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ORIGINAL PAPER

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Obsessive-compulsive severity spectrum in the community: prevalence, comorbidity, and course

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Abstract *Objectives* To describe lifetime prevalence rates, course and comorbidity of obsessive-compulsive disorder (OCD), obsessive-compulsive syndromes (OCS) and OC-symptoms (OC-sx) up to age 41. *Methods* In the Zurich community cohort study 591 subjects were selected after screening at the age of 19 and studied prospectively by 6 interviews from 20 to 40; they represent 1599 subjects of the normal population. The diagnoses of OCD met DSM-IV criteria. Course was assessed by graphic illustrations and prospective data. *Results* The lifetime prevalence rate was 3.5 % for OCD (males 1.7 %, females 5.4 %) and 8.7 % for OCS (males 9.9 %, females 7.5 %). The onset of OC-sx was 18 years (median); and in 70 % before age 20. OCD was treated in one third of cases, OCS in 6.1 %. The course of symptoms was chronic in 60 %, but OCD and OCS showed in most cases considerable improvements over time. OCD reduced quality of life mostly in the subject's psychological well-being and at work but to a considerable extent also in other social roles. Comorbidity was prominent with bipolar disorder, panic disorder and social phobia and also significant with bulimia, binge eating, generalized anxiety disorder and suicide attempts; there was no association with substance abuse/dependence. *Conclusion* OCD and OCD are manifestations of a wide spectrum of severity with high prevalence and strong clinical validity. The long-term course is better than generally assumed.

Key words obsessive-compulsive disorder · obsessive-compulsive spectrum · prevalence · comorbidity · course

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Introduction

In recent years, a number of epidemiological studies have examined the prevalence and psychopathological correlates of obsessive-compulsive spectrum disorders.

In late adolescence, obsessive-compulsive disorders (OCD) have a lifetime prevalence of 2 to 3 % (Maina et al. 1999; Zohar 1999).

In adulthood, the 6-month prevalence rates range from 0.7 to 2.1 % with more female (1.5 %) than male (1 %) sufferers, according to a review of nine population surveys of adults using the Diagnostic Interview Schedule (DIS) (Bebbington 1998; Sasson et al. 1997). A cross-national analysis of seven studies found lifetime prevalence rates of DSM-III OCD between 1.9 and 2.5 % with the exception of Taiwan, where the rate was only 0.7 % (Horwath and Weissman 2000). The National Survey of Psychiatric Morbidity in the United Kingdom (Heyman et al. 2001; Jenkins et al. 1997) found a prevalence of 1.5 % in females and 1 % in males. A telephone survey among 2261 Canadians conducted by lay interviewers identified 3.1 % and, after clinical reappraisal, 0.6 % OCD cases (Stein et al. 1997).

On a lower diagnostic level, the lifetime prevalence rates are considerably higher. High rates of OC symptoms (OC-sx) were found in studies in adolescents, for instance 43.1 % in Egypt (Okasha et al. 2001) but also, on the defined symptom and syndromal level (OCS). Uncontrollable OC-sx was found in 6.1 % of 3062 women in the Ontario questionnaire survey (Frise et al. 2002); there was an age-related decrease of the prevalence. Maina et al. (1999) identified 12.3 % of OCS among 1883 Italian army recruits. Bebbington et al. (1998) found a prevalence of OCS of 7 % in men and 15 % in women and Bijl et al. (1998) 0.9 % with almost equal gender rates. In the Zurich study (Degonda et al. 1993), we found OCS in 5.5 % of males and 5.9 % of females (M + F 5.7 %) up to

age 30. Applying DSM-IV (American Psychiatric Association 1994) criteria and the Composite Diagnostic Interview Schedule (M-CIDI) modified by Wittchen et al. (1995, 2001) to a sample of 4093 subjects from the community, Grabe et al. (2000) found a lifetime prevalence of 0.5 % for OCD and 2 % for subclinical OCD (OCS); the 12-month prevalence rates were only slightly lower (0.39 % and 1.6 %, respectively); rates among women were higher than among men.

In contrast to the documentation of prevalence rates of OCD and OCS by numerous rigorous studies, there is a relative paucity of available data on the prevalence, correlates, and adult outcomes associated with OC spectrum disorders in the community largely because previous studies of the longitudinal epidemiology of OC spectrum disorders were limited to younger age groups (for a review see Valleni-Basile et al. 1996). Finally, there are clinical reports suggesting that the course and phenomenology of OC may vary, especially in later years, indicating the importance of collecting prospective data.

In order to begin to address this gap, the current study will present newly updated findings of the Zurich cohort followed-up for another ten years to age 40, in order to provide longitudinal data on prevalence, comorbidity, and correlates of OC spectrum disorders.

Methods

Sample

The Zurich study is comprised of a cohort of 4,547 subjects (m = 2201; f = 2346) representative of the canton of Zurich in Switzerland, who were screened in 1978 with the Symptom Checklist 90-R (Derogatis 1977) and a questionnaire for socio-demographic data. The men were randomly selected at age 19 among male conscripts into the Swiss army. The women were selected at age 20 from the list of voters provided by all local communities. In order to increase the probability of the development 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) and a random sample of those with scores below the 85th percentile; the following mean item cut-off scores were applied 1.57 for males and 1.89 for females (Angst et al. 1984).

So far six interview waves have been conducted as follows: 1) 1979 (M 20yrs/F 21yrs); 2) 1981 (M 22yrs/F 23yrs); 3) 1986 (M 27yrs/F 28yrs); 4) 1988 (M 29yrs/F 30yrs); 5) 1993 (M 34yrs/ F 35yrs); and 6) 1999 (M 40yrs/F 41yrs).

An analysis of the impact of the attrition over 20 years was published recently (Eich et al. 2003). The overall design of the study is shown in Fig. 1.

