

Invited Paper

Prevalence of mental disorders in the Zurich Cohort Study: a twenty year prospective study

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SUMMARY. Background — In order to minimise retrospective recall in developing estimates of the prevalence of mental disorders in the general population, we conducted a prospective study of a cohort of youth from Zurich, Switzerland. **Method** — A 20 year prospective study of a community-based cohort aged 19-20 from Zurich Switzerland. The sample was enriched by subjects scoring high on the Symptom Checklist 90 R (Derogatis, 1977). A semi-structured diagnostic interview was administered by clinically experienced psychologists and psychiatrists. The six interviews from 1979 to 1999 assessed diagnoses and sub-threshold manifestations of major diagnostic categories (with the exception of schizophrenia) for the past twelve months, depending on the current DSM versions (DSM-III, DSM-III R, DSM-IV). Additional information on symptoms and treatment were collected for the years between the interviews. The reported prevalence rates are weighted for stratified sampling and cumulate the one-year rates of the six interviews. **Results** — The cumulative weighted prevalence rates for any psychiatric disorder were 48.6% excluding, and 57.7% including tobacco dependence. In addition 29.2% and 21.8%, respectively manifested sub-diagnostic syndromes. Overall there were no significant gender differences. The corresponding treatment prevalence rates were 22.4% and 31.1%, respectively for the diagnostic subjects and 6.9% and 6.1%, respectively for the sub-diagnostic groups. The total treatment prevalence rate was 37.2% of the population (males 30.0%, females 44.1%). **Conclusions** — Our findings reveal that psychiatric disorders are quite common in the general population. When the spectra of mental disorders are considered, nearly three quarters of the general population will have manifested at least one of the mental disorders across their lifetime. **Limitations** — The data are based on a relatively small sample; a single age cohort, and the study was conducted in Zurich, Switzerland. These study features may diminish the generalisability of the findings.

Declaration of Interest: this work was supported by Grant 3200-050881.97/1 of the Swiss National Science Foundation, and Research Scientist Development Awards (MH 46376 and DA00293) from the US National Institutes of Health (Dr. Merikangas).

KEY WORDS: prevalence, community, cohort study, mental disorders, sub-diagnostic syndromes.

Received 18.10.2004 — Accepted on 19.10.2004.

INTRODUCTION

The *Zurich Cohort Study of Young Adults* was designed to investigate the prevalence of mental disorders and symptoms and functional somatic syndromes in the general population of the canton of Zurich,

Switzerland. Because there were no standardised diagnostic interviews for mental and functional somatic disorders at the study inception in 1978, a new diagnostic interview (SPIKE) was developed to embrace a wide range of psychiatric syndromes and symptoms as well as functional somatic syndromes (Angst *et al.*, 1984). Since this time, there has been substantial development in diagnostic instrumentation including the *Diagnostic Interview Schedule* (DIS) (Robins *et al.*, 1981) and the *Composite International Diagnostic Interview* (CIDI) (Wittchen, 1994) for use in large scale community surveys. There has also been an evolution in the diagnostic

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classification systems during the past 20 years, with several versions of the diagnostic criteria having been used across the duration of the study (DSM-III 1980, DSM-III R 1987 and DSM-IV 1994). Diagnostic criteria changes were incorporated into respective versions of the SPIKE interview.

This paper reports the cumulative one-year prevalence rates of mental disorders and sub-diagnostic (sub-threshold) syndromes based on six interviews over a 20-year period as a cohort of youth ages 19-20 progressed through early adulthood. This age group is passing through the prime period for onset and establishment of major and minor mental disorders. The chosen methodology is based on a number of unpublished pre-studies, of which only two may be mentioned briefly.

PRE-STUDIES

The design of the Zurich Study was influenced by a questionnaire study on recall, carried out in 1976 in 153 males and 61 females. 105 of 212 mailed questionnaires (49%) were returned (Kaeser, 1979; Weber, 1979). Recall was quite poor, with about one fourth of subjects who had been examined for behavioural and/or psychological problems (documented in the school health records) failing to recall the problems that they had reported earlier. There was no difference in recall of behavioural problems (truancy, running away, conflict with teachers and parents, lying, stealing) versus psychological problems (depression, anxiety, sleep terrors).

In 1975 a random sample of 126 19-year old Swiss men (recruited at the mandatory conscription, but examined in research groups under medical secrecy) were given the *Hopkins Symptoms Checklist* (HSCL-58, (Derogatis *et al.*, 1974)) and the *General Health Questionnaire* (GHQ) as a screening instrument (Goldberg & Williams, 1988). Using the GHQ as a gold standard, there was an overall agreement in 90 cases (16 positives and 74 negatives); 33 were false positive cases and 3 false negative cases. We found an acceptable sensitivity and specificity (84.2% and 69.2% respectively) when using a HSCL cut-off of 1.75. On the basis of its sensitivity we chose the SCL-90 R (Derogatis, 1977), which was the extension of the HSCL-58, as a screening instrument providing a clinical syndrome profile with 9 sub-scales.

As a consequence of these earlier studies, and in order to minimise memory problems, the Zurich Study was originally designed to study the development prospectively every year. However, because annual follow-ups of

this cohort were beyond the scope of our resources, we conducted six waves of follow-up across the 20-year follow-up.

