

# Obsessive–compulsive disorder in the community: 12-month prevalence, comorbidity and impairment

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## Abstract

**Background** Although subthreshold conditions are associated with impairment in numerous disorders, research on obsessive–compulsive disorder (OCD) below the diagnostic threshold of DSM-IV in the general population is limited.

**Purpose** To estimate the DSM-IV 12-month prevalence, comorbidity and impairment of OCD, subthreshold OCD (i.e., fulfilling some but not all core DSM-IV criteria), and obsessive–compulsive symptoms (OCS) (i.e., endorsement of OCS without fulfilling any core DSM-IV criteria) in a general population sample.

**Methods** Data from the German National Health Interview and Examination Survey–Mental Health Supplement ( $N = 4181$ , age 18–65 years), based on the standardized diagnostic Munich Composite International Diagnostic Interview.

**Results** The 12-month prevalence of OCD was 0.7%, subthreshold OCD was 4.5%, and OCS was 8.3%. Subjects in all three groups showed higher comorbidity (odds ratios [ORs]  $\geq 3.3$ ), compared to those without OCS. The OCD,

subthreshold OCD and OCS were all associated with increased odds of substance abuse/dependence-, mood-, anxiety- and somatoform disorders, with especially strong associations with possible psychotic disorder (ORs  $\geq 4.1$ ) and bipolar disorders (ORs  $\geq 4.7$ ). Participants in all three groups showed higher impairment (ORs  $\geq 3.1$ ) and health-care utilization (ORs  $\geq 2.4$ ), compared to those without OCS, even after controlling for covariates.

**Conclusions** Individuals with subthreshold OCD and OCS, not currently captured by DSM-IV OCD criteria, nevertheless show substantial comorbidity, impairment and health-care utilization. This should be taken into account in future conceptualization and classification of OCD and clinical care.

**Keywords** Obsessive–compulsive disorder · Obsessive–compulsive symptoms · Epidemiology · Mental disorder · Cross-sectional survey

## Introduction

Obsessive–compulsive disorder (OCD) is one of the ten most debilitating conditions among all physical and mental diseases worldwide [38]. According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) [1] the core clinical features of OCD are obsessions and/or compulsions. Obsessions are persistent thoughts, impulses, or images that are experienced as intrusive and inappropriate and cause anxiety or distress. Compulsions include repetitive behaviors or mental acts performed in response to obsessions and are aimed at preventing or reducing the distress or some dreaded outcome. Those afflicted with OCD often have difficulty suppressing such thoughts or behaviors, although they

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**Table 1** Previous epidemiological studies estimating impairment and health care use in subjects with subthreshold OCD

Study	Sample	Instrument	Interviewer	Prevalence rates	Definition of subthreshold OCD
Transitions in alcohol consumption and smoking Grabe et al. [23]	4,075 (Age 18–64)	DSM-IV; DIA-X/ M-CIDI	Lay	Lifetime: OCD 0.5% Subthreshold OCD 2% 12-Month: OCD 0.39% Subthreshold OCD 1.6%	The presence of OC symptoms of DSM-IV <sup>a</sup> + at least one criterion of the DSM-IV criteria A, B, C for OCD is affirmed <sup>b</sup>
The Zurich study Angst et al. [2]	591 (Age 20–40)	DSM-IV; SPIKE	Psychiatrist/clinical psychologist	Lifetime: OCD 3.5% Subthreshold OCD 8.7%	The presence of OC symptoms of DSM-IV <sup>a</sup> + moderate distress (29–49 on the analogue scale 0–100)
The Netherlands Mental Health Survey and Incidence Study (NEMESIS) de Bruijn et al. [9]	7,076 (Age 18–64)	DSM-III-R; CIDI	Lay	Lifetime: OCD 0.9% Subthreshold OCD 4.9%	The presence of OC symptoms of DSM-III-R <sup>a</sup> + at least criterion A is affirmed <sup>c</sup>

*CIDI* The Composite International Diagnostic Interview; *DIA-X/M-CIDI* The Munich Composite International Diagnostic Interview; *DSM-III-R* Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised; *DSM-IV* Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; *OC* obsessive–compulsive; *OCD* obsessive–compulsive disorder; *SPIKE* The Structured Psychopathological Interview and Rating of the Social Consequences for Epidemiology

<sup>a</sup> For example, thoughts of violence, contamination, doubt, or behaviors such as washing, checking, ordering, and hoarding

