns
Interpersonal sensitivity	0.0001	ns	ns	ns
Depression	0.0001	0.0002	0.02	0.03
Anxiety	0.0001	0.0009	0.008	ns
Anger/Hostility	0.0001	0.0008	0.002	0.006
Phobia	0.0001	0.0005	ns	0.007
Paranoid thougths	0.0001	ns	ns	ns
Psychoticism	0.0001	ns	ns	ns
Total score	0.0001	0.01	0.06	ns

[a] The significant differences all refer to higher scores of women (Wilcoxon test)

ns = Not significant

The means and standard deviations are available on request

Table 3. Proportions of male and female subjects with symptoms of depression (positive response to probe question, DE) at age 27/28 years (1986)

	Males $n = 96$ %	Females $n = 131$ %	P
Sad, depressed	96	96	
Loss of energy, initiative	81	85	
Worthlessness	55	67	0.002
Avoiding contacts	58	66	
Decreased sexual interest	33	63	0.000
Inhibited, blocked	65	59	
Loss of interests and activity	61	62	
Difficulties thinking, indecisive	55	58	
Guilt feelings	55	67	0.002
Anxious about the future	40	50	
Lack of appetite	31	38	
Weight loss	17	24	
Increased appetite	11	29	0.001
Weight gain	5	22	0.000
Insomnia	33	36	
Sleeping more, tiredness	35	46	
Worse in the morning	21	30	
Cannot be cheered up	21	22	
Slowed down in moving, talking	26	35	
Restless, constantly moving	34	33	
Tired of living, wishing to die	28	35	
Anxious about ordinary tasks	24	32	
Fearful to be alone	31	33	

The DSM-III-R symptoms of melancholia are emphasized. None show a female preponderance.

EDE) reported more symptoms than males (Table 3). For MDD, the difference became significant only in 1986; for RBD, it then approached significance. The increase in symptoms was due to our presenting more symptoms in 1986 than in the former interviews (see Method). This fact did not, however, appreciably change the proportions of medians and means of number of symptoms by sex.

(b) Type of symptoms. Table 3 compares males and females with a positive answer to the screening question (DE) in 1986: females significantly more often complained of feeling guilty and worthless, of decreased sexual interest, of increased appetite, and of weight gain.

Some of these symptoms are non-specific in the sense that at the 1986 interview diminished sexual interest appeared more often among women than men whether depressed or not. Over 7 years, women also constantly reported more somatic symptoms on the SCL-90R (Table 2). The 1986 list – but not the earlier ones – of symptoms of depression contained the DSM-III-R criteria for melancholia (with the exception of early morning awakening). None of these symptoms of a more severe type of depression were reported more often by women.

If symptoms are compared by sex for other syndromes or diagnoses, the sex difference in type of symptoms remains the same.

Table 4. Major Depressive Disorder (MDD) by temporal distance from interview and sex

		Males	Females	Sex ratio	$P \leq$
1979		$n = 292$ %	$n = 299$ %		
MDD-	1– 3 months	3.4	5.4	1.6	ns
DSM-III	4–12	1.4	5.0	3.75	0.05
1981		$n = 220$ %	$n = 236$ %		
MDD-	1– 3 months	3.2	6.4	2.1	ns
DSM-III	4–12	1.8	8.0	4.75	0.01
1986		$n = 225$ %	$n = 232$ %		
MDD-	1– 3 months	4.4	9.1	2.1	ns
DSM-III	4–12	1.3	6.0	4.7	0.01

ns = Not significant

8 Subjective impairment at work

In 1986, 73% of males and 58% of females with a positive answer to the probe question (DE) considered themselves impaired at work. If present, the degree of impairment was not different. If, however, the subjects with work impairment were compared with the total sample (225 males, 232 females), a similar rate of men and women with any dysphoric mood and work impairment (31% vs 33%) was observed. The surplus of women in the large category of DE is therefore due to subjects with complaints that were not severe enough to change the subjects' activity.

When a more stringent definition of a depressive syndrome (duration of at least 2 weeks, EDE) was used, the impairment rates among both sexes were approximately equal.

