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Ranges of psychiatric morbidity in the old and the very old – results from the Berlin Aging Study (BASE)

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Abstract The purpose of this study was to determine prevalence rates of psychiatric morbidity in the elderly, distinguishing different levels of psychiatric caseness as compared to the diagnoses of the DSM-III-R. In a cross-sectional population-based study in Berlin (West), Germany, 516 people aged 70 to 95+ were randomly selected from the obligatory city registry (1990-1993) and stratified by age and gender (N = 43 men and N = 43 women in each of six 5-year age groups). Psychiatric and physical examinations were carried out in an extensive standardized assessment. Distinct psychopathological syndromes occurred in 72.7% of the elderly (54.6% of the men, 79.1% of the women). A clinically defined psychiatric disorder was found in 49.4% of the elderly (95% confidence interval 43.9% – 54.9%; 36.4% of the men, 54.0% of the women). Excluding insomnia, the overall psychiatric morbidity was 40.4% (30.9% m, 43.8% w). Excluding clinical diagnoses that were not otherwise specified in the DSM-III-R, the overall prevalence of specified DSM-III-R diagnoses was 23.5% (16.3% m, 26.0% w). Excluding dementia, which is known to be age-related, the prevalence was 11.3% (8.5% m, 12.2% w) and no significant effect between the age groups was seen. A considerable proportion of clinically relevant psychiatric morbidity in the elderly does not meet the criteria of specified DSM-III-R diagnoses, although these cases are in need of care. The data show that the threshold and severity of caseness accounts for important differences when overall psychiatric morbidity is assessed.

Key words Psychiatric morbidity · Elderly · Epidemiology · Prevalence · Caseness · Dementia · Depression · Insomnia · Anxiety · Severity · Subthreshold morbidity · Gender

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Introduction

The percentage of people aged 65 and over in the world population, particularly in most industrial countries, will increase rapidly in the next few decades (Jorm et al. 1988, Hauser 1986). Epidemiological studies of people aged 65 and over have consistently shown an age-related increase in dementia, somatic morbidity, and social isolation (Bergman et al. 1986, Marmot et al. 1987, Morgan et al. 1987, Perlin 1994). However, it is not clear whether there is also an age-related increase of psychiatric morbidity apart from dementia.

Only a few studies have reported on the overall prevalence of psychiatric morbidity in the elderly. A wide range of prevalence rates has been determined due to: differing thresholds of case definition and the severity of the diseases; varying sampling criteria, e.g., exclusion of institutionalized people or selected ages; the use of different instruments and investigators, e.g., trained interviewers or psychiatrists; and the exclusion of certain diseases, e.g., dementia or insomnia. In many studies, somatic disorders or drug use were not taken into account. Summarizing the available studies, overall psychiatric morbidity, usually implying the need for professional help, affects about 20% to 25% of persons aged 65 and over with estimates ranging from 12.3%, to 19.3%, to over 43%, and even 52.2% to 54.1% (Weyerer and Dilling 1984, Dilling et al. 1989, Regier et al. 1988, Copeland et al. 1987, Parson 1965, Meller et al. 1993, Skoog et al. 1993). For people aged 85 and above, higher rates of psychiatric morbidity were found, mainly because of the age-related increase in dementia prevalence. However, the precision of these estimates is limited due to the small samples of the very old in these studies.

Of all diagnoses, dementia has received the most attention. The prevalence of moderate and severe dementia in people aged 65 and over is approximately 5% (Henderson

1986). Beginning with less than 2% at the age of 65, prevalence rates double about every 5 years (Jorm et al. 1987, Hofman et al. 1991, Wernicke and Reischies 1994). A doubling of incidence rates about every 10 years has been well documented up to the age of 80 or 85 (Hagnell et al. 1981, Nielsen et al. 1982, Cooper and Bickel 1989, Copeland et al. 1992). Mowry and Burvill (1988) reported a wide variation in the prevalence of mild dementia ranging from 3% to 64% using different diagnostic criteria on the same population. These findings reflect the fact that the variation in diagnostic criteria for mild dementia, including the unsolved problem of its differentiation from benign forgetfulness, has important consequences for the prevalence rates reported by various studies.