<sup>b</sup> The DSM-IV OCD criteria: criterion A (Obsessions: The symptoms are recognized as a product of the own mind, are recurrent and persistent and not simply excessive worries about real life problems; the person attempts to ignore, suppress or neutralize them. Compulsions: Repetitive behaviors or mental acts in response to an obsession or according to rules, which are aimed at preventing or reducing distress or dreaded events (even though this response is excessive or connected to the obsession in an unrealistic way), criterion B (The person recognizes the symptoms are excessive or unreasonable), criterion C (The symptoms are time consuming—at least 1 h per a day—or cause a substantial impairment or distress)

<sup>c</sup> The DSM-III-R OCD criterion A (The symptoms are repetitive or recurrent and the person recognizes the symptoms are excessive or unreasonable)

usually recognize that the obsessions or compulsions are unreasonable and excessive [1].

Recent epidemiological and clinical population studies suggest that subthreshold mental disorders, which by definition do not fulfill all of the required criteria of a given diagnosis, are common [26, 34, 35, 49]. These subthreshold mental conditions are not benign or simply diagnostic artifacts. Instead, individuals who endorse subthreshold conditions are likely to suffer from substantial comorbidity and impairment [34, 49]. Despite mounting evidence of the pernicious effects of subclinical conditions in general, the understanding of such issues in OCD is limited [2]. To date, only three studies (see Table 1) have examined impairment and health care utilization in relation to subthreshold conditions of OCD, defined as fulfilling at least one but not all core DSM-III-R/IV criteria [9, 23] or defined as the presence of obsessive–compulsive symptoms (OCS) according to DSM-IV as well as moderate distress [2]. These studies have found that the 12-month prevalence of subthreshold OCD was more frequent (0.6–4.9%) [3, 9,

22, 53] than that of threshold OCD (0.3–3.0%) [2, 7, 9, 23, 31, 37, 50, 53, 57] in the general population and that the subthreshold conditions are strongly associated with more comorbidity, poorer functioning at work or in social activities and a greater use of health-care services [2, 3, 9, 22, 23].

It remains an open question whether these negative effects are associated with the presence of any subthreshold OCS or if a certain critical level of symptomatology must be achieved before the negative affects occur. Extant studies have documented that the phenomenon of OCS without further sub-clinical features does indeed exist and with substantial prevalence rates in the general population. Nestadt and colleagues [40] estimated the 1-month prevalence rate of OCS at 1.5% in the Eastern Baltimore Mental Health Survey sample. This rather low rate may be based on the fact that the questions on OCS in the diagnostic interview applied in this study covered only three potential obsessions and compulsions, and, moreover, the features were only counted as OCS if they did ‘occur against

conscious resistance'. In contrast, the 1-month prevalence of obsessions or compulsions in a Canadian community sample was 26.2 and 22.2%, respectively [53]. In the Zurich study [14], 29.8% of young adult subjects endorsed OCS at least once during the longitudinal study period of 10 years. Likewise, the lifetime prevalence of OCS was 28.2% in the National Comorbidity Survey Replication (NCSR) sample [50]. The clinical importance of OCS without further sub-clinical features (i.e. none of the core DSM-III-R/IV criteria is fulfilled) remains largely unknown despite documentation of such substantial prevalence rates. Two studies by Fullana and colleagues [20, 21] reported that the presence of OCS dimensions (i.e., contamination, symmetry/ordering, harm/checking, etc.) was associated with an increased risk of most mental disorders other than OCD. Nevertheless, to our knowledge, no epidemiological study has examined the differences in sociodemographic risk indicators, comorbidity and impairment across the various degrees of symptomatology (i.e., full-blown OCD, subthreshold OCD and OCS) using DSM-IV criteria for OCD in a general population sample in the same study.

In the current paper, we address these open issues using data from the German Health Interview and Examination Survey and its Mental Health Supplement. Extending the prevalence findings reported by Jacobi et al. [29], the purposes of this study are to determine the 12-month prevalence of DSM-IV-defined OCD, subthreshold OCD (i.e., fulfilling at least one but not all core DSM-IV criteria) and OCS (i.e., endorsement of at least one obsessive or compulsive symptom without fulfilling any of the core DSM-IV criteria) and to examine how these varying levels are associated with sociodemographic characteristics, comorbid other mental disorders, current impairment, and health-care utilization in the general population.