When the algorithm of major depressive disorder was introduced, subjective work impairment as an additional case criterion reduced the prevalence, by about one third for both males and females. However, the sex ratio did not change appreciably at age 22/23 and 27/28 years.

9 Recall of depression

An analysis of sex ratio in prevalence of dysphoric mood by distance from the actual interview showed that DE and NRBD were equally distributed by sex over 1 year. For EDE and MDD, on the other hand, sex ratio significantly increased with distance from the interview, which could mean that women remember past mood fluctuations better than men. This sex difference appeared at three interviews over 7 years (Table 4).

10 Comorbidity

The following results are based on the 591 probands who participated at least in one of the four interviews over 10 years (1979–88). Comorbidity was defined as the cross-sectional or longitudinal association of another psychiat-

Table 5. Cross-sectional and longitudinal comorbidity of major depressive disorder (MDD), recurrent brief depression (RBD), or both, 1979–88 among males and females ($n = 591$)

	Males		Females		
	Odds ratio $n = 292$	P	Odds ratio $n = 299$	P	
Panic	10.7	0.000	4.7	0.000	Sex-independent comorbidity
Suicide attempts	3.9	0.006	6.6	0.000	
Neurasthenia	8.7	0.000	3.6	0.000	
Insomnia	3.5	0.000	3.6	0.000	
Hypomania	2.0	ns	1.8	ns	
Migraine	1.6	ns	0.9	ns	
Generalized anxiety	3.1	ns	2.4	ns	
Social phobia	2.7	ns	6.0	0.000	Sex-dependent comorbidity
Agoraphobia	1.8	ns	2.7	0.02	
Simple phobia	1.1	ns	2.2	0.02	
Binge eating	0.5	ns	3.5	0.006	

ns = Not significant

ric diagnosis with the diagnosis of MDD, RBD, or both. In either sex, panic, suicide attempts, insomnia, and neurasthenia coexisted with depression at a much higher level than by chance (Table 5). A sex difference, however, appeared in that, for women (but not men), a diagnosis of depression was associated with a diagnosis of social and simple phobia, with agoraphobia and binge eating.

Table 6a. Rates of male and female subjects with positive response to the probe question, including the years between screening and interviews and between interviews 1979–1988 (longitudinal sample, $n = 356$)

	Males $n = 164$ %	Females $n = 192$ %	Sex ratio
DE present in			
0– 1 years	32.9	14.6	0.45
2– 6 years	45.7	47.9	1.1
7–11 years	21.3	37.5	1.7
$\chi^2 = 20.695$; $P < 0.000$			

11 Recurrence of depression

The following longitudinal analysis includes the 1988 follow-up data. At each interview, probands were asked whether they had experienced dysphoric mood states (DE) during the years since the last interview (in 1979, since the screening). For the 356 subjects who participated at all interviews 1978–1988, we computed the number of men and women who reported DE for one, for two, or any number of years. Women were strongly overrepresented among probands who reported depressive mood for 9–11 years, and underrepresented among those who reported depressive mood never or only once ($P < 0.000$).

As this assessment is strongly influenced by memory of past affective states, we also compared for the same longitudinal sample males and females who fulfilled criteria of or received diagnosis of DE, EDE, MDD-DSM-III or RBD for the last 12 months at one, two, three or four interviews from 1979 to 1988.

Females reported DE and EDE syndromes at more interviews than men. For diagnoses, the difference merely amounted to a trend. The sex difference in recurrence of DE diminished when the period covered was restricted to the year before the interview.

Table 6b. Rates of male and female subjects with positive response to probe question or who were given a diagnosis of depression at least at one of the four interviews 1979–88 (longitudinal sample, $n = 356$)

	DE			EDE			MDD-DSM-III RBD		
	Males $n = 145$ %	Females $n = 182$ %	Sex ratio	Males $n = 58$ %	Females $n = 92$ %	Sex ratio	Males $n = 63$ %	Females $n = 112$ %	Sex ratio
Diagnosed at one interview	31.0	21.4	0.7	81.3	64.1	0.8	66.7	53.6	0.9
Diagnosed at least at two interviews	68.9	78.6	1.1	18.7	35.9	1.9	33.3	46.4	1.4
χ^2	3.901			4.904			2.844		
$P \geq$	0.05			0.05			0.09		

Discussion

In our sample, women almost invariably prevailed among subjects who indicated low mood, whatever the cut-offs and definitions, with the exception of mere sporadic spells and RBD. For MDD-DSM-III, the sex ratio at each interview varied between 2 and 3, and thus corresponded to the bulk of the literature.