Whereas the prevalence rates for major depression range from 0.7% to 5.4% (Regier et al. 1988, Weissman and Myers 1978), the prevalence of depression of all severities is much higher and more variable: at 11.5% to 26.2% (Copeland et al. 1987, Kay et al. 1964). These differences are again due to several factors, including different diagnostic criteria, the tendency of depressive symptoms to be confounded with age-related symptoms of somatic multimorbidity, sensory impairment and, lack of drive, and to different inclusion or exclusion criteria used in sampling, e.g., of institutionalized people whose prevalence rates of depression can reach 40% and more (Ames et al. 1988, Harrison et al. 1990). With respect to the elderly, it is still unclear whether there are similar gender differences as have been observed in younger people (Gurland et al. 1988). In contrast to dementia, the question of age-related changes in prevalence rates remains open resulting in an increase, a decrease or no significant differences (Kay et al. 1985, Weissman et al. 1988, Livingstone et al. 1990).

The reported prevalence rates of schizophrenia in the elderly range from 0.1% to 1.7% (Kessler et al. 1994, Cooper and Sosna 1983). Anxiety disorders occur less frequently in people aged 65 and over than in younger subjects (Flint 1994). The ECA study reported an overall prevalence of all anxiety disorders of 5.5% for persons aged 65 and older (Regier et al. 1988). Prevalence rates of other psychiatric disorders in the old are similarly low and described as declining in old age (Regier et al. 1988, Kessler et al. 1994).

In summary, the validity and comparability of epidemiological studies of the elderly are restricted by problems of representativity, by small sample sizes, especially of men and of the very old by the exclusion of particular groups, e.g., institutionalized persons or those who are unable to give informed consent, by the dynamics of the source population and the high mortality in the very old, and by the confounding of somatic morbidity with psychiatric morbidity. Moreover, the use of different instruments and varying diagnostic criteria, and gradings of severity also inhibit the validity and comparability of epidemiological studies focusing on the elderly.

The Berlin Aging Study (BASE) (Baltes et al. 1993) was designed to overcome, or at least to reduce, some of these methodological problems. The features and strengths of this interdisciplinary study consists of (a) a representative sample, (b) an age- and gender-stratified sample, (c) a sufficient number of people aged 90 and older, (d) the inclusion of institutionalized people, (e) physical and neurological examination by internists, (f) psychiatric examination by psychiatrists, (g) standardized examinations, scales and tests, (h) a special drug and complaint interview, (i) DSM-III-R (American Psychiatric Association 1987) diagnoses comprising the whole spectrum of Axis-I-disorders, (j) a description of all levels of severity including mild cases and (k) subthreshold cases, and (l) a sleep interview. The main objective of this article is to report prevalence rates for overall psychiatric morbidity in relation to age and gender, and the changes in prevalence rates after exclusion of insomnia, dementia and subthreshold disorders. Findings concentrating on dementia will be reported in a separate paper.

Methods

The Berlin Aging Study (BASE) is a representative, community-based, cross-sectional study of the old and very old population (70 to 105 years) of West Berlin which is representative for most important variables (Baltes et al. 1993). The interdisciplinary design involves four research units: psychiatry, internal medicine, psychology and sociology.

From May 1990 to June 1993, an age and gender-stratified sample of people aged 70 years and over (N = 1,908), including persons living in institutions, was randomly drawn in four sections from the obligatory central residents' registration office from a source population of 280,259 old people. For security reasons, the data on 77 persons in public life were not available for sampling. The inclusion of subjects required informed consent. In cases of doubt (N = 89), the capacity to consent was checked by a psychiatrist. If persons were not able to give informed consent, e.g., in cases of severe dementia, they were excluded from the full study protocol (N = 54) but included in the estimation of dementia prevalence. If there was any doubt that a person might be unable to take part in the study because of very severe physical illness (N = 8), an examination was carried out by an internist.

A three-step design was used to measure study variables because only a smaller proportion of subjects were prepared to take part in all investigations of the study. In the first step, basic information on somatic and mental health, education and competence in daily living was obtained for the 1,264 persons, who participated, out of the original sample (N = 1,908). In the second step, an interdisciplinary "Intake Assessment" (IA, N = 928) was performed in one session. Finally, an "Intensive Protocol" (IP, N = 516) was performed in the third step, including at least 15 sessions of investigations: the IA, three sessions by each of the four research units, an investigation by a dentist, and a final session. This procedure allowed the check of several important variables concerning the representativity of the sample and to look for selection bias. A detailed description of the sample selectivity was given by Lindenberger et al. (1999). All sessions took place at the participant's home with the exception of part of the internal investigation and the dental assessment. Data were collected in a central data file. The investigation took place immediately after the addresses were obtained from the registry and lasted on average four months. The psychiatric and somatic investigations, conducted by research psychiatrists and internists, were mostly completed in less than seven days. The rate of dropouts and refusals (N = 644) was nearly equal across all six age groups: for IP: 70-74 years: 11.3% (male 11.2%, female 11.4%), 75-79 years: 13.8% (m 12.9%, f 14.4%), 80-84 years: 17.8% (m 18.9%, f 17.0%), 85-89 years: 19.9% (m 19.6%, f 20.1%), 90-94 years: 14.6% (m 16.2%, f 13.5%), 95 years and over: 22.7% (m 21.3%, f 23.7%). The higher percentages in higher