Interviews

The Structured Psychopathological Interview and Rating of the Social Consequences for Epidemiology (SPIKE) was administered in the subjects' homes by psychiatric residents and clinical psychologists with extensive clinical training. Psychopathology, including the obsessive-compulsive spectrum, was assessed for the 12 months prior to each interview. In addition, symptoms were also assessed for each calendar year between the interviews but not taken into account for the diagnoses; the latter refer strictly to the pre-interview year.

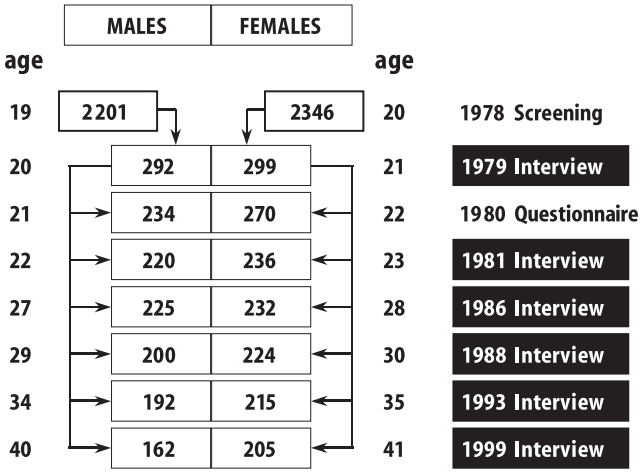

Fig. 1 Design of the Zurich cohort study

Diagnoses

Three categories of OC manifestations were defined:

OCD a) the presence of 1 of 9 criterial OC-symptoms of DSM-IV plus b) significant distress (> 49 on an analogue scale [0–100]) or work impairment or impairment in other activities plus c) the symptoms were subjectively not pleasurable or unreasonable plus d) they could not be suppressed.

OCS an obsessive-compulsive syndrome defined by criteria a) and b) but distress needed only to be moderate (29–49 on the analogue scale [0–100]). Criteria c) and d) were not required.

OC-sx: OC-symptoms We distinguished a group suffering from symptoms during the twelve months prior to an interview from a group suffering from symptoms only during the years between the interviews.

Other psychiatric diagnoses were made by algorithms according to the following criteria: anxiety states (generalized anxiety and panic disorder): DSM III; major depression, dysthymia and bulimia: DSM-III-R; phobias, substance abuse/dependence: DSM-IV; neurasthenia, recurrent brief depression: ICD-10. A Zurich diagnosis of minor depression required 3–4 of 9 DSM-III-R criterial symptoms, with a minimum duration of 2 weeks. Uni- and bipolar disorders were diagnosed according to the criteria described recently in detail (Angst et al. 2003a). Different versions of the diagnostic manuals were used to define diagnoses, the aim consistently being to approximate as closely as possible to the criteria of the most recent editions. This aim could not always be achieved in the study whose inception (1979) predates the publication of DSM-III (1980) by one year and DSM-IV (1994) by 15 years.

Course and consequences of the OC spectrum

The course pattern of OC manifestations was assessed by presenting interviewees with graphic illustrations distinguishing single episodes from recurrent and chronic courses (Fig. 2). In addition, SCL-90 R measures including the obsessionality subscale were taken 8 times: at the screening, at each interview, and in the year between the first and second interview. The obsessionality scale includes the following ten items (abbreviated): 3) repeated unpleasant thoughts, 9) trouble remembering things, 10) worried about sloppiness, 28) feeling blocked in getting things done, 38) having to do things very slowly, 45) having to double check what you do, 46) difficulty making decisions, 51) your mind going blank, 55) trouble concentrating, 65) having to repeat the same actions.

Subjective quality of life was assessed at the age of 34/35 across 8

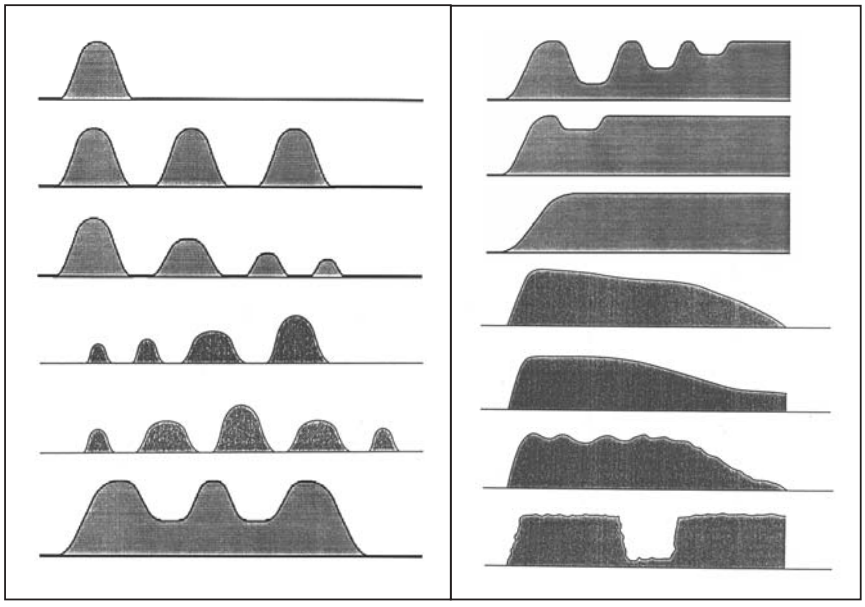

Fig. 2 Graphic templates of possible course patterns, to which subjects matched the course of their own OCD manifestations. If no match was possible, subjects were asked to draw their own course pattern

domains of life (Bech and Angst 1996). Distress and work impairment as a consequence of OC manifestations were measured by a temperature scale from 0–100 presented to interviewees in the form of a thermometer. Impairment in other social roles was scored dichotomously (yes/no). Treatment for OC was defined by consultation of a doctor or psychologist.