## Materials and methods

### Design and sample

Data were taken from the German Health Interview and Examination Survey, Mental Health Supplement (GHS-MHS). The GHS-MHS assessed a subsample of the German Health Survey (GHS), the first nationwide cross-sectional study in Germany for medical and social assessments, commissioned by the German Ministry of Science, Research and Education and the Robert Koch Institute and authorized by the relevant institutional review board and ethics committee. The GHS (core study) was designed to collect data on somatic disorders, impairments, healthcare utilization and sociodemographic characteristics in a representative sample of 7,124 subjects aged 18–79 living in Germany in 1997 (response rate: 61.4%). The

sample was drawn from population registries of 113 communities throughout Germany with 130 sampling sites. For financial and logistical reasons the data for mental disorders were gathered using a two-stage design. The first stage entailed the administration of a 12-item screening questionnaire for mental disorders (CID-S) [60] at the end of the medical examination of the core study (GHS). The second stage involved the separate administration of the computer-assisted version of the Munich Composite International Diagnostic Interview (DIA-X/M-CIDI) to all core survey respondents who screened positive for a mental disorder and to a random sample of 50% who screened negative. This second stage forms the GHS-MHS and covers a subsample of the GHS ( $N = 4181$ ; aged 18–65; conditional response rate: 87.6%). Due to the resulting oversampling of positive screenings, data were weighted in later analyses. Written informed consent was obtained for the GHS and the GHS-MHS. Detailed description of aims, design, and methods of the GHS has been described elsewhere [28].

### Assessment

The diagnostic assessments were based on the DIA-X/M-CIDI. The DIA-X/M-CIDI is a fully structured interview, a modified version of the World Health Organization CIDI (version 1.2; WHO, 1997), supplemented by questions to cover DSM-IV and ICD-10 criteria. The DIA-X/M-CIDI allows the assessment of symptoms, syndromes and diagnoses of mental disorders along with information about onset, duration, and clinical/psychological severity. The clinical interviewers were trained psychologists and physicians. Diagnostic findings reported in this paper were obtained using the DIA-X/M-CIDI diagnostic algorithms [44]. All subsequent analyses were performed for 12-month criteria. The test-retest reliability of the full DIA-X/M-CIDI was good with kappa values ranging between 0.56 and 0.81 [61]. For the OCD, the test-retest reliability with an average time interval of 38 days between interviews, investigating in a general population sample of 60 subjects was found to be excellent ( $\kappa = 0.81$ ) [61]. The validity of the DIA-X/M-CIDI OCD diagnoses compared to diagnoses from independent treating physicians in a sample of 68 randomly chosen patients was also excellent ( $\kappa = 0.91$ ). The sensitivity was 100%, while the specificity was 98.4% [47].

### Assessment of OCD

The DIA-X/M-CIDI-OCD module consists of two parts: one for the assessment of obsessions, and one for the assessment of compulsions. The obsession section begins with a stem question in order to scan a wide range of

potential thoughts and cognitions presented in the form of a symptom list (“During the last 12 months, have you been bothered by having certain unpleasant thoughts or images like recurrent arbitrary thoughts, such as the idea that your hands are dirty or have germs on them?” [yes or no]). The rest of the obsession section is skipped entirely if the respondent answers no. If respondents acknowledge at least one item, they are subsequently asked for the mandatory DSM-IV criteria before providing information on the age of onset and last occurrence. In the subsequent section on compulsions, three stem questions are again presented to assess whether he or she had engaged in repetitive behaviors (“doing something like washing hands over and over again” [yes or no] or “checking several times whether the door is locked” [yes or no]) or mental acts (“counting something like tiles in a floor” [yes or no]). This second part of the OCD section is also skipped when the respondent answers no. Respondents, who acknowledge at least one of these stem questions, are then asked for the remaining mandatory criteria A (diagnostic details of obsessions and compulsions), B (recognition that the obsessions or compulsions are excessive or unreasonable), and C (causes distress or dysfunction).

Based on the respondents’ responses from the DIA-X/M-CIDI-OCD section, this paper splits the sample into four mutually exclusive groups:

- (a) OCD: the subject met full DSM-IV criteria A, B, and C for OCD.
- (b) Subthreshold OCD: The subject affirmed at least one of the stem questions for obsessive or compulsive symptoms, and fulfilled at least one of the DSM-IV diagnostic criteria A, B or C, but not full DSM-IV criteria.
- (c) OCS: The subject affirmed at least one of the stem questions for obsessive or compulsive symptoms, but did not fulfill any of the DSM-IV criteria A, B or C.
- (d) No OCS: the subject did not affirm any of the stem questions for obsessions or compulsions.