Table 1 Representativity and socio-economic data

Socio-economic variables	Men %		Women %	
	Census*	IP	Census*	IP
School				
8 years	70.2	57.9	75.4	65.5
9–10 years	18.8	28.4	19.9	30.4
> 11 years	11.0	13.7	5.7	3.1
Occupational training > 2 years	68.3	78.5	50.4	48.8
Income (monthly)				
< 690 $	5.2	3.2	20.3	16.1
690–1,520 $	59.5	36.4	62.4	60.0
> 1,520 $	35.3	60.4	17.3	23.8
mean (in US $)	1,680	1,960	1,360	1,560
Marital status				
married	68.1	62.8	14.8	9.7
widowed	22.1	27.3	65.6	66.4
divorced	6.0	5.5	8.0	13.3
single	3.8	4.5	11.6	10.7
Living conditions				
alone	26.4	33.5	68.0	73.0
with others	69.7	62.6	25.5	16.9
in an institution	3.9	3.8	6.5	10.1

* Berlin Census 1991; Intensive Protocol IP (N = 516, men: N = 258, women: N = 258)

age groups were nearly exclusively due to death during assessment.

Subjects were 70 to 105 years of age, with 86 subjects in each of the six 5-year age groups in the IP sample (N = 516). Each age group consisted of equal numbers of men and women (N = 43). The representativeness of the sample (N = 516) was examined using a comparison with general Berlin census data (Table 1) (Berlin Census 1991) and the two sample steps (N = 1,264 and N = 928). There were no major differences between study participants and the Berlin citizens of the same age and gender concerning important socio-economic variables, such as family status, living situation, education and income. There were only small differences in education and income, mostly not reaching statistical significance. Furthermore, there were no relevant differences in the percentage of selection for the single levels of study participation in age and gender.

In the IP psychiatric sessions, all subjects were examined and diagnosed by psychiatrists using the Geriatric Mental State Examination (GMS-A) (Copeland et al. 1976, Gurland et al. 1976, McWilliam et al. 1988) and the History and Aetiology Schedule (HAS) (Copeland and Dewey 1991), instruments, developed for elderly persons, with a high validity and reliability (Copeland et al. 1976, Gurland et al. 1976, Copeland and Dewey 1991). This procedure made it possible to take into account the case history and information from family members or persons being close to the participants. Both instruments had been translated into German and back translated into English in collaboration with the Liverpool group (Copeland et al. 1990). A high validity concerning psychiatric morbidity as well as item and interrater reliability has been shown in prior studies (Kellett et al. 1975, Cowan et al. 1975). The interrater reliability of the GMS-A was assessed by 52 co-ratings. Each of the three psychiatrists co-rated five or more GMS-A ratings independently. The interrater reliability reached the Kappa values reported for the GMS in other studies, ranging from .70 to .83 (Copeland et al. 1990, Henderson et al. 1983, Hooijer et al. 1991). Specially developed semi-structured interviews covering complaints, medication and physician consultations were completed as well as an interview on sleep. A telephone interview with the family doctor dealing with diagnoses, medication and mental state was also conducted. For every participant, the diagnostic criteria and staging were discussed in a conference of all research psychiatrists. Neurological and physical examinations were carried out by physicians from the Internal Medicine Unit of BASE. In a consensus conference of internists and psychiatrists, the data from each participant were jointly evaluated for psychiatric symptoms and diagnoses of somatic morbidity as well as drug effects. These evaluations provided the base for the clinical psychiatric diagnoses and for the application of the diagnostic criteria, algorithms and the staging of the DSM-III-R (Jorm et al. 1988, Copeland et al. 1990). Axis II diagnoses according to the DSM-III-R were not included because the information from the standardized examination was not sufficient.