METHODOLOGY

1. Sample

The Zurich Study is comprised of a cohort of 4,547 subjects (2201 males; 2346 females) representative of the canton of Zurich in Switzerland, who were assessed in 1978 with the *Symptom Checklist 90-R* (Derogatis, 1977) and a questionnaire for socio-demographic data. The study is based on a stratified sample with an over-representation of risk cases. In order to increase the probability of psychiatric syndromes, a sub-sample of 591 subjects (292 males, 299 females) was selected for interview, with two thirds consisting of high scorers (defined by the 85th percentile or more of the SCL-90-R) and one third consisting of a random sample of those with scores below the 85th percentile. The screening took place in 1978 at ages 19 (males) and 20 (females), the first and second interviews in 1979 and 1981, the third and fourth interviews in 1986 and 1988, the fifth interview in 1993 and the sixth in 1999. In 1980 a questionnaire, identical to the screening was mailed (figure 1).

Across 20 years, 62.1% of the original sample continued to participate in the study and the following proportions participated in specific numbers of interviews: 47% in all 6 interviews; 63% in 5 interviews; 74% in 4 interviews; 82% in 3 interviews; and 91.4% in at least 2 interviews. Those who had dropped out did not differ significantly from the 1999 participants regarding the risk group at study entry and most demographic characteristics (Eich *et al.*, 2003).

2. Diagnostic Interview

The *Structured Psychopathological Interview and Rating of the Social Consequences for Epidemiology* (SPIKE) was administered in the participants homes by psychiatric residents and clinical psychologists with extensive clinical training (Angst & Dobler-Mikola, 1985). This interview schedule assesses a number of somatic syndromes (including insomnia, headache, gastrointestinal, cardiovascular, respiratory, perimenstrual, and sexual syndromes) and psychological syndromes (including depression, hypomania, anxiety, phobia, obsessive-compulsive disorder, eating disorder, post-traumatic stress disorder, substance abuse and suicidality).

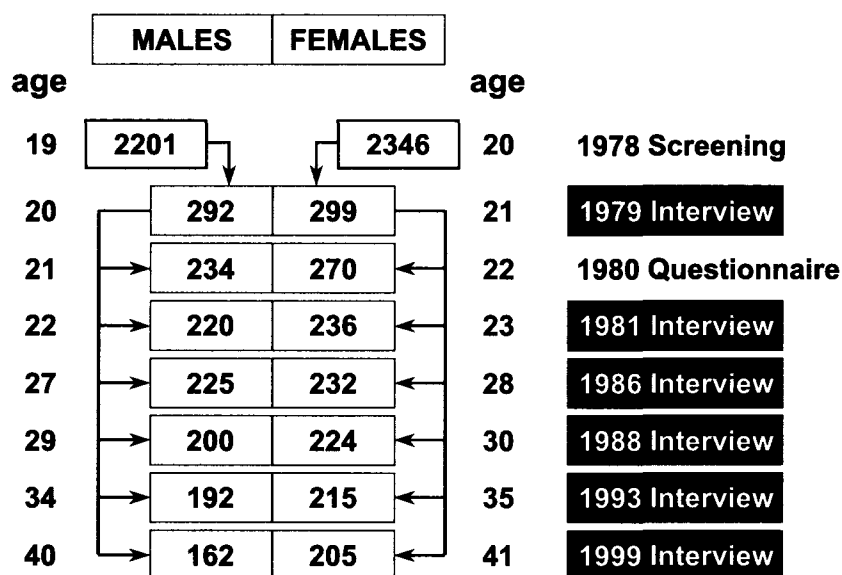


Figure 1. - Design of the Zurich cohort study.

Screening probes were based solely on the major phenomenological features of each syndrome (e.g., depressed, sad mood, loss of joy/interests) and were administered for each diagnostic category. Positive endorsement of the screening probe was followed for each syndrome first by queries about specific symptoms and second about their duration, frequency and severity, treatment history and impairment in work, social and leisure activities. Visual analogue measures of subjective distress and work impairment using a continuous scale from 0 to 100, with 0 representing no distress (impairment) and 100 indicating maximal distress (impairment) were included in each diagnostic section of the interview. Personal and family history of the syndromes were assessed for all subjects, irrespective of endorsement of the diagnostic screening question for each section. Professional treatment was defined as consulting an M.D. or a psychologist for the specific syndrome.

The inter-rater reliability of the SPIKE showed kappas of 0.89 and 0.91 for the symptoms of depression and anxiety (GAD) and of 0.90 for the corresponding syndromal diagnoses (Hochstrasser & Angst, 1996) (Wicki & Angst, unpublished data). The validity of the SPIKE has also been assessed by comparing physician ratings and medical records to an administration of the SPIKE by another clinician among 140 patients drawn from psychiatric clinics or social-psychiatric services in the canton of Zurich (Meier, 1985; Busslinger, 1984; Illes, 1981) and

from a local hospital (Pförtmüller, 1983). The SPIKE rating of the diagnostic level of depression was found to have high sensitivity and modest specificity (0.95 and 0.59, respectively, for major depression and 0.83 and 0.63, respectively, for minor depression). Likewise, the SPIKE had good sensitivity for detecting sub-threshold depression, anxiety and mania (i.e., respective kappas of 0.90, 0.83, 0.67).

3. Diagnostic Definitions

3.1. Threshold-Level

Classification of psychiatric disorders were made by algorithms on the basis of DSM-III criteria (GAD, panic disorder), DSM-III-R criteria (major depressive disorder, phobias, obsessive-compulsive disorder (OCD)), and DSM-IV criteria (post traumatic stress disorder, bipolar-II disorder (BP-II), and substance abuse/dependence). A diagnosis of bipolar-I disorder required hospital treatment for mania rather than one week duration because none of the subjects who met the latter criterion alone reported impairment. Exclusion criteria were never applied in order to investigate the associations between diagnostic categories.