The cut-off criteria that consistently led to a higher prevalence of women were at the *level of syndromes,* recurrence and length of episodes and at *the level of diagnosis,* number of symptoms, and length of episodes.

A sex difference in period or lifetime prevalence may have several sources:

(a) sex specific differences in the recall of past symptoms or episodes;
(b) sex specific expressivity;
(c) longer duration of episodes in one sex;
(d) higher recurrence of episodes in one sex;
(e) a more chronic course of a disorder in one sex;
(f) higher first incidence in one sex.

(a) Because *differential memory for past affective states by sex* calls in question all the epidemiological parameters mentioned above, we will discuss these findings first. In our study, significant changes in sex ratio appeared with increasing temporal distance from the interview: women seemed to remember longer-lasting depressive states (EDE) and MDD-DSM-III better than men. Thus, the female surplus could be an artefact of recall.

There are, however, several arguments against this conclusion. Differential recall becomes irrelevant when very recent and short periods are considered. A female excess was found on the SCL-90R depressive symptoms over the last 4 weeks and in other variables measuring "negative affect", which may be the matrix of the milder depressions (Andrews et al. 1990). Furthermore it would be expected that differential recall by sex would appear in other affective states as well. In our sample, however, no increase of sex ratio with temporal distance was found for the least severe depressive syndromes (DE, NRBD) or for panic attacks.

The problem of recall may play a role in the sex difference in recurrence of depression. A comparison of negative mood fluctuations (positive answer to probe question) over 11 years as reported by subjects who had participated at all interviews resulted in a strong female preponderance in recurrence. This method involves recall of the years between interviews of between screening and first interview. When for the same sample recurrence was defined as reporting DE or being given a diagnosis of depression at least twice, the female surplus decreased. This method merely involves recall of the year before the actual interview.

The question whether lower male prevalence in depression is wholly or partly due to differential recall will only be solved by a prospective study assessing at T_2 the recall of data given at T_1. The conclusion that sex differences in depression are mere artefacts of memory (Nolen-Hoeksema 1987) is not justified, although differential recall may be one influence among many others.

(b) If at the same level of severity, i.e. subjective suffering, women report more symptoms of depression, they will meet diagnostic criteria more frequently than men because of higher *expressivity.* This was found in a clinical sample (Frank et al. 1988) by comparing self-ratings on depression with clinical ratings and in a population sample (Philipps and Segal 1969) by comparing the number of self-reported depressive symptoms with self-reported somatic illnesses.

We applied three methods to assess sex difference in *severity of depression:* type of symptoms, work impairment and comorbidity. Women reported more somatic symptoms (concerning appetite and sexuality) and more symtpoms of self-evaluation. The symptoms of melancholia occurred with equal frequency, independent of sex.

Work impairment was more frequently found in men with any mood fluctuations (DE), but there was no sex difference for work impairment in longer lasting depressive mood (EDE). Introducing work impairment as a supplementary diagnostic criterion into MDD-DSM III did not alter the sex ratio.

Regarding comorbidity, depression in women appears to be more strongly associated with a diagnosis of insomnia and binge eating and with avoidant behaviour at a level which justifies diagnosis. It is unlikely that differential comorbidity is a consequence of differential recall by sex, because on four SCL-90R measures over 9 years women consistently reported more "negative affect" (including somatisation and phobia) during the past 4 weeks than men.

In a study on relatives of patients, Young et al. (1990) showed that, once depression was diagnosed by duration and by impaired functioning, the female tendency to report more symptoms contributed very little to boosting the sex ratio.