A hierarchical caseness procedure was applied (Table 2). The lowest level of caseness was the subthreshold case which was defined to show distinct psychopathological symptoms in the GMS-A but did not reach the criteria of a DSM-III-R diagnosis. The threshold for an illness case according to the DSM-III-R was defined by a GAF (Global Assessment of Functioning Scale) (Jones et al. 1995, Patterson and Lee 1995) score of 70 or lower. Persons were defined as mild illness cases when they presented a clear main symptom and were judged by the psychiatrist as having a mental illness with clinical relevance, which correlated well with the GAF. The diagnoses refer to the current state at the point of investigation and the criteria of the DSM-III-R including the specified time period. Moderate illness cases were judged as an illness with an indication for therapeutical intervention and a GAF score

Table 2 Staging of psychiatric disorders (according to DSM-III-R)

Subthreshold case[a]	1. At least one main symptom is present 2. Relevant symptom items of the GSM-A are positive – at least 1 cognitive symptom for an organic syndrome – at least 2 of the following symptoms major depression of (DSM-III-R) for a depressive syndrome: – depressive mood, lost of interests or lost of pleasure 3. Symptoms are continuous or recurring during the last 4 weeks
Illness cases	
Mild case	1. Subthreshold case is present 2. GAF[b] score 70 or lower, mild symptoms, generally functioning quite well 3. Psychiatric judgement of illness 4. Therapeutical intervention is possibly indicated
Moderate case	1. Criteria of a mild diagnosis are fulfilled 2. GAF[b] score 60 or lower, moderate symptoms, or moderate difficulty in social interaction, between mild and severe case 3. Therapeutical intervention is indicated
Severe case	1. Criteria of a moderate diagnosis are fulfilled 2. GAF[b] score 40 or lower, major impairment in several areas, unable to take sufficiently care of oneself 3. Admission to an institution is indicated

[a] Subthreshold cases did not reach the criteria for a diagnosis according to the DSM-III-R including NOS cases

[b] Global Assessment of Functioning Scale (Jones et al. 1995, Patterson et al. 1995)

Table 3 DSM-III-R diagnoses[a] in people aged 70 years and older

DSM-III-R	Diagnosis[a]	Prevalence %[c]				
		N[b]	All	Severity		
				Mild	Moder.	Severe
290.00	Dementia (primary degenerative; NOS)	100	12.5	5.5	3.4	3.6
290.20	– with delusion	3	0.3	0.0	0.3	0.0
290.21	– with depression	6	1.0	0.4	0.6	0.0
293.81	Organic delusional disorder	4	0.0	0.0	0.0	0.0
293.82	Organic hallucinosis	5	0.6	0.6	0.0	0.0
294.80	Organic mental disorder NOS	8	1.6	0.8	0.8	0.0
295.62	Schizophrenia, residual type, chronic	1	0.2	partially in remission		
297.10	Paranoid hallucinosis	2	0.5	0.0	0.5	0.0
296.22	Major depression, single type, moderate	20	4.2	0.0	4.2	0.0
296.23	Major depression, single type, severe	2	0.5	0.0	0.0	0.5
296.24	Major depression, single type, psychotic	1	0.1	0.0	0.0	0.1
296.25	Major depression partially in remission	1	0.2	partially in remission		
296.26	Major depression in full remission	(1)	(0.2)	in remission		
296.35	Maj. dep. more episodes part. in remission	2	0.4	partially in remission		
296.36	Maj. dep. more episodes in full remission	(1)	(0.1)	in remission		
296.46	Bipolar disorder, manic, in full remission	(1)	(0.3)	in remission		
300.00	Anxiety disorder NOS	9	2.5	2.5	0.0	0.0
300.01	Panic disorder without agoraphobia	1	0.0	0.0	0.0	0.0
300.02	General anxiety disorder	2	0.9	0.0	0.9	0.0
300.22	Agoraphobia without panic disorder	3	0.8	0.5	0.3	0.0
300.30	Obsessive compulsive disorder	1	0.2	0.2	0.0	0.0
300.40	Dysthymia	11	2.0	0.3	1.7	0.0
303.90	Alcohol dependence	4	0.5	0.4	0.1	0.0
304.10	Dependence on sedatives, hypnotics	1	0.5	0.0	0.5	0.0
305.00	Alcohol abuse	5	0.7	0.2	0.5	0.0
305.40	Intoxication of sedatives, hypnotics	2	0.2	0.0	0.2	0.0
307.42	Insomnia	85	18.8	2.6	12.9	3.3
309.00	Adjustment disorder with depress. mood	5	0.7	0.6	0.1	0.0
309.24	Adjustment disorder with anxiety	1	0.0	0.0	0.0	0.0
310.10	Organic personality disorder	6	0.6	0.2	0.4	0.0
311.00	Depression NOS	85	17.8	10.1	7.7	0.0
All	Overall psychiatric morbidity	276	49.4	18.0	26.9	4.5

[a] Including NOS cases; N = 516; after Consensus Conference
[b] Total unweighted number of cases
[c] Prevalence rates weighted by age and gender

of 60 or below (Jones et al. 1995). In severe illness cases, the GAF score was 40 and below and admission to an institution was indicated (Jones et al. 1995). If the specified criteria of a DSM-III-R diagnosis in mild or moderate illness cases did not fulfill a clinical diagnosis, they were classified as NOS (not otherwise specified).