3.2. Sub-threshold-Level

Depressive disorders *Minor depression* lasting two weeks or more with 3-4 of 9 criterial symptoms of depression. *Recurrent brief depression*: repeated (>11 episodes per year) spells of depression of brief duration

(under two weeks) meeting symptom criteria of DSM-III-R for major depressive episode. **Anxiety Disorders** (Angst, 1998) **Panic**: repeated panic attacks (>1 attack) over the past 12 months; **Phobias**: Phobic symptoms plus avoidance behavior plus clinically significant distress; **Recurrent Brief Anxiety (RBA)**: repeated (>11 episodes per year) spells of anxiety of brief duration (under two weeks) meeting symptom criteria of DSM-III generalised anxiety disorder (Angst & Wicki, 1992). **Obsessive Compulsive Syndrome (OCS)** recurrent, persistent obsessions or repetitive compulsions, interfering with social or professional role functioning (Degonda *et al.*, 1993). **Eating Disorders Binge Eating**: at least four binges over one year (Vollrath *et al.*, 1992) **Substance Use Disorders Alcohol**: regular drinking (i.e., > 4 days per week; 4-6 drinks per occasion) without consequences **Tobacco**: daily smoking without consequences or dependence; **Drugs**: Cannabis use weekly over one year, Cocain, Heroin, Hallucinogens) use four or more times per week without social or personal consequences.

4. Statistical Analysis

Chi square tests and Kruskal-Wallis tests (Kruskal & Wallis, 1952) were computed by SAS Version 8.2. Prevalence rates and standard errors were computed by Stata 8.2 adjusting for sample stratification. For each interview the prevalence rates were computed for the past 12 months. Cumulative prevalence rates were then computed across six interviews as the cohort progressed from ages 20 to 40.

RESULTS

Social and Demographic Variables

The socio-demographic distribution of the sample according to the original risk group and lifetime presence or absence of a mental disorder was analysed. Those with a disorder did not differ from controls with respect to social class, parents' income, fathers' profession, non-intact family, probands' education, and urbanisation (size of home town).

Overall Cumulative Prevalence Rates

Estimates of lifetime cumulative prevalence of the major diagnostic categories are presented in table I. These rates are not mutually exclusive and therefore may include the same individual in multiple categories. The magnitude of mood disorders (24%), anxiety disorders (26%), and substance abuse/dependence (24%) were quite similar. There was a preponderance of women with mood and anxiety disorders, and a comparable preponderance of males with substance abuse/dependence. A total cumulative prevalence rate of 48.6% was found for all DSM diagnoses: mood and anxiety disorders, substance abuse/dependence and bulimia. There was no gender difference in the aggregate estimate of mental disorders. The total prevalence rates of aggregate sub-threshold disorders was 29.2%, with a 1.3 greater aggregate rate among females compared to males. The threshold and

Table I. - Sex-specific 20 year cumulative prevalence rates of major categories of mental disorders.

DISORDERS	THRESHOLD Cumulative Prevalence				SUB-THRESHOLD Cumulative Prevalence			
	Both % (s) (95% C.I.)	Males % (s) (95% C.I.)	Females % (s) (95% C.I.)	F/M ratio	Both % (s) (95% C.I.)	Males % (s) (95% C.I.)	Females % (s) (95% C.I.)	F/M ratio
MOOD DISORDERS	24.2 (2.5) (19.3-29.1)	18.5 (3.2) (12.2-24.8)	29.8 (3.8) (22.3-37.3)	1.61	24.6 (2.6) (19.8-30.1)	23.1 (3.6) (16.7-30.9)	26.0 (3.8) (19.3-24.1)	1.13
ANXIETY DISORDERS	26.3 (2.6) (21.6-31.7)	18.9 (3.2) (13.4-26.0)	33.6 (4.0) (26.3-41.8)	1.78 (p<.005)	29.4 (2.8) (24.2-37.2)	26.9 (3.8) (20.1-35.1)	31.8 (4.1) (24.5-40.3)	1.18 (p<.04)
SUBSTANCE ABUSE/ DEPENDENCE	23.7 (2.5) (18.1-28.0)	32.7 (4.1) (24.7-40.7)	13.7 (2.8) (8.1-19.3)	0.42	17.4 (2.3) (13.4-22.4)	18.0 (3.3) (12.3-25.5)	16.9 (3.2) (11.5-24.1)	0.94
Alcohol abuse/dependence	17.9 (2.3) (13.4-22.4)	28.0 (3.9) (21.0-36.2)	8.0 (2.3) (4.6-13.6)	0.28	14.7 (2.2) (10.9-19.5)	18.7 (3.4) (12.9-26.3)	10.9 (2.7) (6.6-17.4)	0.58
Drug abuse/dependence	8.0 (1.6) (4.9-11.2)	11.7 (2.7) (7.4-18.1)	4.5 (1.7) (2.1-9.3)	0.38	0.9 (0.4) (0.3-2.4)	1.4 (0.9) (0.4-4.9)	0.4 (0.2) (0.2-0.9)	0.29
Tobacco dependence	40.5 (3.3) (34.0-46.9)	45.0 (4.7) (35.9-54.3)	36.0 (4.5) (27.7-45.2)	0.80	4.3 (1.2) (2.4-7.4)	2.7 (1.3) (1.1-6.7)	5.8 (2.1) (2.8-11.4)	2.15
TOTAL ¹	48.6 (3.1) (42.6-54.5)	48.9 (4.4) (40.5-57.4)	48.2 (4.3) (40.0-56.6)	.99 (p<.92)	29.2 (2.8) (24.0-35.1)	25.7 (3.8) (18.9-33.9)	32.7 (4.1) (25.2-41.2)	1.28 (p<.14)
TOTAL ²	57.7 (3.1) (51.6-63.5)	58.1 (4.3) (49.4-66.3)	57.3 (4.3) (48.7-65.4)	.99 (p<.89)	21.8 (2.6) (17.1-27.2)	18.5 (3.4) (12.7-26.1)	25.0 (3.8) (18.2-33.2)	1.35 (p<.33)

¹Total includes bulimia

²Total also includes bulimia and tobacco dependence

Table II. - 20 year cumulative prevalence rates of major diagnostic categories of present study and selected recent studies.