Statistics

Prevalence rates were weighted using methods developed for stratified samples (Pickles et al. 1995; Dunn et al. 1999). The weighted prevalence rates refer to a denominator of 2599 subjects. The prevalence rates are cumulative taking into account all six interviews, each covering diagnoses over the last twelve months prior to the interviews. Where appropriate, Chi-square and Kruskal-Wallis tests were applied. Models of relative risk (RR) using binomial rather than logistic regression, were computed, since odds ratios from logistic regression estimates of relative risk are inaccurate when the outcome is not rare (Wacholder 1986). All models were estimated using STATA Release 7.

Results

Prevalence rates

The one-year prevalence rates across the six interviews varied considerably (Table 1). The average annual rate was 0.7 % for OCD, 2.5 % for OCS and 3.9 % for OC-sx.

The longitudinal cumulative prevalence rate for OCD was 3.5 % (men 1.7 %, women 5.4 %), for OCS 8.7 % (men 9.9 %, women 7.5 %) and for OC-sx 12.1 % (men 13.7 %, women 10.5 %) (Table 2). Overall there were significant gender differences in OCS prevalence rates; more women had OCD and more men had OCS and OC-sx.

Table 1 One-year frequencies and prevalence rates of OC-spectrum

	OCD Diagnosis (1)			OC Syndrome (2)			OC Symptoms (3)			All others (4)			p (1–4) M + F	p (1–3) M + F
	M	F	M + F	M	F	M + F	M	F	M + F	M	F	M + F		
N (unweighted)														
age 20/21	3	8	11	19	9	28	35	25	60	235	257	492	–	–
age 22/23	3	1	4	11	8	19	11	8	19	195	219	414	–	–
age 27/28	1	1	2	9	9	18	13	5	18	202	217	419	–	–
age 29/30	1	3	4	7	8	15	11	9	20	181	204	385	–	–
age 34/35	1	4	5	8	11	19	2	3	5	181	197	378	–	–
age 40/41	2	4	6	3	12	15	1	7	8	156	182	338	–	–
Prevalence %														
age 20/21	0.2	3.0	1.6	4.7	2.2	3.5	10.8	5.0	7.9	84.3	89.8	87.1	0.0001	0.0001
age 22/23	0.3	0.1	0.2	2.3	1.7	2.0	4.5	2.7	3.5	93.0	95.5	94.3	0.07	0.66
age 27/28	0.1	0.1	0.1	3.1	2.0	2.5	5.6	1.6	3.6	91.2	96.3	93.8	0.0001	0.1
age 29/30	1.3	0.3	0.8	1.9	3.1	2.5	3.6	5.4	4.5	93.2	91.2	92.2	0.01	0.01
age 34/35	0.1	1.6	0.9	3.3	1.2	2.2	0.2	2.6	1.5	96.4	94.5	95.4	0.0001	0.0001
age 40/41	0.3	1.6	1.0	0.4	3.7	2.2	0.1	4.3	2.4	99.2	90.3	94.4	0.0001	0.36

Age of onset and course

The age of onset refers to the onset of symptoms. The average age of onset was under age 20. 30 % of individuals had developed symptoms by the age of 15, 50 % by the age of 18 and 70 % by 20 (Table 2).

The course of the illness, as assessed by graphic illustrations, was rather unfavorable: 62 % of both OCD and OCS cases described the course of their illness as chronic, and the remaining third as recurrent.

A more favorable picture of the course of OC is shown with the 8 measures on the OC subscale of the SCL-90 R taken from age 19/20 to 40/41. Fig. 3 shows a clear decrease in OC scores over time. The result was the same using the total sample and when only the subjects with all 8 measures were included. There were no gender differences.

A rather favorable picture of the course of OC is also seen in Fig. 4. The right side of the figure represents the outcome at the last available assessment (which varied between individuals according to their participation patterns). Participants' age at this final assessment was 40/41 for 367 subjects, 34/35 for 65 subjects, 29/30 for 42 subjects, 27/28 for 25 subjects, and 22/23 for 41 subjects. The initial diagnostic groups on the left side represent the highest (i. e., most severe) diagnostic category a participant ever belonged to across all interviews prior to the final assessment. Accordingly, the time period between initial and final diagnosis varied between participants. The mean interval between intial and final diagnosis was 14.3 years for cases with initial OC symptoms, 11.9 years for cases with an inital OC syndrome, and 12.9 years for initial OCD cases. The change between diagnostic subcategories over the 20 year study period is quite dramatic, suggesting that the nature of OC in each individual is highly variable over time and has a rela-

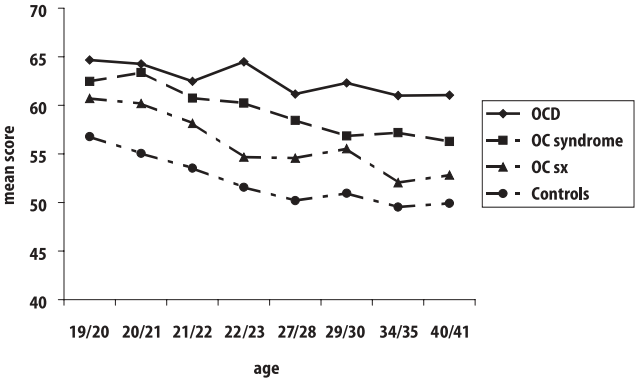

Fig. 3 Longitudinal course of SCL-90R obsessionality: mean t-transformed values (x = 50, sd = 10) across 21 years