Prevalence rates, standard errors and confidence intervals were calculated by weighting the stratified sample according to the age and gender distribution of the source population (N = 280,259). More details of the weighting procedure were described by Baltes et al. (1999) and Lindenberger et al. (1999). Chi^2 tests were used to test for statistical significance to compare the degrees of severity of psychiatric illness, and the differences between men and women. Confidence intervals were estimated based on the source population. Analysis of variance (simple factorial ANOVA) was used to compare the prevalence of age groups.

Results

The most frequent psychiatric disorder in the elderly (Table 3) was insomnia (18.8%), followed by depression NOS (17.8%) and organic mental disorders (16.6%), including dementia (13.8%). Major depression was seen in 4.8% of the elderly and dysthymia in 2.0%. The overall prevalence of anxiety disorders was 4.4%, including 2.5% NOS cases. General anxiety disorder was diagnosed in 0.9%, agoraphobia without panic disorder in 0.8% and obsessive compulsive disorder in 0.2% of the overall population. The prevalence rates of schizophrenia, alcohol or drug dependence or adjustment disorders were below 1%. Four persons with organic delusional disorder did not reach relevant prevalence percents as a result of the weighting procedure. They were members of the younger age group of women.

A psychiatric syndrome, including all subthreshold and illness cases (Table 2), was found in 72.7% of the elderly (weighted by age and gender), in 54.6% of the men and 79.1% of the women (Table 4). In 8.6%, a syndrome of sleep disturbance was found, which did not fulfill the criteria of insomnia according to DSM-III-R (6.0% m, 9.5% w). The 72.7% were subdivided in 23.3% subthreshold

Table 4 Psychiatric morbidity levels a by age and gender (N = 516)

Age group (in years)	N	Sub-threshold cases[b] (N) All	Illness cases[a]					
			Severity[c] (N)			All	p %[d]	95% CI
			Mild	Moder.	Severe			
70–74	86	10	14	15	1	30	38.4	28.1–48.7
75–79	86	22	13	24	0	37	46.6	36.1–57.1
80–84	86	24	13	22	4	39	48.2	37.6–58.8
85–89	86	16	17	28	10	55	68.5	58.7–78.3
90–94	86	15	10	29	15	54	67.3	57.4–77.2
95 +	86	12	18	30	13	61	75.3	66.2–84.4
All	516	99	85	148	43	276		
Weighted %		23.3	18.0	26.9	4.5		49.4	43.9–54.9
ANOVA							p < 0.0001	
Men								
70–74	43	3	5	6	0	11	25.6	12.6–38.6
75–79	43	8	6	9	0	15	35.0	20.7–49.3
80–84	43	12	4	12	1	17	39.5	24.9–54.1
85–89	43	9	7	11	6	24	55.9	41.1–70.7
90–94	43	7	2	16	6	24	56.0	41.2–70.8
95 +	43	6	9	17	2	28	65.2	51.0–79.4
All	258	45	33	71	15	119		
Weighted %		18.2	12.1	21.6	2.7		36.4	29.4–43.4
ANOVA							p < 0.0001	
Women								
70–74	43	7	9	9	1	19	44.2	29.4–59.0
75–79	43	14	7	15	0	22	51.2	36.3–66.1
80–84	43	12	9	10	3	22	51.2	36.3–66.1
85–89	43	7	10	17	4	31	72.1	58.7–85.5
90–94	43	8	8	13	9	30	69.7	56.0–83.4
95 +	43	6	9	13	11	33	76.8	64.2–89.4
All	258	54	52	77	28	157		
Weighted %		25.1	19.9	28.8	5.3		54.0	46.9–61.1
ANOVA							p < 0.0001	

[a] DSM-III-R diagnoses, including insomnia and clinically NOS cases
[b] Subthreshold cases which did not reach the criteria of DSM-III-R diagnoses (no illness cases)
[c] Unweighted number of cases; for severity see Table 2
[d] Prevalence weighted by age and gender

cases, which did not reach the diagnostic criteria of an illness according DSM-III-R, and 49.4% of illness cases. These illness cases include specified DSM-III-R diagnoses, insomnia (DSM-III-R 307.42) and NOS clinical diagnoses, and they were seen in 49.4% (95% CI 43.9 – 54.9%) of all persons, in 36.4% (95% CI 29.4 – 43.4%) of men, and in 54.0% (95% CI 46.9 – 61.1%) of women. There was a highly significant correlation with age and a ratio of men to women of approximately 2 : 3 (Table 4).