If the female preponderance in depression were *merely* due to men being less often diagnosed because of their relative reticence and thus to a higher threshold of manifestation, men should have a stronger genetic loading with depression. Rice et al. (1984) and Merikangas et al. (1985), studying first-degree relatives of affectively ill index cases, refuted this hypothesis.

We conclude that our data on symptoms of melancholia and work impairment point to an equal severity of subjective suffering among men and women. We believe that the latter's reporting of more symptoms and more comorbidity is due to a stronger tendency to be affected more globally and in various spheres of their personality and not merely to sex differences in expressivity (Briscoe 1989).

(c) Our various cut-offs for caseness show that women consistently prevail in syndromes and diagnoses which imply *longer duration* (EDE, MDD-DSM-III). In either sex, the 1-year prevalence of a diagnosis of depression varies very little over 8 years. Duration of episodes by itself is able to inflate period prevalence. There are few

epidemiological studies where length of depressive episodes has been investigated by sex (Amenson and Lewinsohn 1981; Oliver and Simmons 1985; Cheng 1989). Only in Cheng's Taiwan samples was longer duration of the present episode in women reported.

(d) *Recurrence* of a disorder enhances prevalence. Our data show that with various cut-offs for caseness women prevail in recurrence, mainly of syndromes and less clearly of depression as a diagnosis. There are five prospective studies of non-clinical populations with data on period incidence, in which recurrence usually cannot be differentiated from first incidence. No sex difference in period incidence of a diagnosis of depression was found by Wilhelm and Parker (1989; student teachers, 5 years' incidence), or by Kaplan et al. (1987; general population, 9 years' incidence of the depressive symptoms), whereas in the Florida Health study (Schwab and Bell 1979) the incidence of depressive symptoms over 3 years was higher among females, as was recurrence (not first incidence) of a diagnosis of depression in the study by Amenson and Lewinsohn (1981). Using a similar method, this finding was not confirmed by Oliver and Simmons (1985). Aneshensel (1985) studied recurrence (not first incidence) in a Los Angeles population over 3 years and found female sex a risk factor for recurrence. Our study is the first to describe recurrence by actual diagnoses over 10 years.

(e) The finding of a female preponderance in the longer-lasting syndromes of depression and in MDD raises the question whether there are sex differences in *chronicity*. As our interviews covered only 1 year at a time, we must be satisfied with indirect evidence. Several characteristics of depressive episodes and of depressed persons are known to influence recovery negatively: elevated neuroticism scores (Hirschfeld et al. 1984; Weissman et al. 1988); length of previous episodes (Scott 1988); elevated comorbidity (Sargeant et al. 1990).

In our sample, female probands fulfill all three conditions. Their SCL-90R scores were consistently higher, their depressive episodes longer and associated with more comorbidity than men's. If chronicity is defined as retrospectively reporting feelings of dysphoria (DE) over a number of years, women strongly predominated, but here differential recall may contribute to the sex difference.

Data on an enhanced risk of chronic depression among women are contradictory. In their large clinical sample of treated recurrent depression, Frank et al. (1988) found that depressed women made slower and more difficult recoveries.

In five of six prospective epidemiological studies which spanned several years, there was a female preponderance among the chronically depressed (Schwab and Bell 1979; Aneshensel 1985; Cheng 1989; Sargeant et al. 1990; Rodgers 1991; not so, however, Murphy et al. 1986). Elevated rates among females for the diagnosis of dysthymia as an indicator of a chronic course of depression have also been shown (Robins et al. 1984; Myers et al. 1984; Vaquez-Barquero et al. 1987). In the young Zurich cohort, however, there was no sex difference at either of the two interviews where the diagnosis of dysthymia was given (Angst and Wicki 1991). Still, the bulk of the evidence supports our conclusion from the presence of risk factors and points to a more chronic course of depression among females.