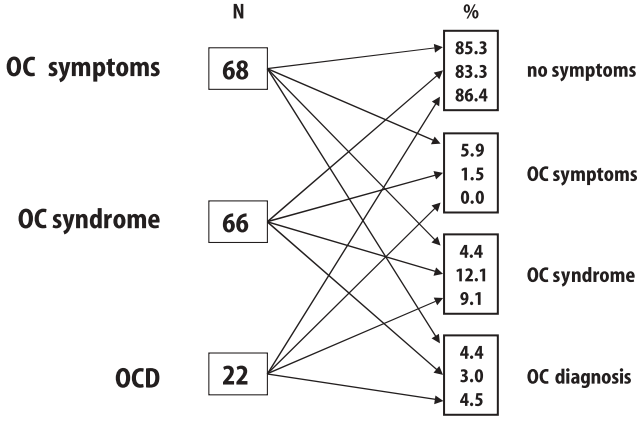

Fig. 4 Change of diagnoses over time. The outcome diagnosis (right side) was made at the last available interview. The initial diagnosis (left side) represents the most severe diagnostic category a participant belonged to across all interviews prior to the outcome assessment. The average time period between initial and outcome diagnosis ranged between 11 and 15 years (see text for more details)

Table 2 Cumulative prevalence rates of OC spectrum, onset and course

	OCD Diagnosis (1)	OC Syndrome (2)	OC Symptoms (3)	OC sympt. betw. intv. (4)	Mood or anxiety disorder (5)	All others (6)	p (1–3.6)	p(1–3)
Subjects	30	81	77	37	217	149		
Men	11	44	41	20	93	83		
Women	19	37	36	17	124	66	0.2942	0.3777
Prevalence %	3.5	8.7	12.1	2.6	36.1	37.0		
Men	1.7	9.9	13.7	2.4	29.0	43.5		
Women	5.4	7.5	10.5	2.9	43.0	30.8	0.0001	0.0001
Age of onset of symptoms (x,s)	19.1 (5.7)	16.9 (6.4)	18.2 (5.8)	18.7 (3.2)				0.2578
Course pattern: N	13	29	14	–				
Single episode (%)	–	–	14.3	–				
Recurrent (%)	38.5	37.9	35.7	–				
Chronic (%)	61.5	62.1	50.0	–				0.1799
Any impairment (%)	100	19.8	–	–				
Work impairment (%)	73.3	11.1	–	–				
Treatment (%)	33.3	6.2	2.6	3.7	0.5			
Distress (mean, s)	64.6 (24.0)	30.8 (28.1)	–	–				

tively favorable prognosis. The predictive value of a diagnosis of OCD for future OCD (4.5 %) was not greater than that of a diagnosis of OCS (3 %) or OC-sx (4.4 %). OCD (N only 22) had a good prognosis: 9 % became OCS and 86 % symptom-free. OCS (N = 66) remained stable in 12 % and 85 % became symptom-free.

Consequences of OC spectrum

Impairment, distress and treatment rates

By diagnostic definition, all OCD cases were impaired at work or in social activities; in addition 19.8 % of OCS subjects reported impairment. Distress was also a diagnostic criterion: OCD cases had high distress scores (median 64); OCS cases had a median of 20 (Table 2).

Cumulative treatment rates at age 40 varied across the subgroups: OCD 33.3 %, OCS 6.2 %, OC-sx manifesting during the interview years 2.6 %, and OC-sx between interview years 5.4 %. During the twelve months prior to the interviews, 20 % of those with OCD and 3.7 % of OCS cases had been treated.

Quality of life

Quality of life assessed at the age of 35 was impressively lowered proportional to the severity of OC manifestations. Psychological well-being and quality of life at work were regarded as suffering the most. Relationships with parents, partners and friends were affected to a lesser extent. There were no significant differences between subjects with and without OC manifestations as regards financial problems, somatic well-being and quality of life within the family. Retrospective reports indicated that quality of life in childhood/adolescence was reduced significantly in subjects with OCD and OCS (Table 3).

Comorbidity

Table 4 demonstrates a surprisingly high association between the OC spectrum and bipolar disorders and especially with BP-II disorders. 53 % of OCD and 37 % of OCS cases manifested some hypomanic symptoms, and 30 % of OCD and 21 % of OCS cases qualified for BP-II diagnoses. The associations with anxiety disorders, including phobias, as well as with bulimia and binge eating, were of comparable strength.

Sex adjusted binomial regression analysis revealed that the risk of suffering from OCD/OCS was significantly increased in the presence of the following disorders: bipolar spectrum (RR = 1.8), bipolar II disorder (RR = 1.9), minor bipolar disorder (RR = 1.6), panic disorder (RR = 2.3), panic attacks (RR = 2.2), and social phobia (RR = 2.1).

OCD/OCS was significantly associated with an increased risk of attempted suicide (RR = 1.5), GAD (RR = 2.3), agoraphobia (RR = 1.6), bulimia (RR = 2.6), binge eating (RR = 1.5), and marginally with neurasthenia (RR = 1.5). In stark contrast to these findings there was no significant association of any form of unipolar depression (major, minor or recurrent brief depression) with OCD/OCS. In addition, OCD/OCS was not linked with alcohol or drug abuse/dependence.