#### Sociodemographic correlates

The following sociodemographic correlates of DSM-IV OCD, subthreshold OCD and OCS were examined: gender, age, marital status, working status, and social class. The assessment of social class was based on the Winkler Index [59]. The Winkler Index uses information about educational level, monthly net household income, and occupational position as indicators for social class. Each indicator ranges from 1 (the lowest status) to 7 (the highest status). The total index (Winkler Index) values can therefore range between 3 and 21 points. Based on the total index values, three social classes were defined: (1) low (from 3 to 8

points), (2) middle (from 9 to 14 points), and (3) high (from 15 to 21 points).

#### Associations between OCD and other mental disorders

The following DSM-IV mental disorders were used for comorbidity analyses: any mental disorder due to general medical conditions; substance use disorders (alcohol abuse/dependence, nicotine dependence, illicit substance abuse/dependence); possible psychotic disorder (In the DIA-X/M-CIDI, possible psychotic disorder included the experience of psychotic symptoms of delusions or hallucinations combined with speaking to a doctor about the symptoms); mood disorders (major depressive disorder, dysthymia, bipolar disorders); anxiety disorders (panic disorder with and without agoraphobia, agoraphobia without panic disorder, social phobia, simple phobias, phobic disorder not otherwise specified (NOS), generalized anxiety disorder); somatoform disorders (somatization disorder, undifferentiated somatoform disorder, somatic symptom index (SSI) 4/6, pain disorder, hypochondriasis); and eating disorders (anorexia nervosa, atypical anorexia nervosa, bulimia nervosa, atypical bulimia nervosa, for definition see Table 3).

#### Impairment and health-care utilization

Current impairment was assessed by asking the respondent whether he or she was completely or partially unable to carry out daily activities (function at work, in school or in family), because of psychological problems in the 4 weeks before the interview took place [yes or no]. Health-care utilization was evaluated by asking the respondent whether he or she had ever received at least a minimal intervention for any of his or her mental health conditions (i.e., “having ever sought any kind of treatment because of psychological problems or having been recommended by a doctor to seek any psychological or psychiatric treatment” [yes or no]).

#### Statistical analyses

The data were weighted for age, gender, community distribution, and screening status in order to address different sampling probabilities and systematic non-response [28]. Statistical analyses were calculated using the STATA software package, version 10.0 [51], and the Huber-White sandwich matrix was applied for robust estimates of confidence intervals in case of weighted data [48]. Logistic regression (odds ratio [OR] with 95% confidence intervals [CI]) was used to examine associations between OCD, subthreshold OCD, OCS and covariates (sociodemographic characteristics, comorbid mental disorders, impairment, and health-care utilization). Throughout the paper, a *p* value

<0.05 was considered as statistically significant. All comparisons were controlled for age and gender.

## Results

### 12-month prevalence of OCD, subthreshold OCD and OCS

The 12-month prevalence rate for OCD was 0.7% (95% CI = 0.4–1.1; weighted number [Nw] = 30), for subthreshold OCD 4.5% (95% CI = 3.8–5.2; Nw = 188), and for OCS 8.3% (95% CI = 7.4–9.2; Nw = 346). Thus, in the total sample 13.5% (95% CI = 12.3–14.7%; Nw = 564) of the 4,181 subjects reported having experienced at least one OC symptom in the last 12 months. In the total sample, 86.5% (95% CI = 83.7–89.4;

Nw = 3,617) of the respondents reported no OCS during the last 12 months.

### Sociodemographic correlates

No associations were found between OCD and gender, age, marital, employment status, and social class (Table 2). The 12-month prevalence rates of subthreshold OCD and OCS were lower in the older age group (50–65 years) compared to the younger age group (18–34 years) (subthreshold OCD: OR = 0.4, 95% CI = 0.3–0.8; OCS: OR = 0.6, 95% CI = 0.4–0.9). The 12-month prevalence rates of OCS were higher in the separated, divorced, or widowed subjects group, when compared to those who were married (OR = 1.6, 95% CI = 1.1–2.4). No socio-demographic correlates were found for subthreshold OCD and OCS with gender, employment status and social class.