DISORDERS	ZURICH STUDY	NATIONAL COMORBIDITY SURVEY	EDPS STUDY MUNICH	WMH2000 NEMESIS STUDY	GHS Germany
AUTHOR	Angst et al. (1984)	Kessler et al. (1994)	Wittchen et al. (1998)	Bijl et al. (1998)	Jacobi et al. (2004)
Sample size	2599 ¹⁾	8098	3021	7076	4181
	Cumulative Prevalence	Lifetime Prevalence	Lifetime Prevalence	Lifetime Prevalence	Lifetime Prevalence
Age (years)	20-40	15-54	14-24	18-64	18-79
Criteria	DSM-III/ III-R/ IV	DSM-III-R	DSM-IV	DSM-III-R	DSM-IV
	Prevalence (standard error)	Prevalence (standard error)	Prevalence	Prevalence (standard error)	Prevalence (standard error)
Mood	24.2 (2.5)	19.3 (0.7)	16.8	19.0 (0.5)	18.6 (0.6)
Anxiety	26.3 (2.6)	24.9 (0.8)	14.4	19.3 (0.5)	
Substance abuse/dependence ³⁾	23.7 (2.5)	26.6 (1.0)	17.7	18.7 (0.5)	9.9
TOTAL DISORDERS	48.6 (3.1) ²⁾	47.3 (1.5) ²⁾	-	41.2 (0.6)	

¹⁾ weighted

²⁾ including sociopathy/ antisocial personality

³⁾ Substance abuse/dependence did not include nicotine

sub-threshold rates are mutually exclusive within major diagnostic categories but not across categories.

Comparative Prevalence Estimates with Other Community Surveys

Table II compares the lifetime prevalence rates of the Zurich Cohort Study with those of other recent community surveys that employed DSM-III-R or DSM-IV criteria. Despite differences in diagnostic interviews, age composition and time period prevalence estimates, the rates of major diagnostic categories were similar between the Zurich Study and the National Comorbidity Survey, NCS (Kessler et al., 1994). The Nemesis study (The Netherlands) (Bijl et al., 1998) and the EDPS study (Munich) (Wittchen et al., 1998) tended to have slightly

lower rates. The high rate of mood disorders in the Zurich Cohort Study is probably attributable to the prospective design and lack of adherence to a duration criterion in the probe for mood disorders.

Treatment Prevalence Rates

Nearly half (46.1%) of those with threshold level disorders reported a history of treatment for that disorder. About one fourth of those with sub-threshold-level disorders reported lifetime treatment (i.e., 23.6%); in addition, 5.0% of subjects without any diagnosis were treated (figure 2). Approximately, one-fourth of subjects treated in their lifetimes did not receive a DSM diagnosis. This trend was far more frequent among women than among men (respectively, 10.2% vs. 5.8%).

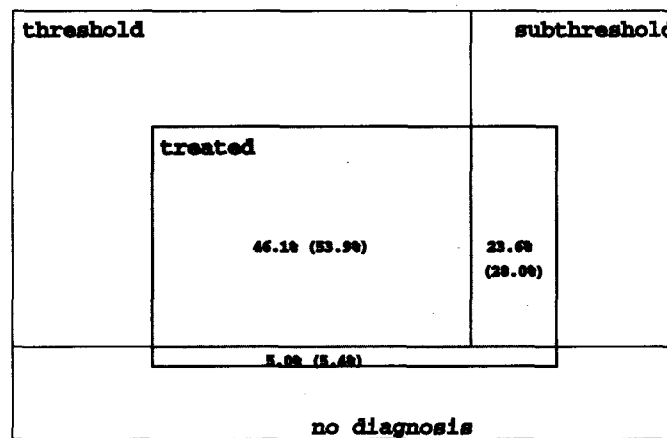


Figure 2. - Proportion of treated subjects among cases of lifetime threshold, subthreshold and diagnosis-free cases. (Proportions are higher if tobacco dependence/abuse is included (numbers in brackets)).

Table III. - 20 year cumulative treatment prevalence rates.