Discussion

Prevalence and gender differences

Our finding that the one-year prevalence of OC varies over the lifespan is consistent with and adds to existing epidemiologic data on the prevalence of OCD and OC spectrum disorders in the community (Angst 1994; Weissman et al. 1994; Bebbington 1998; Nestadt et al. 1998; Zohar 1999; Grabe et al. 2000; Heyman et al. 2001). The finding in this sample that OCD is more prevalent among females, which is consistent with Grabe

Table 3 Quality of life at age 34/35: mean scores (and standard deviations)

	OCD Diagnosis (1)	OC Syndrome (2)	OC Symptoms (3)	OC sympt. betw. intv. (4)	Mood or anxiety disorder (5)	All others (6)	p (1–4,6)
Subjects	21	55	44	17	149	66	
Domains[a]							
Physical well-being	2.9 (1.1)	3.4 (0.8)	3.3 (0.8)	3.5 (0.8)	3.3 (0.9)	3.6 (0.7)	0.131
Psychological well-being	2.8 (1.1)	3.3 (0.8)	3.5 (0.7)	2.9 (1.3)	3.4 (0.9)	3.7 (0.8)	0.002
At work	3.1 (1.2)	3.3 (1.0)	3.6 (0.7)	2.9 (1.0)	3.4 (0.8)	3.8 (0.7)	0.001
Financial situation	3.1 (1.1)	3.2 (0.9)	3.6 (0.8)	3.5 (1.0)	3.3 (0.9)	3.5 (0.7)	0.071
Parents relationship	3.2 (0.9)	3.1 (0.9)	3.2 (0.9)	3.2 (0.9)	3.5 (0.9)	3.7 (0.9)	0.006
Partner relationship	2.6 (1.4)	3.4 (1.2)	3.5 (1.2)	3.2 (1.2)	3.5 (1.0)	3.8 (0.9)	0.023
Within family	3.3 (1.2)	3.7 (0.8)	3.6 (1.0)	3.6 (0.9)	3.9 (0.7)	4.0 (0.6)	0.363
Friends relationship	3.1 (0.8)	3.6 (0.7)	3.6 (0.7)	3.6 (0.8)	3.7 (0.6)	3.7 (0.6)	0.028
Childhood in retrospect	2.8 (0.9)	2.9 (1.0)	3.2 (1.0)	2.9 (0.9)	3.2 (1.0)	3.4 (1.0)	0.016

[a] scores range from 1 (very poor)–5 (excellent)

Table 4 Comorbidity with mood disorders and suicidality

	Obsessive -Compulsive				No OC-Sx	Risk ratios[a] (95 % C. I.)	p (Risk Ratio[a])
	OCD	OCS	OC-Sx	OC-Sx interval			
Subjects	30	81	73	54	349		
Comorbidity	%	%	%	%	%		
All unipolar depression	33.3	35.8	31.2	33.3	30.1	1.2 (0.8–1.7)	0.35
Major depr. disorder	20.0	21.0	18.2	25.9	14.3	1.3 (0.9–1.9)	0.21
Minor depression	3.3	4.9	5.3	1.9	4.3	1.1 (0.5–2.4)	0.81
Rec. brief depression	10.0	9.9	8.2	5.6	11.5	0.9 (0.5–1.6)	0.82
All bipolar disorders	53.3	37.0	39.0	25.9	24.4	**1.8 (1.3–2.5)**	**0.0001**
BP-II disorder	30.0	21.0	20.8	9.3	12.0	**1.9 (1.3–2.7)**	**0.001**
Minor BP disorder	16.7	13.6	11.7	7.4	8.6	**1.6 (1.0–2.4)**	**0.05**
Hypomania	–	2.5	6.5	5.6	3.7	0.5 (0.1–1.9)	0.31
Suicide attempts	26.7	13.6	14.3	18.5	13.6	**1.6 (1.0–2.4)**	**0.04**
Panic disorder	16.7	12.4	13.0	5.6	5.2	**2.1 (1.4–3.2)**	**0.001**
Panic attacks (2+/yr)	50.0	27.2	24.7	16.7	16.1	**2.1 (1.4–2.9)**	**0.0001**
GAD	46.7	27.2	16.9	11.1	14.0	**2.2 (1.6–3.1)**	**0.0001**
Agoraphobia	23.3	8.6	6.5	5.6	7.5	**1.6 (1.0–2.6)**	**0.05**
Social phobia	40.0	18.5	18.2	11.1	10.6	**2.1 (1.5–3.0)**	**0.0001**
Specific phobia	20.0	14.8	11.7	14.8	10.6	1.4 (0.9–2.2)	0.13
Bulimia	14.3	1.3	3.0	2.2	1.41	2.2 (1.1–4.1)	0.02
Binge eating	28.6	14.7	10.6	11.1	12.3	1.4 (0.9–2.2)	0.09
Neurasthenia (ICD)	23.3	11.1	10.4	11.1	9.7	1.4 (0.9–2.2)	0.16
Substance abuse/dep	16.7	38.3	31.2	33.3	25.5	1.3 (0.9–1.8)	0.22
Alcohol abuse/depend.	13.3	23.5	27.3	24.1	19.5	1.0 (0.7–1.6)	0.92
Benzodiaz. abuse	3.3	1.2	2.6	3.7	1.4	1.5 (0.9–2.7)	0.13
Drug abuse/dependence	10.3	9.3	14.3	13.6	6.7	1.1 (0.7–1.9)	0.66

[a] Risk ratios computed by binomial regression on cases with vs. without OCD or OCS

et al. 2001 but in contrast to Maggini et al. 2001, Okasha et al. 2001 and that OCS and OC symptoms are more common among males in this sample is unexplained although several reasons may be proposed. Females may be more vulnerable to OCD, compared with less severe OC manifestations, which would be compatible with the known female preponderance among sufferers from anxiety disorders (Silverstein 2002), and especially other forms of anxiety associated with OCD (e. g., panic attacks) (Andrade et al. 1996). Alternatively, females may be socially more likely than males to admit to distress and impairment, as shown recently for depression (Angst et al. 2002). This has been previously suggested as a possible explanation for gender differences in rates (Martin and Lemos 2002).

Onset and course

The availability of data over twenty years up to the age forty allows a new perspective on the course of OC spectrum disorders in adult life. The onset of OC spectrum disorders occurs during youth and adolescence in the large majority of cases. The early onset found in our study is in accord with the literature. Goodwin et al.'s (1969) review mentioned a mean age of onset of roughly 20 years of age, with 65 % of cases beginning before 25.