**Table 2** Sociodemographic correlates of OCD, subthreshold OCD and OCS (12-month prevalences if correlate present [weighted data])

	OCD ( <i>n</i> = 30)			Subthreshold OCD ( <i>n</i> = 188)			OCS ( <i>n</i> = 346)		
	%	OR <sup>a</sup>	95% CI	%	OR <sup>a</sup>	95% CI	%	OR <sup>a</sup>	95% CI
<b>Gender</b>									
Male	0.6	1.0		4.0	1.0		7.9	1.0	
Female	0.9	1.6	(0.7–3.3)	5.0	1.2	(0.9–1.8)	8.7	1.1	(0.8–1.5)
<b>Age</b>									
18–34 years	0.7	1.0		5.7	1.0		9.7	1.0	
35–49 years	0.9	1.3	(0.5–2.9)	4.7	0.8	(0.5–1.2)	8.6	0.8	(0.6–1.2)
50–65 years	0.5	0.7	(0.3–1.8)	2.9	0.4*	(0.3–0.8)	6.3	0.6*	(0.4–0.9)
<b>Marital status</b>									
Married	0.5	1.0		3.9	1.0		7.6	1.0	
Single	0.9	1.7	(0.6–4.9)	6.5	1.4	(0.9–2.3)	8.5	0.8	(0.6–1.3)
Separated/divorced/widowed	1.4	2.5	(0.9–6.4)	4.1	1.0	(0.6–1.8)	11.7	1.6*	(1.1–2.4)
<b>Employment status</b>									
Fulltime	0.7	1.0		4.2	1.0		7.9	1.0	
15–34 h/week	0.7	0.6	(0.1–3.2)	6.8	1.6	(0.9–3.0)	7.8	0.9	(0.6–1.7)
<15 h/week	0	–	–	4.8	1.1	(0.5–2.6)	9.8	1.2	(0.6–2.5)
Retired	0.6	0.6	(0.1–2.4)	3.3	1.0	(0.4–2.3)	5.9	0.9	(0.5–1.7)
School/student	0.9	1.2	(0.3–4.4)	5.1	0.9	(0.5–2.0)	8.4	0.8	(0.5–1.5)
Unemployed	1.1	1.2	(0.3–5.2)	3.1	0.7	(0.3–1.7)	9.5	1.2	(0.8–2.1)
Homemaker	0.6	0.5	(0.1–2.1)	4.9	1.1	(0.6–2.2)	9.8	1.2	(0.8–2.0)
<b>Social class<sup>b</sup></b>									
Low	1.1	1.0		5.5	1.0		9.1	1.0	
Middle	0.7	0.6	(0.2–1.5)	4.4	0.7	(0.5–1.2)	8.1	0.8	(0.6–1.2)
High	0.4	0.3	(0.1–1.2)	4.2	0.7	(0.4–1.3)	8.1	0.9	(0.6–1.4)

CI confidence intervals, OCD obsessive–compulsive disorder, OCS obsessive–compulsive symptoms, OR odds ratios from logistic regression adjusted for age and gender

\*  $p < 0.05$

<sup>a</sup> All three groups were compared with No OCS separately for logistic regression

<sup>b</sup> Based on ‘Index of social class’ (Winkler and Stolzenberg [59]) derived from information on education, income and occupational position. Each indicator ranges from 1 (the lowest status) to 7 (the highest status). The total index values can take between 3 and 21 points. Three social classes were defined based on the total values: Low (from 3 to 8), Middle (from 9 to 14 points), and High (from 15 to 21 points)

## 12-month comorbidity with other mental disorders

Higher rates of comorbidity were found for almost all of the assessed DSM-IV mental disorders in subjects with OCD, subthreshold OCD and OCS as compared to subjects with No OCS (see Table 3). At least one mental disorder other than OCD was assessed in 89.2% of the subjects with OCD, 65.9% of the subjects with subthreshold OCD, and 61.2% of the subjects with OCS. It was seen that OCD, subthreshold OCD and OCS were all associated with elevated odds for having at least one mental disorder other than OCD, when compared to the No OCS group.

Not only OCD, but also subthreshold OCD and OCS were associated with elevated odds for substance abuse/dependence, mood, anxiety disorders, and somatoform disorders/syndromes when compared to the No OCS group. In addition, OCD, subthreshold OCD and OCS were all associated with increased odds of the presence of possible psychotic disorder and bipolar disorder, compared to No OCS.