Disorder	Threshold Treatment Rates				Subthreshold Treatment Rates			
	M+F % (s) (95% C.I.)	M % (s) (95% C.I.)	F % (s) (95% C.I.)	F/M ratio	M+F % (s) (95% C.I.)	M % (s) (95% C.I.)	F % (s) (95% C.I.)	F/M ratio
MOOD	13.4 (1.9) (10.1-17.7)	7.1 (2.0) (4.1-12.2)	19.6 (3.2) (14.0-26.6)	2.76 (p<.03)	7.3 (1.5) (4.9-10.8)	5.7 (1.8) (3.1-10.4)	8.9 (2.4) (5.8-14.8)	1.56 (p<.38)
Anxiety	9.3 (1.5) (6.7-12.7)	5.9 (1.6) (3.5-9.9)	12.6 (2.5) (8.4-18.4)	2.14 (p<.57)	5.4 (1.2) (3.8-8.4)	3.7 (1.3) (1.9-7.3)	7.0 (2.1) (3.8-12.3)	1.89 (p<.30)
Substance abuse/dependence	3.7 (1.0) (2.2-6.2)	4.5 (1.6) (2.3-8.8)	2.9 (1.2) (1.2-6.6)	0.64 (p<.44)	.08 (.05) (.02-.30)	.08 (.08) (.01-.60)	.08 (.08) (.01-.50)	1.00 (p<.98)
All disorders ¹	22.4 (2.4) (18.1-27.4)	18.5 (3.1) (13.2-25.4)	26.2 (3.5) (19.8-33.7)	1.42 (p<.05)	6.9 (1.5) (4.5-10.6)	4.8 (1.8) (2.3-9.7)	9.0 (2.5) (5.2-15.2)	1.88 (p<.36)
All disorders ²	31.1 (2.7) (26.0-36.6)	25.6 (3.6) (19.2-33.4)	36.4 (4.0) (28.9-44.5)	1.42 (p<.02)	6.1 (1.5) (3.7-9.7)	4.4 (1.8) (2.0-9.5)	7.7 (2.4) (4.2-13.8)	1.75 (p<.56)
No diagnosis	-	-	-	-	1.1 (0.6) (0.3-3.3)	1.0 (0.9) (0.2-5.7)	1.2 (0.9) (0.3-5.0)	1.2 (p<.68)

¹ including bulimia, but not tobacco use disorders

² including tobacco use disorders

The treatment prevalence rates of mood disorders (13.4%), anxiety disorders (9.3%) and substance abuse/dependence (3.7%) were highly variable. Whereas 55% of those subjects with mood disorders and 34% of those with anxiety disorders had been treated, only 16% of those with a substance use disorder had received treatment. With the exception of substance abuse/dependence, there was generally a marked preponderance of women among treated subjects as shown by the high female to male ratios in table III.

Prevalence of Single Diagnostic Categories (table IV)

Bipolar Disorder

DSM-criteria yielded very low prevalence rates of bipolar disorders: 0.6% BP-I, 0.9% BP-II and 1.2% hypomania. Although no subjects met criteria for bipolar I disorder at any of the six interviews, 4 subjects had been hospitalised for the treatment of mania. These persons failed to report impairment associated with their manic symptoms. When sub-threshold definitions were included, 11.0% of the population (5.3% with a narrow and 5.7% with a wide definition) met criteria for bipolar II disorder (Angst *et al.*, 2003). Sub-threshold minor bipolar was found in 6.5%, pure hypomania in 4.0%, chronic minor bipolar (i.e., cyclothymia) in 2.5%.

Depression

Major depressive disorder (DSM III-R) was found in 21.5% and dysthymic disorder in 2.8% of the population. A female preponderance was present in MDD (OR=2.8; CI=1.2-6.6) but not in dysthymia. Most striking was the finding that 89 of 190 cases (46.8%) with major depres-

sive episodes and 22 of 42 dysthymics (52.4%) also met wide criteria for bipolar-II disorders. Excluding subjects with at least two of seven criterial manic symptoms, only 11.4% met criteria for pure major depressive disorder.

Anxiety States

DSM-III panic disorder was found in 3.4% and sub-threshold panic (i.e., repeated panic attacks or panic disorder) in 7.6% of the population. There was a strong female preponderance in both groups. DSM-III generalised anxiety disorder (GAD) (without exclusion criteria) was found in 14.1 % of the population, and an approximately equal proportion met criteria for sub-threshold GAD.

Phobias

There were high prevalence rates of phobias (15.5%), with variation in sex-specific rates according to phobic subtypes. The greatest female-to-male ratio was found for agoraphobia (3.7; OR=3.9; CI=1.2-12.8) and specific phobia (3.1; OR=3.5; CI=1.5-8.2), with a lower and non-significant ratio for social phobia (2.1; OR=2.2; n.s.). Likewise, sub-threshold phobic states were even more common than threshold level phobias.

OCD, OC-Syndromes and PTSD

The prevalence of OCD was 3.5% with a 3.2 fold higher rate in females. Obsessive-compulsive syndromes (excluding OCD) were found in 8.7% and were approximately equally common in men (9.9%) and women (7.5%). Although post-traumatic stress disorder was assessed at ages 35 and 40, no cases were found.

Bulimia and Binge Eating

The prevalence of bulimia was 1.3%, occurring nearly exclusively in females (2.3%). The same was true for binge eating, which was identified in 9.9% of females and 1.3% of males. The gender effects for bulimia (OR=15.6; CI=2.7-89.8) and binge eating (OR=9.6; CI=4.7-19.5) were both quite significant.

Substance Abuse and Dependence

The cumulative prevalence of alcohol dependence was 8.7%. Alcohol dependence occurred nearly exclusively

among males (14.5%), in whom there was a four-fold greater frequency than among females (3.1%) (OR=0.2; CI=0.1-0.4). A three-fold preponderance of males was also found for illicit drug dependence (6.2% vs. 2.0% among females; OR=0.3; n.s.). Slightly higher prevalence rates were found for aggregate substance abuse. With the exception of tranquillisers, males also had greater rates of alcohol abuse or dependence (OR=0.2; CI=0.1-0.5) and drug abuse or dependence (OR=0.4; CI=0.1-0.9).