After the exclusion of insomnia according to DSM-III-R, which is not reported in most epidemiological studies, the overall rate of psychiatric illness cases was 40.4% (95% CI 34.9 – 45.9), including DSM-III-R and clinically NOS diagnoses. In 45 cases (7.5%), a second psychiatric diagnosis was given, in six cases (1.2%) a third diagnosis and in one case (0.2%) a fourth psychiatric diagnosis was found. The prevalence rises with increasing age from 28.9% (95% CI 19.3 – 38.5%) for the group aged 70–74 to 68.3% (95% CI 58.5 – 78.1%) for subjects aged 95 and over (ANOVA $p < 0.0001$). In women, psychiatric morbidity was significantly higher than in men (43.8% vs. 30.9%; chi^2 80.6, df = 1, $p < 0.0001$) and increased from 32.6% (95% CI 18.6 – 46.6%) for the group aged 70-74 to 69.8% (95% CI 56.1 – 83.5%) for the group aged 95 and over. In comparison, the men aged 70-74 showed a rate of 20.9% (95% CI 8.7 – 33.1%) and the rate of men aged 95 and older was 58.2% (95% CI 43.4 – 73.0%). A moderate or severe psychiatric disorder, for which treatment was judged to be indicated (Table 2), was diagnosed in 158 subjects, or 24.0% of the general population beyond the age of 70. The difference between men and women for moderate and severe cases was smaller (19.1% vs. 25.8%) than in mild cases of illness (11.8% vs. 18.0%).

When all of the clinical NOS cases that did not fulfill specified criteria of the DSM-III-R were excluded, the overall prevalence was 23.5% (95% CI 20.2 – 26.8%): 16.3% of men and 26.0% of women. Moderate and severe cases occurred in 18.3%, in 11.4% of men and in 20.8% of women. There was a clear age-related increase in prevalence rates almost exclusively due to dementia ($p < 0.001$). Therefore, in a next step, all cases of dementia were excluded (Table 5). The resulting prevalence rate was 11.3% (95% CI 7.8 – 14.6%), 8.6% (95% CI 4.4 – 12.6%) of men and 12.2% (95% CI 7.7 – 16.7%) of women. Moderate and severe cases occurred in 9.4%, in 8.5% of men and in 12.2% of women. There was a slight but not significant increase of psychiatric morbidity with higher ages. There were only four severe cases (0.6%) found and the proportion of men to women was nearly 2 : 3. Table 6 summarizes the results of the prevalence rates

Table 5 DSM-III-R diagnoses without NOS and dementia cases[a]

Age group (in years)	N	Specific DSM-III-R cases[a]					
		Severity(N)[b]			All	p %[c]	95% CI
		Mild	Moderate	Severe			
70–74	86	3	5	0	8	9.3	3.2–15.4
75–79	86	1	7	0	8	10.4	3.9–16.9
80–84	86	1	6	1	8	10.5	4.0–17.0
85–89	86	2	9	0	11	13.4	6.2–20.6
90–94	86	3	11	3	16	21.7	13.0–30.4
95+	86	3	13	0	16	16.8	8.9–21.7
All	516	13	51	4	68		7.8–14.6
Weighted %		1.9	8.8	0.6		11.3	
ANOVA						n.s.	

[a] DSM-III-R diagnoses without NOS and dementia cases, insomnia not included
[b] Unweighted number of cases
[c] Prevalence weighted by age and gender

Table 6 Prevalence of psychiatric morbidity with different levels of caseness[a]

Levels of caseness	Prevalence %[a]		
	All[b]	Men[c]	Women[c]
Persons with a psychopathological syndrome[d]	72.7	54.6	79.1
Subthreshold cases[e]	23.3	18.2	25.1
Illness cases[f]	49.4	36.4	54.0
DSM-III-R cases without insomnia	40.4	30.9	43.8
DSM-III-R cases without insomnia and without NOS cases	23.5	16.3	26.0
DSM-III-R cases without insomnia, NOS cases and without dementia	11.3	8.5	12.2

[a] Prevalence weighted by age and gender for each person
[b] N = 516
[c] N = 258
[d] subthreshold cases together with all illness cases
[e] subthreshold cases, which did not reach the criteria of an illness case according DSM-III-R
[f] DSM-III-R and NOS cases

according to different levels of psychiatric caseness. Depending on the inclusion criteria, the rates vary from 11.3% to 72.7%.