## Impairment and health-care utilization

The subjects in the OCD, subthreshold OCD and OCS groups showed increased rates of impairment (Table 4), with endorsements of 60.1, 19.9, and 21.1%, respectively. The OCD, subthreshold OCD and OCS were associated with elevated odds for impairment compared to the No OCS group. Importantly, OCD and OCS were associated with impairment even after adjusting for age, gender and mental disorders other than OCD.

Considerable rates of health-care utilization were also found in the OCD, subthreshold OCD and OCS groups, with endorsement of having ever used health-care because of mental problems in 68.2, 36.3, and 36.6%, respectively (see Table 4). The OCD, subthreshold OCD and OCS were again associated with elevated odds for health-care utilization compared to No OCS. Finally, the association between health-care utilization and OCS, but not OCD or subthreshold OCD, remained significant when adjusting for gender, age and mental disorders other than OCD.

## Discussion

Using data from a representative population sample that was assessed with a well-established standardized diagnostic interview, we examined the 12-month prevalence of OCD, subthreshold OCD and OCS and their associations with sociodemographic characteristics, comorbid other mental disorders, current impairment, and health-care utilization. Unlike previous research, we divided the subthreshold groups into two groups that varied by severity

(i.e., endorsing at least one symptom of obsessions or compulsions vs. endorsing at least one symptom plus one of the core DSM-IV criteria). By demonstrating the impact of OCS, our results added important evidence to previous research on subthreshold OCD. It has been argued that OCD should be defined using less restrictive criteria because subthreshold OCD might better describe the clinical reality of individuals who suffer from this symptomatology [23, 52]. Our findings suggest that OCS without further sub-clinical features is indeed clinically meaningful, both in its own right and in the extremely common presentation with comorbid conditions.

The 12-month prevalence of OCD found in this study (0.7%) corresponds to previous studies conducted on the general population, with ranges from 0.3 to 3.0% [2, 7, 9, 23, 31, 37, 50, 53, 57]. Twelve-month prevalence rates of 0.6 to 4.9% for subthreshold OCD that fulfill some but not all the required DSM-IV criteria of threshold OCD (4.5%) is likewise consistent with previous studies [3, 9, 22, 53]. In our effort to further scrutinize subthreshold OCD conditions, we examined OCS without further OCD features and found a 12-month prevalence of 8.3%. It is important to highlight that our OCS definition differed from previous research on subthreshold OCS, as these studies required the endorsement of further (sub) threshold OCD features.

The overall 12-month prevalence of individuals who report experiencing at least one OC symptom was 13.5% in this representative sample. This is in accordance with the OCS dimensions study by Fullana and colleagues [21] (13%). However, our finding is considerably lower than the prevalence of OCS examined in Switzerland (lifetime 29.8%) [14], in the USA (lifetime 28.2%) [50], and in Canada (1-month 22.2–26.2%) [53], while it is higher than the finding from the study by Nestadt and colleagues [40] (1-month 1.5%) in the USA. Methodological differences across the studies is likely to account for these varying rates. Previous studies have utilized different diagnostic criteria (i.e., DSM-III OCD criteria versus DSM-IV OCD), time frames, instruments, and sampling methods. According to Fontenelle and colleagues [19] the majority of socio-demographic features and core phenomenological symptoms of OCD were relatively independent of geographic, ethnic and cultural differences across samples from Brazil, North-, Latin America, Europe, Africa and Asia. Nevertheless, the interpretation of prevalence differences between countries is difficult [5] because of the paucity of studies that examine OCD across cultures [19].

We did not find gender differences regarding the 12-month prevalence rates of OCD, subthreshold OCD, and OCS, which is supported by several studies [8, 9, 31], but contradictory to some reports of gender differences in the prevalence of subthreshold OCD [23] or OCS [14, 21].