Table IV. - 20 year cumulative prevalence of specific disorders in the zurich cohort study.

Diagnostic level	Threshold			Sub-threshold		
	M+F Prevalences (95% C.I.)	Men Prevalences (95% C.I.)	Women Prevalences (95% C.I.)	M+F Prevalences (95% C.I.)	Men Prevalences (95% C.I.)	Women Prevalences (95% C.I.)
DISORDER MOOD DISORDERS						
- Bipolar I	0.6 (0.4) (0.1-2.6)	0.0 (0.0) (0.0-0.6)	1.0 (0.9) (0.2-5.3)			
- Bipolar II	0.9 (0.6) (0.2-3.4)	0.0	1.8 (1.2) (0.5-6.6)			
- Cyclothymia	0.4 (0.4) (0.0-3.0)	0.0	0.9 (0.9) (0.1-5.9)	2.1 (0.9) (0.9-4.7)	0.3 (0.2) (0.1-0.8)	3.7 (1.7) (1.5-8.9)
- Hypomania	1.2 (0.6) (0.4-3.3)	1.3 (0.9) (0.3-5.0)	1.2 (0.9) (0.3-4.9)	2.8 (1.0) (1.4-5.5)	3.4 (1.5) (1.4-8.0)	2.2 (1.2) (0.7-6.4)
- Major/minor depression ¹	21.5 (2.4) (17.1-26.5)	16.9 (3.1) (11.6-23.9)	25.9 (3.6) (19.5-33.6)	10.3 (1.9) (7.1-14.7)	7.8 (2.3) (4.4-13.6)	12.8 (3.0) (7.9-19.9)
- Dysthymia	2.8 (0.8) (1.6-4.8)	2.6 (1.0) (1.3-5.3)	3.0 (1.2) (1.3-6.7)	-	-	-
ANXIETY STATES						
Panic	15.6 (2.1) (11.9-20.2)	13.2 (2.8) (8.6-19.8)	17.9 (3.1) (12.5-24.8)	15.9 (2.2) (12.0-20.7)	7.8 (2.1) (4.5-13.2)	23.7 (3.6) (17.3-31.6)
GAD	3.4 (0.9) (2.0-5.6)	2.0 (0.9) (0.8-4.9)	4.7 (1.5) (2.5-8.8)	7.6 (1.5) (5.2-11.1)	1.7 (0.4) (1.1-2.6)	13.4 (2.8) (8.8-20.0)
	14.1 (2.1) (10.5-18.6)	11.6 (2.7) (7.2-18.0)	16.5 (3.1) (11.3-23.5)	12.0 (2.0) (8.6-16.3)	7.0 (2.1) (3.8-12.5)	16.7 (3.2) (11.4-23.9)
PHOBIAS						
Agoraphobia	15.5 (2.1) (11.8-20.1)	9.1 (2.3) (5.5-14.8)	21.7 (3.4) (15.7-29.1)	22.8 (2.9) (18.1-28.2)	17.4 (3.3) (11.9-24.8)	28.0 (3.9) (20.9-36.3)
Specific phobia	4.2 (1.1) (2.6-6.9)	1.8 (0.9) (0.7-4.9)	6.6 (1.9) (3.7-11.5)	4.4 (1.2) (2.5-7.5)	1.7 (0.9) (0.6-4.8)	7.0 (2.2) (3.7-12.8)
Social phobia	10.7 (1.9) (7.6-14.9)	5.2 (1.8) (2.6-10.0)	16.1 (3.2) (10.8-23.3)	19.1 (2.4) (14.7-24.3)	13.0 (3.0) (8.2-20.1)	24.9 (3.7) (18.3-33.0)
	7.6 (1.4) (5.2-10.9)	4.9 (1.8) (2.4-9.8)	10.2 (2.3) (6.5-15.5)	10.9 (1.9) (7.7-15.1)	7.9 (2.1) (4.6-13.2)	13.8 (3.0) (8.9-20.8)
OBSESSIVE COMPULSIVE DISORDER						
	3.5 (1.1) (1.9-6.3)	1.7 (0.9) (0.6-4.8)	5.4 (1.9) (2.6-10.5)	8.7 (1.6) (6.0-12.4)	9.9 (2.4) (6.0-15.8)	7.5 (2.1) (4.3-12.7)
EATING BULIMIA / BINGE						
	1.3 (0.6) (0.5-3.3)	0.2 (0.1) (0.0-0.6)	2.3 (1.2) (0.8-6.4)	5.6 (1.0) (3.6-8.8)	1.3 (0.3) (0.8-2.0)	9.9 (2.5) (6.0-16.0)
SUBSTANCE ABUSE AND DEPENDENCE						
Alcohol dependence	23.1 (2.5) (18.5-28.4)	32.7 (4.1) (25.3-41.1)	13.7 (2.8) (9.0-20.3)	17.4 (2.3) (13.4-22.4)	18.0 (3.3) (12.3-25.5)	16.9 (3.2) (11.5-24.1)
Alcohol abuse (excl)	8.7 (1.6) (6.0-12.5)	6.0 (1.2) (4.0-9.1)	14.5 (3.0) (9.0-22.4)	14.5 (3.0) (9.6-21.4)	3.1 (1.2) (1.9-5.1)	1.4 (0.7) (0.8-2.3)
Alcohol total	9.2 (1.8) (6.2-13.3)	13.5 (3.0) (8.6-20.5)	8.1 (2.2) (4.6-13.6)	5.0 (1.9) (3.1-7.9)	-	2.3 (1.0) (1.3-3.6)
Illicit drugs abuse/dep	17.9 (2.3) (13.8-22.9)	28.0 (3.9) (21.0-36.2)	2.0 (1.2) (0.6-6.4)	4.0 (1.1) (2.3-6.7)	5.5 (1.8) (2.9-10.2)	2.5 (1.2) (0.9-6.4)
Tranquilliser dep.	4.1 (1.2) (2.3-7.3)	6.2 (2.1) (3.2-11.9)	0.5 (0.2) (0.3-1.1)	-	-	-
Tranquilliser abuse	1.2 (0.6) (0.4-3.3)	1.9 (1.2) (0.5-6.7)	4.1 (0.2) (1.8-9.1)	-	-	-
Tranquilliser total	2.4 (0.9) (1.1-4.9)	0.6 (0.2) (0.3-1.2)	4.6 (1.7) (2.2-9.4)	14.7 (2.1) (11.0-19.3)	8.8 (2.4) (5.0-14.8)	20.4 (3.4) (14.5-27.9)
Tobacco dependence	3.6 (1.1) (2.0-6.4)	2.5 (1.3) (0.9-6.6)	29.4 (3.9) (22.4-37.4)	4.3 (1.2) (2.4-7.4)	2.7 (1.3) (1.1-6.7)	5.8 (2.1) (2.8-11.4)