Discussion

There are several unique features and strengths of this study. It reports data on the very old with a fairly large group of persons aged 90 and older. It refers to a representative, community-based sample randomly drawn from the citizen registry, including persons living in institutions. It was representative for the most important variables. It used a standardized intensive assessment protocol and an investigation by experienced psychiatrists and internists resulting in a wealth of data. It covers all DSM-III-R Axis I diagnoses, including sleep disorders, as well as clearly defined subthreshold disorders. It furthermore reports prevalence rates for different severity levels. To maximize the validity of diagnoses in the absence of a "Gold Standard" (Farone and Tsuang 1994), all diagnoses were reviewed and checked by three psychiatrists and internists in common consensus conferences. This consensus of experts seems to be the best way to obtain valid diagnoses with high sensitivity and specificity. This study was limited by the sample size which was relatively low for an epidemiological study. However, due to stratification by age and gender, the size of the very old age group, particular, it was large enough to answer the study questions. Another restriction of the study was the selectivity of participants in the IP sample (N = 516). This factor was tested for the main constructs at different levels of selection and compared to the Berlin Census data. The sample was found to be representative of the Berlin population above 70 years in nearly all variables. Only for education and income were smaller differences found, which mostly did not reach significance. Finally, the study was carried out in the former Western part of Berlin (Germany) with about two million inhabitants which limits the generalizability of the results, e.g., for rural populations.

The results showed a wide range of psychiatric morbidity, depending on the threshold and diagnostic criteria. The values ranged from about 90% for women aged 95 and over, who showed a subthreshold or an illness case with a relevant psychopathological syndrome, to 9.3% for defined DSM-III-R diagnoses without insomnia and NOS cases for persons aged 70-75. Of all persons older than 70 years, 72.7% were classified as having at least a psychiatric case, a subthreshold or an illness case. Copeland et al. (1999) showed in an European comparison that a few symptoms of depression were present in more than 60% of the elderly, not always related to levels of illness. In our study, only 23.3% showed syndromes, which however did not reach the level of any psychiatric illness. It is a question for further research whether this is associated with any impairment in their quality of life, problems in activ-

ities of daily living, higher frequencies of consultations with physicians, higher rates of drug consumption, or whether this indicates a preliminary stage of a psychiatric illness. Overall psychiatric morbidity was 49.4% in persons aged 70 and over when clinical illness cases were counted, including NOS diagnoses, as well as mild illness cases. This prevalence rate could be higher if Axis II diagnoses according to the DSM-III-R were included, which was not possible in BASE.

Insomnia according to the criteria of DSM-III-R was the most frequent diagnosis (18.8%). In most epidemiological studies, insomnia is not separately assessed or is seen as a symptom of some other disease, e.g., depression, dementia or pain. In this study, these possible confounders were excluded in the consensus conference. Insomnia was found as the only disorder in 9.0% of the subjects and as a separate diagnosis in comorbidity with other psychiatric diseases in 9.8%. Excluding insomnia, the overall psychiatric morbidity is reduced to 40.4%, including NOS diagnoses and mild cases of illness.

Exclusion of all NOS cases resulted in an overall prevalence rate of 23.5%. This result is consistent with many other epidemiological studies. Differing thresholds of caseness provide one explanation for different prevalence rates, for example, if only moderate and severe cases, which are easier to define than mild ones, are counted (Banerjee 1993, Chochinov et al. 1994, Wing et al. 1978). When dementia, which showed the well-known age-related increase in prevalence, was also excluded, the overall prevalence of specified DSM-III-R diagnoses was 11.3% with only four cases (0.6%) of severe illness. No significant age-related increase of psychiatric morbidity was seen; only a trend was evident that may be statistically significant in larger sample sizes. This psychiatric morbidity was in the same range as in younger people, not lower as described by other authors (Regier et al. 1988, Myers et al. 1984). At all stages of the exclusion procedure, the prevalence of psychiatric morbidity remained significantly higher in women. This confirms the results of most other studies that found similar proportions of psychiatric morbidity between men and women to be from 2:3 to 1:2 (Regier et al. 1988, Copeland et al. 1987). In contrast, Skoog et al. (1993) did not find significant differences by gender.