(f) Reliable data on *first incidence* of adults are almost impossible to obtain in epidemiological studies. The epidemiology of child and adolescent psychiatric disorder leads to the conclusion that possibly the period of life with a higher female first incidence of depressive symptoms, of syndromes and of milder depression *lies outside the age limits of epidemiological studies on the adult population.* Studies on adolescents often use measures of mental distress rather than diagnoses. Rauste-von Wright and von Wright (1981) found among a sample of healthy adolescents that there were no sex differences on a score of psychosomatic symptoms at age 11 and 13 years, but that at age 15 and 18 years girls scored significantly higher. In a study of a representative sample of Swiss school children of age 11–16 years, significant sex differences in psychosomatic and depressive symptoms began to appear between 11 and 13 years of age (Müller and Beroud 1987).

In the Ontario study on children at age 4–11 years, the sex ratio of emotional disorder was 1.1, at age 12–16 years, however, 2.7 (Offord et al. 1987). In a study on older high school students, Lewinsohn found that diagnosed depression had an earlier incidence and occurred more frequently among female than among male adolescents (Lewinsohn et al. 1990).

As mentioned before, a psychosomatic discomfort and dysphoric feelings – as measured in the *SCL-90R* – may be a risk factor for the development of the milder depressions. So, at the age of 20 years, the young Swiss women may have entered our study with increased vulnerability for, and a higher lifetime prevalence of, depression. Then from ages 20/21 years to ages 28/29 years the sexes showed a differential regression to the mean. The frequency of each depressive syndrome decreased in men, while recurrent milder episodes (RBDE) and longer lasting dysphorias (EDE) remained stationary in women. In contrast to the male subgroup of the sample the female component did not "outgrow" certain syndromes. This finding is compatible with a meta-analysis of epidemiological cross-sectional studies on the prevalence of depression and of depressive symptoms by sex and age (Jorm 1987a). Made comparable by a statistical transformation, these studies show a peak in prevalence at about 20 years of age – womens' rates being higher – and then a rapid fall-off in men and a much slower one in women.

The same sex difference in persistence was also found for psychiatric symptoms as measured by the SCL-90R. Higher scores for females persisted over 9 years for anxiety/phobias, depression, anger, and somatization. Thus, also at the level of "negative affect" for the female sample, the regression to the mean was slower and less complete. This confirms the observation of Jorm (1987b) who also compared several cross-sectional epidemiological studies of neuroticisms by sex, and concluded that a higher level of neuroticism at young adult age persists in women while male neuroticism decreases.

Conclusion

Studying a young adult longitudinal sample and varying criteria for a diagnosis of depressive syndromes, MDD and RBD we found a higher prevalence of some syndromes and major depression in females. These results could be due to the findings that females present:

- a higher first incidence of depression and depressive syndroms in adolescence;
- a slower regression to the mean of certain syndromes;
- a longer duration of the episodes at the level of diagnoses and syndromes;
- more recurrence of both depression as a diagnosis and depressive syndromes; and
- a more chronic course of depression.

Sex differences thus appear not only in first incidence but also in the *course* of dysphoric states. If depressions are seen as a continuum between the poles of the frequent, brief dysphorias of an emotionally unstable personality of the one hand, and depressive psychosis on the other, men are situated nearer to the first pole, women nearer to the second pole. This conclusion is confirmed by sex differences in the incidence of depressive psychosis (Bebbington 1988) and delinquency (von Zerssen and Weyerer 1980).

Sex differences also appear in the greater number and greater variation of female symptoms and, corresponding to this, in women's higher comorbidity. Psychiatric disorder in women seems to lead to a more global or more diffuse reaction than in men, which should not be confounded with differential expressivity.

There is a tendency for differences in course (recurrence, lower regression to the mean) to appear especially in syndromes. Nonetheless, there is a consistent female surplus in "hard core" MDD over 8 years. The search for the *causes* of a female surplus among the dysphoric and depressed general population could lead to different combinations of answers for not stringently defined mental distress and for core disorders of specified duration and severity. It is unlikely that global simple solutions, such as "learned helplessness" or "female sex hormones", will solve the riddle of sex differences in depression.

Acknowledgement. The authors thank Dr. Kathleen R. Merikangas, PhD, Genetic Epidemiology Research Unit, Department of Psychiatry, Yale University, New Haven, USA for her valuable comments.

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