¹ Minor depression = subthreshold

DISCUSSION

These findings demonstrate the high prevalence of psychiatric disorders in the general population. Nearly one in every two adults has experienced at least one episode of a mood, anxiety, or substance use disorder that has met contemporary diagnostic criteria. The lifetime treatment prevalence rate of all mental disorders was 31% (men 26%, women 36%). Despite differences in the methodological and sampling features across studies, the morbidity estimates for aggregated disorders in the present study are remarkably similar, but slightly higher than those of other contemporary community studies (Jacobi *et al.*, 2004; Bijl *et al.*, 1998; Kessler *et al.*, 1994). The lower rates of the EDPS study (Wittchen *et al.*, 1998) may be attributable to the young age of the cohort.

Our higher rates could be a consequence of the wide probing by professionals for each interview section, to the small sample size, or to repeated interviews, because forgetting cannot be ignored in assessing lifetime-prevalence rates. The pilot study, which documented a 25% loss of information by forgetting up to age 20, suggests that the real lifetime prevalence may be higher than commonly reported.

The usual patterns of the female-to-male sex ratio emerged in our data, with a moderate female preponderance of mood and anxiety disorders and a four-fold increased risk of substance use disorders among males. The lack of sex differences in sub-threshold-level disorders suggests that the sex difference may be attributed in part to male-female differences in the severity and consequences of mood and anxiety disorders rather than to differences in symptoms themselves. This confirms our earlier observation regarding differential male and female thresholds for social phobia and panic (Merikangas *et al.*, 1998).

An unresolved issue is the distinction between depression and bipolar disorder. Applying DSM-IV criteria for hypomania, major depressive disorder (MDD) was prevalent in 21.5%; in contrast, pure cases of MDD shrank to 11.4% when the Zurich criterion of two of seven hypomanic symptoms without time restriction was applied, as shown in an earlier paper (Angst *et al.*, 2003).

In 1984, on the basis of our data (Angst & Dobler-Mikola, 1985) we concluded that there was a continuum from normal to pathological expression of depression, compatible with the view of Kessler (2002). Similar findings have emerged for other manifestations as well, and we have systematically examined the threshold validity for all of the major anxiety disorders, bipolar disorder, and phobic disorders for which sub-threshold definitions

have been developed (Angst F. *et al.*, 2002; Angst & Merikangas, 2001; Angst, 1998; Angst & Merikangas, 1997; Angst *et al.*, 1997; Merikangas & Angst, 1994; Degonda *et al.*, 1993; Angst & Wicki, 1992; Vollrath *et al.*, 1992).

LIMITATIONS

The limitations of this study include: *differences in diagnostic information available across waves*, since the clinical interview was expanded over time to capture the evolution of more extensive diagnostic systems; *the increasing attrition rate across the 20 years of the study*; and *the relatively small sample size of this cohort and limited generalisability to other cohorts*.

REFERENCES

- Angst F., Stassen H.H., Clayton P. J. & Angst J. (2002). Mortality of patients with mood disorders: follow-up over 34-38 years. *Journal of Affective Disorders* 68, 167-181.
- Angst J. (1998). The emerging epidemiology of hypomania and bipolar II disorder. *Journal of Affective Disorders* 50, 143-151.
- Angst J. & Dobler-Mikola A. (1985). The Zurich Study - A prospective epidemiological study of depressive, neurotic, and psychosomatic syndromes. IV. Recurrent and nonrecurrent brief depression. *European Archives of Psychiatry and Neurological Sciences* 234, 408-416.
- Angst J. & Merikangas K.R. (1997). The depressive spectrum: diagnostic classification and course. *Journal of Affective Disorders* 45, 31-40.
- Angst J. & Merikangas K. R. (2001). Multi-dimensional criteria for the diagnosis of depression. *Journal of Affective Disorders* 62, 7-15.
- Angst J. & Wicki W. (1992). The Zurich Study: XIII. Recurrent brief anxiety. *European Archives of Psychiatry and Neurological Sciences* 241, 296-300.
- Angst J., Dobler-Mikola A. & Binder J. (1984). The Zurich Study - A Prospective Epidemiological Study of Depressive, Neurotic and Psychosomatic Syndromes. I. Problem, Methodology. *European Archives of Psychiatry and Neurological Sciences* 234, 13-20.
- Angst J., Merikangas K.R. & Preisig M. (1997). Subthreshold syndromes of depression and anxiety in the community. *Journal of Clinical Psychiatry* 58, 6-10.
- Angst J., Gamma A., Benazzi F., Ajdacic V., Eich D. & Rössler W. (2003). Toward a re-definition of subthreshold bipolarity: epidemiology and proposed criteria for bipolar-II, minor bipolar disorders and hypomania. *Journal of Affective Disorders* 73, 133-146.
- Bijl R.V., van Zessen G., Ravelli A., de Rijk C. & Langendoen Y. (1998). The Netherlands Mental Health Survey and Incidence Study (NEMESIS): objectives and design. *Social Psychiatry and Psychiatric Epidemiology* 33, 581-586.
- Busslinger M. (1984). Validierung des Psychiatrisch-Epidemiologischen Fragebogens SPIKE. Medical Thesis, University of Zurich: Zurich.
- Degonda M., Wyss M. & Angst, J. (1993). The Zurich Study. XVIII.