The design of this study allows the direct comparison of its results with other epidemiological studies because of the distinction between levels of caseness and severity as well as the availability of prevalence rates by age groups. Using the criteria of the DSM-III-R, Skoog et al. (1993) found an overall psychiatric morbidity of 54.1% for 85-year-old subjects. This coincides with the rate of 53.5% found in BASE for the group aged 85-89. The prevalences of other psychiatric illnesses besides dementia and depression were relatively low, mostly estimated as lower than one percent (Myers et al. 1984, Lehtinen et al. 1990, Magnusson 1989). The large number of diseases classified as NOS (not otherwise specified) reflects a lack of diagnostic classification applicable to the very old, especially regarding mild diseases and unspecific symptoms.

Dementia prevalence of persons aged 70 and over was 13.8%, with 7.9% for moderate and severe dementias. The prevalence of dementia showed a strict age-related increase up to the age of 94 years, confirming the results of Jorm et al. (1987) and Hofman et al. (1991). Fichter et al. (1995) described a prevalence of dementia of 21.2% based on the Mini Mental State Examination (Folstein et al. 1975). The higher prevalence rates of psychiatric morbidity in the older age groups were mainly caused by dementia. Therefore, an age-specific analysis of prevalence rates excluding dementia was necessary. There was no significant age-related increase of non-dementia psychiatric morbidity. However, for men the prevalence rates were a little higher in the older age groups. The same result was found when only the specific DSM-III-R diagnoses were considered. As observed in younger populations, there was a significant difference between men and women: a ratio of 2:3.

Depression is the most common psychiatric disorder in the elderly. This fact is demonstrated in this study by an overall prevalence rate of 26.8% for people aged 70 and over, with 14.4% moderate and severe cases. The threshold for mild depressive illness cases follows a dimensional staging which can be seen as one reason for varying prevalence rates reported in the literature. Severe major depression was found in only four cases (0.6%). This low value may result from a selection bias due to social withdrawal and feelings of worthlessness typical for severe depressions. Moderate and severe depressions that were judged to be in need of treatment were seen in 14.9% of the elderly, with 4.8% major depressions. Other studies found prevalence rates of major depression ranging from 0.7% for people aged 65 and over to 7.7% for 85-year-olds (Regier et al. 1988, Skoog et al. 1993). Meller et al. 1993 found a prevalence of depression in 23.6% of persons aged 85 and older. This difference could be a result of the exclusion criteria concerning somatic illnesses or it may be due to the application of different diagnostic procedures, e.g., diagnoses made by a computer-algorithm (Copeland et al. 1987). As demonstrated by follow-up studies, depressive syndromes increased the risk of suffering from major depression later in life which correlate with higher mortality (Horwarth et al. 1992, Murphy et al. 1988, Burvill and Hall 1994). The rate of recovery is correlated to the severity of depression (Keller et al. 1992). Therefore, early detection of depression could improve the outcome of treatment as well as reduce costs for the medical care system. Follow-up data from this study will assess the relationships between subdiagnostic and mild depressive illness cases and their outcome.

The prevalence of anxiety disorders was rather low (4.4%), especially considering that old people are often handicapped by somatic disorders with age-related increases in sensory and mobility impairments (Meller et al. 1993, Steinhagen-Thiessen and Borchelt 1993). However, a low rate of anxiety disorders in older people has also been reported in other epidemiological studies (Flint 1994). The ECA study showed large prevalence differences between different towns, particularly for the elderly,

which suggests methodological difficulties (Myers et al. 1984).

In conclusion, relevant psychiatric morbidity without insomnia was found in 40.4% of the elderly in the community. When only moderate or severe psychiatric diseases were considered, the prevalence rate was 24.0%. This value must be taken into account for health service planing. The prevalence of dementia showed a clear age-related increase up to the 90-94 year old age group; the prevalence was higher in women. With respect to depression, moderate and severe cases were observed in 14.4% with no age effect, but a higher prevalence was found in women. A major finding of this study is the high prevalence of over 20% which does not fulfill the specific criteria of a DSM-III-R diagnosis. The consequences of such "subdiagnostic" or "subthreshold" psyhopathology with regard to morbidity, complaints, need for care and costs to the health care system need further classification and they are under investigation in the Berlin Aging Study (BASE). When dementia was excluded, the psychiatric morbidity in persons over 70 did not differ a great deal from younger age groups, and therefore, old age may not be a period of life that must coincide with despair or psychological problems.

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