Obviously, course and outcome depend on the sample studied. Most studies have dealt with hospitalized or mixed groups and few with outpatients. Hospitalized patients have a clearly worse outcome, with chronicity, but over the years the disorder wanes gradually (Lo 1967; Ingram 1961; Rudin 1953; Müller 1953). According to Berrios and Chiu (1989) (follow-up over 11 years) symptoms usually persisted but became less impairing. The most recent, and longest, 47-year follow-up study of hospitalized patients by Skoog and Skoog (1999) convincingly demonstrated an improvement in 83 % of cases, comprising 20 % complete recovery, 28 % recovery with subclinical symptoms, 35 % improved with symptoms; only 9 % were unchanged and 8 % worse.

In outpatients, too, the prognosis was shown to be not unfavorable, as stressed by Müller (1953) on the basis of a 25 year follow-up, a result which was confirmed by Grimshaw (1965), who found improvement in 64 % of cases and worsening in only 6 %. In adolescents the prognosis of OCD and OCS seems to be especially favorable as shown by a prospective one-year epidemiological study (Valleni-Basile et al. 1996).

The Zurich Study is to our knowledge the first long-

term follow-up of a community sample of OCD and OCS. We found a clear trend to an improvement over the 20 years of observation, both on the SCL-90 measures of obsessive-compulsive symptoms and in the interview data, which showed a change in 9% from OCD to OCS and 86% recovery. This improvement is consistent with epidemiological data suggesting that the prevalence of OCD declines with age (Karno and Golding 1991; Robins and Regier 1991).

Comorbidity

As Grabe et al. 2001 we found a highly significant comorbidity of OCD/OCS with social phobia, which is likewise characterized by an early onset. The nature of this association is not clear. We may hypothesize that the disorders share common features, for instance oversensitivity as a personality trait, or anxiety, which would also explain the association with GAD and panic.

Of special interest is our finding that OCD/OCS was associated with bipolar spectrum disorders but not with depression; this latter finding is at odds with other reports of clear comorbidity with depression (Tükel et al. 2002; Steketee et al. 2001). In this context, it has certainly to be borne in mind that our repeated interviews enabled us to identify a far higher number of hidden bipolar cases and to correct the overdiagnosis of depression. In addition, the concept of the bipolar spectrum used in our study is much wider than that commonly applied and includes, as bipolars, subjects with hypomanic symptoms associated with a diagnosis of depression (Angst et al. 2003a). In the Epidemiologic Catchment Area Study, the association (year of interview) of OCD with manic episodes expressed as odds ratios was 15 and with major depressive episodes 10 (Robins et al. 1991, p 359 in: Robins and Regier 1991); an earlier analysis of three sites (Boyd et al. 1984) had demonstrated an odds ratio of 17.8 between OCD and manic episodes over the previous month. In a later analysis of the ECA data Chen and Dilsaver (1995), distinguishing between bipolar and unipolar disorders, found the association between OCD and bipolar disorders to be double that between OCD and depressive disorders. A follow-up of these cases would doubtlessly change many diagnoses from depression to bipolar disorder (Angst et al. 2003b) and could consequently also considerably change the associations. The association of OCD with depression could turn out to be an artifact of the heterogeneity of depression including unidentified bipolars.

Finally, the lack of a significant association between OC spectrum disorders and substance use disorders is noteworthy. It appears that the connection between OC spectrum disorders and substance use differs from the relationship between other anxiety disorders and the likelihood of substance use (Regier et al. 1993). This pattern is consistent with previous results (Bejerot and Humble 1999), though previous studies have not provided such prospective data. The reasons that OC appears to differ from other forms of anxiety and even affective disorders in patterns of comorbidity with substance use merits further study, which may provide important information on etiologic factors. Similarly, the link between eating disorders and OCD/OCS observed here is consistent with previous evidence of high rates of comorbidity of anxiety disorders and eating disorders in both clinical and epidemiologic samples (Milos et al. 2002; Wentz et al. 2001; Lennkh et al. 1998). Moreover, it has been postulated that key pathological features of eating disorder may involve issues of perfectionism and control, which have also been identified as underlying constructs central to OC spectrum disorders (O'Connor 2001; Bouchard et al. 1999; Antony et al. 1998; Davis et al. 1998). It is therefore conceivable that the comorbidity of eating disorders and OC spectrum disorders may reflect the presence of a common vulnerability to both.

Limitations

The limitations of this study are evident: the cohort selected at age 19–20 cannot represent all age groups; the group is relatively small, although, if weighted for stratified sampling, it represents 2600 subjects. The longitudinal design over 20 years is loaded with an attrition rate of about 10% per interview wave (Eich et al. 2003). The period of the study (1979 to 1999) coincided with developments in the diagnostic concepts, so that it was inevitable that we used several diagnostic manuals.

Conclusions

There is substantial evidence of a clinically relevant spectrum of OCD/OCS in the general population, with a total prevalence (up to the age of 41) of 12%. One third of OCD cases received professional treatment, whereas in most cases the milder obsessive-compulsive manifestations were not seen by clinicians. Both OCD and OCS had a much better long-term prognosis than is generally assumed.

The majority of cases were comorbid, and comorbidity was accompanied by elevated distress, treatment and suicide attempt rates. Comorbidity with certain anxiety disorders (GAD, repeated panic attacks and social phobia) and with bipolar disorders was particularly strong. No association was found with substance abuse/dependence, a finding requiring further investigation because of the known comorbidity of anxiety and mood disorders with substance abuse. Further research on the time sequence of the associations is also needed.