- Obsessive-compulsive disorders and syndromes in the general population. *European Archives of Psychiatry and Neurological Sciences* 243, 16-22.
- Derogatis R.L. (1977). *Symptoms Checklist 90, R-Version Manual I: Scoring, Administration and Procedures for the SCL-90*. Johns Hopkins Press: Baltimore.
- Derogatis L.R., Lipman R.S., Rickels K., Uhlenhuth E.H. & Covi L. (1974). The Hopkins Symptom Checklist (HSCL): A measure of primary symptom dimensions. In *Psychological Measurements in Psychopharmacology* (ed. P. Pichot). Karger: Basel.
- Eich D., Ajdacic-Gross V., Condrau M., Huber H., Gamma A., Angst J. & Össler W. (2003). The Zurich study: participation patterns and symptom checklist 90-R scores in six interviews, 1979-99. *Acta Psychiatrica Scandinavica* 108, 11-14.
- Goldberg D.P. & Williams P. (1988). *A User's Guide to the General Health Questionnaire*. NFER/Nelson: Windsor.
- Hochstrasser B. & Angst J. (1996). The Zurich Study: XXII. Epidemiology of gastrointestinal complaints and comorbidity with anxiety and depression. *European Archives of Psychiatry and Neurological Sciences* 246, 261-272.
- Illes P. (1981). Validierung des Fragebogens "SPIKE" an Diagnosen der Krankengeschichten des Sozialpsychiatrischen Dienstes Oerlikon (Klinik Hard). Medical Thesis, University of Zurich: Zurich.
- Jacobi F., Wittchen H.-U., Hölling C., Höfler M., Pfister H., Müller N. & Lieb, R. (2004). Prevalence, co-morbidity and correlates of mental disorders in the general population: results from the German Health Interview and Examination Survey (GHS). *Psychological Medicine* 34, 597-611.
- Kaeser D. (1979). Psychiatrische Katamnese von ehemaligen schulpsychiatrischen Fällen. Medical Thesis, University of Zurich: Zurich.
- Kessler R.C. (2002). The categorical versus dimensional assessment controversy in the sociology of mental illness. *Journal of Health and Social Behavior* 43, 171-188.
- Kessler R.C., McGonagle K.A., Zhao S., Nelson C.B., Hughes M., Eshleman S., Wittchen H.-U. & Kendler K.S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. *Archives of General Psychiatry* 51, 8-19.
- Kruskal W.H. & Wallis W.A. (1952). Use of ranks in one-criterion variance analysis. *Journal of the American Statistical Association* 47, 583-621.
- Meier R. (1985). Katamnese von 40 jugendlichen Patienten nach einem Suizidversuch bei verschiedenen Behandlungsmöglichkeiten im Anschluss an eine somatische Klinik. Medical Thesis, University of Zurich: Zurich.
- Merikangas K.R. & Angst J. (1994). Validity sub-threshold anxiety and depression: results of the Zurich cohort study. *Neuropsychopharmacology* 10, 543S.
- Merikangas K.R., Stevens D.E., Fenton B., Stolar M., O'Malley S., Woods S. W. & Risch N. (1998). Co-morbidity and familial aggregation of alcoholism and anxiety disorders. *Psychological Medicine* 28, 773-788.
- Pförtmüller J. (1983). Beitrag zur Validierung des Depressionsratings im Fragebogen SPIKE IV an psychiatrisch hospitalisierten Patienten. Medical Thesis, University of Zurich: Zurich.
- Robins L.N., Helzer J.E., Croughan J. & Ratcliff K. S. (1981). National Institute of Mental Health Diagnostic Interview Schedule. Its history, characteristics, and validity. *Archives of General Psychiatry* 38, 381-389.
- Vollrath M., Koch R. & Angst J. (1992). Binge eating and weight concerns among young adults. Results from the Zurich cohort study. *British Journal of Psychiatry* 160, 498-503.
- Weber M. (1979). Zuverlässigkeit der Beantwortung eines anamnetischen Fragebogens bei zwanzigjährigen Zürchern. Medical Thesis, University of Zurich: Zurich.
- Wittchen H.-U. (1994). Reliability and validity studies of the WHO-Composite International Diagnostic Interview (CIDI): a critical review. *Journal of Psychiatric Research* 28, 57-84.
- Wittchen H.-U., Nelson C.B. & Lachner G. (1998). Prevalence of mental disorders and psychosocial impairments in adolescents and young adults. *Psychological Medicine* 28, 109-126.