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References

1. American Psychiatric Association (1994) Diagnostic and statistical manual of mental disorders (DSM-IV). American Psychiatric Association, Washington DC
2. Andrade L, Eaton WW, Chilcoat HD (1996) Lifetime co-morbidity of panic attacks and major depression in a population-based study: age of onset. Psychol Med 26:991–996
3. Angst J (1994) The epidemiology of obsessive compulsive disorder. In: Hollander E, Zohar J, Marazziti D, Olivier B (eds) Current insights in obsessive compulsive disorder. John Wiley & Sons, Chichester New York Brisbane, pp 99–104
4. Angst J, Dobler-Mikola A, Binder J (1984) The Zurich study – a prospective epidemiological study of depressive, neurotic and psychosomatic syndromes. I. Problem, Methodology. Eur Arch Psychiatry Neurol Sci 234:13–20
5. Angst J, Gamma A, Benazzi F, Ajdacic V, Eich D, Rössler W (2003a) Toward a re-definition of subthreshold bipolarity: epidemiology and proposed criteria for bipolar-II, minor bipolar disorders and hypomania. J Affect Disord 73:133–146
6. Angst J, Gamma A, Gastpar M, Lépine J-P, Mendlewicz J, Tylee A (2002) Gender differences in depression. Epidemiological findings from European DEPRES I and II studies. Eur Arch Psychiatry Clin Neurosci 252:201–209
7. Angst J, Gamma A, Sellaro R, Stassen HH (2003b) Diagnostic conversion from depression to bipolar disorders: results of a long-term prospective study of hospital admissions. J Affect Disord (in press)
8. Antony NN, Purdon CL, Huta V, Swinson PR (1998) Dimensions of perfectionism across the anxiety disorders. Behav Res Ther 36:1143–1154
9. Bebbington P (1998) Epidemiology of obsessive-compulsive disorder. Br J Psychiatry 173(Supplement 35):2–6
10. Bech P, Angst J (1996) Quality of life in anxiety and social phobia. Int Clin Psychopharmacol 11(Suppl 3):97–100
11. Bejerot S, Humble M (1999) Low prevalence of smoking among patients with obsessive-compulsive disorder. Comp Psychiatry 40:268–272
12. Berrios GE, Chiu H (1989) Obsessive-compulsive disorders in Cambridgeshire. A follow-up study of up to 20 years. Br J Psychiatry 154(Supplement 4):17–20
13. Bijl RV, Ravelli A, van Zerssen G (1998) Prevalence of psychiatric disorder in the general population: results of the Netherlands mental health survey and incidence study (NEMESIS). Soc Psychiatry Psychiatr Epidemiol 33:587–595
14. Bouchard C, Rheaume J, Ladouceur R (1999) Responsibility and perfectionism in OCD: an experimental study. Behav Res Ther 37:239–248
15. Boyd JH, Burke JD, Gruenberg E, Holzer CE, Rae DS, George LK, Karno M, Stoltzman R, McEvoy L, Nestadt G (1984) Exclusion criteria of DSM-III. A study of co-occurrence of hierarchy-free syndromes. Arch Gen Psychiatry 41:983–989
16. Chen YW, Dilsaver SC (1995) Comorbidity for obsessive-compulsive disorder in bipolar and unipolar disorders. Psychiatry Res 59:57–64
17. Davis C, Kapstein S, Kaplan AS, Olmsted MP, Woodside DB (1998) Obsessionality in anorexia nervosa: the moderating influence of exercise. Psychosom Med 60:192–197
18. Degonda M, Wyss M, Angst J (1993) The Zurich Study. XVIII. Obsessive-compulsive disorders and syndromes in the general population. Eur Arch Psychiatry Clin Neurosci 243:16–22
19. Derogatis LR (1983) SCL-90. Administration, scoring & procedures manual-II. For the r(evised) version and other instruments of the psychopathology rating scales series. Clinical Psychometric Research, Towson, MD (USA)
20. Dunn G, Pickles A, Tansella M, Vazquez-Barquero J-L (1999) Two-phase epidemiological surveys in psychiatry. Br J Psychiatry 174:95–100
21. Eich D, Ajdacic-Gross V, Condrau M, Huber H, Gamma A, Angst J, Rössler W (2003) The Zurich study: participation patterns and symptom checklist 90-R scores in six interviews, 1979–1999. Acta Psychiatr Scand 108(Suppl. 418):(in press)
22. Frise S, Steingart A, Sloan M, Cotterchio M, Kreiger N (2002) Psychiatric disorders and use of mental health services by Ontario women. Can J Psychiatry 47:849–856
23. Goodwin DW, Guze SB, Robins E (1969) Follow-up studies in obsessional neurosis. Arch Gen Psychiatry 20:182–187
24. Grabe HJ, Meyer C, Hapke U, Rumpf H-J, Freyberger HJ, Dilling H, John U (2000) Prevalence, quality of life and psychosocial function in obsessive-compulsive disorder and subclinical obsessive-compulsive disorder in northern Germany. Eur Arch Psychiatry Clin Neurosci 250:262–268
25. Grabe HJ, Meyer C, Hapke U, Rumpf H-J, Freyberger HJ, Dilling H, John U (2001) Lifetime-comorbidity of obsessive-compulsive disorder and subclinical obsessive-compulsive disorder in northern Germany. Eur Arch Psychiatry Clin Neurosci 251: 130–135
26. Grimshaw L (1965) The outcome of obsessional disorder. A follow-up study of 100 cases. Br J Psychiatry 111:1051–1056
27. Heyman I, Fombonne E, Simmons H, Ford T, Meltzer H, Goodman R (2001) Prevalence of obsessive-compulsive disorder in the British nationwide survey of child mental health. Br J Psychiatry 179:324–329
28. Horwath E, Weissman M (2000) The epidemiology and cross-national presentation of obsessive-compulsive disorder. Psychiatr Clin North Am 23:493–506
29. Ingram IM (1961) Obsessional illness in mental hospital patients. J Ment Sci 107:382–402
30. Jenkins R, Lewis G, Bebbington P, Brugha T, Farrell M, Gill B, Meltzer H (1997) The national psychiatric morbidity surveys of Great Britain – initial findings from the household survey. Psychol Med 27:775–789
31. Karno M, Golding JM (1991) Obsessive compulsive disorder. In: Robins LN, Regier DA (eds) Psychiatric disorders in America. The Epidemiologic Catchment Area Study. The Free Press, Macmillan, London, pp. 204–219
32. Lennkh C, Strnad A, Bailer U, Biener D, Fodor G, de Zwaan M (1998) Comorbidity of obsessive compulsive disorder in patients with eating disorders. Eat Weight Disord 3:37–41
33. Lo WH (1967) A follow-up study of obsessional neurotics in Hong Kong Chinese. Br J Psychiatry 113:823–832
34. Maggini C, Ampollini P, Gariboldi S, Cella PL, Pelizza L, Marchesi C (2001) The Pharma High School Epidemiological Survey: obsessive-compulsive symptoms. Acta Psychiatr Scand 103: 441–446
35. Maina G, Albert U, Bogetto F, Ravizza L (1999) Obsessive-compulsive syndromes in older adolescents. Acta Psychiatr Scand 100:447–450
36. Martin R, Lemos K (2002) From heart attacks to melanoma: do common sense models of somatization influence symptom interpretation for female victims? Health Psychol 21:25–32
37. Milos G, Spindler A, Ruggiero G, Klaghofer R, Schnyder U (2002) Comorbidity of obsessive-compulsive disorders and duration of eating disorders. Int J Eating Disord 31:284–289
38. Müller C (1953) Der Übergang von Zwangsneurose in Schizophrenie im Lichte der Katamnese. Schweiz Arch Neurol Psychiat 72:218–225
39. Nestadt G, Bienvenu OJ, Cai G, Samuels JF, Eaton WW (1998) Incidence of obsessive-compulsive disorder in adults. J Nerv Ment Dis 186:401–406
40. O'Connor KP (2001) Clinical and psychological features distinguishing obsessive-compulsive and chronic tic disorders. Clin Psychol Rev 21:631–660
41. Okasha A, Ragheb K, Attia AH, Seif el Dawa A, Okasha T, Ismail R (2001) Prevalence of obsessive compulsive syndrome (OCS) in a sample of Egyptian adolescents. Encéphale XXVII, 8–14
42. Pickles A, Dunn G, Vasquez-Barquero JL (1995) Screening for stratification in two-phase ('two-stage') epidemiological surveys. Statistical Methods in Medical Research 4:73–89
43. Regier DA, Narrow WE, Rae DS, Manderscheid RW, Locke BZ, Goodwin FK (1993) The de facto US mental and addictive disorders service system. Epidemiolog Catchment Area prospective 1-year prevalence rates of disorders and services. Arch Gen Psychiatry 50:85–94

44. Robins LN, Regier DA (eds) (1991) Psychiatric disorders in America. The Epidemiologic Catchment Area Study. The Free Press, New York
45. Rudin G (1953) Ein Beitrag zur Frage der Zwangskrankheit, insbesondere ihrer heriditären Beziehungen. Arch Psychiat Nervenkr 191:14–54
46. Sasson Y, Zohar J, Chopra M, Lustig M, Iancu I, Hendler T (1997) Epidemiology of obsessive-compulsive disorder: a world view. J Clin Psychiatry 58(Supplement 12):7–10
47. Silverstein B (2002) Gender differences in the prevalence of somatic versus pure depression: a replication. Am J Psychiatry 159: 1051–1052
48. Skoog G, Skoog I (1999) A 40-year follow-up of patients with obsessive-compulsive disorder. Arch Gen Psychiatry 56:121–127
49. Stein MB, Forde DR, Anderson G, Walker JR (1997) Obsessive-compulsive disorder in the community: an epidemiologic survey with clinical reappraisal. Am J Psychiatry 154:1120–1126
50. Steketee G, Chambless DL, Tran G, Q (2001) Effects of Axis I and II comorbidity on behavior therapy outcome for obsessive-compulsive disorder and agoraphobia. Compr Psychiatry 42:76–86
51. Tükel R, Polat A, Özdemir Ö, Aksüt D, Türksoy N (2002) Comorbid conditions in obsessive-compulsive disorder. Comp Psychiatry 43:204–209
52. Valleni-Basile LA, Garrison CZ, Waller JL, Addy CL, McKeown RE, Jackson KL, Cuffe SP (1996) Incidence of obsessive-compulsive disorder in a community sample of young adolescents. J Am Acad Child Adolesc Psychiatry 35:898–905
53. Wacholder S (1986) Binomial regression in GLIM: estimating risk rations and risk differences. Am J Epidemiol 123:174–179
54. Weissman MM, Bland RC, Canino GJ, Greenwald S, Hwu H-G, Lee CK, Newman SC, Oakley-Bowne MA, Rubio-Stipec M, Wickramaratne PJ, Wittchen HU, Yeh E-K (1994) The cross national epidemiology of obsessive compulsive disorder. The Cross National Collaborative Group. J Clin Psychiatry 55(Supplement 3):5–10
55. Wentz E, Gillberg C, Gillberg IC, Rastam M (2001) Ten-year follow-up of adolescent-onset anorexia nervosa: psychiatric disorders and overall functioning scales. J Child Psychol Psychiatry 42:613–622
56. Wittchen H-U (2001) Recognition and management of anxiety syndromes. Br J Psychiatry 34(Supplement):1–3
57. Wittchen H-U, Kessler RC, Zhao S, Abelson J (1995) Reliability and clinical validity of UM-CIDI DSM-III-R generalized anxiety disorder. J Psychiatr Res 29:95–110
58. Zohar AH (1999) The epidemiology of obsessive-compulsive disorder in children and adolescents. Child & Adolescent Psychiatric Clin North America 8:445–460