**Table 3** 12-month prevalences of other DSM-IV disorders in OCD, subthreshold OCD and OCS (weighted data)

DSM-IV disorder	OCD ( <i>n</i> = 30)			Subthreshold OCD ( <i>n</i> = 188)			OCS ( <i>n</i> = 346)			No OCS ( <i>n</i> = 3,617) %
	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI	
Mental disorder due to general medical condition	6.1	5.5* <sup>h</sup>	(1.1–25.8)	1.6	1.5	(0.5–4.6)	3.3	3.1*	(1.6–6.2)	1.1
Any substance abuse/dependence <sup>a</sup>	30.0	3.3*	(1.5–7.3)	24.5	2.3*	(1.5–3.5)	22.7	2.1*	(1.6–2.9)	11.6
Alcohol abuse/dependence	14.1	6.3*	(2.2–18.1)	11.3	4.1*	(2.2–7.6)	9.8	3.5*	(2.2–5.6)	3.1
Nicotine dependence	23.1	2.9*	(1.2–6.8)	16.4	1.7*	(1.1–2.8)	17.2	1.9*	(1.4–2.7)	9.2
Any illicit substance abuse/dependence	1.9	2.7 <sup>h</sup>	(0.3–21.0)	2.0	2.6	(0.7–8.9)	1.2	1.7	(0.6–4.9)	0.6
Possible psychotic disorder <sup>b</sup>	39.3	39.8*	(18.7–84.8)	6.5	4.1*	(2.1–8.3)	7.3	4.7*	(2.9–8.0)	1.6
Any mood disorder <sup>c</sup>	69.0	21.3*	(9.5–47.8)	29.6	4.0*	(2.8–5.9)	23.8	3.0*	(2.3–4.1)	9.4
Major depressive disorder	45.4	10.8*	(5.2–22.2)	22.8	3.9*	(2.6–5.9)	18.6	3.0*	(2.2–4.3)	6.9
Dysthymic disorder	42.5	23.7*	(11.2–50.2)	10.9	4.0*	(2.3–7.0)	11.0	4.0*	(2.7–6.0)	3.2
Any bipolar disorder	10.0	22.6*	(6.3–80.9)	4.1	8.2*	(3.4–19.7)	2.3	4.7*	(2.0–11.2)	0.4
Any anxiety disorder other than OCD <sup>d</sup>	66.8	16.4*	(7.4–36.2)	39.0	5.2*	(3.7–7.4)	29.5	3.4*	(2.6–4.6)	11.0
Panic disorder with/without agoraphobia	23.7	18.5*	(8.0–42.9)	4.3	2.7*	(1.3–5.7)	7.4	5.0*	(3.0–8.4)	1.6
Agoraphobia without panic disorder	8.4	6.5*	(1.8–24.1)	7.0	6.0*	(3.2–11.3)	6.1	5.2*	(3.1–8.8)	1.3
Panic attack	33.9	14.2*	(6.4–31.3)	11.1	3.5*	(2.2–5.9)	12.4	4.1*	(2.7–6.1)	3.4
Social phobia	32.7	32.1*	(13.9–74.1)	4.4	2.9*	(1.3–6.7)	4.1	2.8*	(1.6–5.1)	1.4
Any simple phobia <sup>e</sup>	28.8	5.9*	(2.8–12.5)	23.4	4.7*	(3.1–7.1)	15.1	2.7*	(1.9–4.0)	5.9
Phobic disorder NOS	11.5	4.1*	(1.4–12.3)	9.5	3.6*	(2.0–6.4)	5.6	2.0*	(1.2–3.4)	2.8
Generalized anxiety disorder	21.1	25.9*	(10.7–62.8)	4.1	4.3*	(1.9–9.9)	3.1	3.2*	(1.6–6.4)	1.1
Any somatoform disorder/syndrome <sup>f</sup>	51.8	10.4*	(4.8–22.7)	20.4	2.5*	(1.7–3.8)	20.7	2.6*	(1.9–3.6)	9.3
SSI 4/6	12.4	3.7*	(1.3–10.7)	9.3	2.8*	(1.6–5.1)	7.7	2.3*	(1.5–3.6)	3.7
Pain disorder	47.2	11.9*	(5.4–26.5)	13.1	2.0*	(1.2–3.2)	15.2	2.4*	(1.7–3.5)	6.9
Hypochondriasis	0	–	–	0.4	22.8* <sup>h</sup>	(1.4–348.7)	0.3	16.1* <sup>h</sup>	(1.04–249.7)	0.02
Any eating disorder <sup>g</sup>	1.7	6.2 <sup>h</sup>	(0.7–48.5)	0.5	1.6 <sup>h</sup>	(0.3–7.8)	1.2	4.3*	(1.2–15.4)	0.2
Any of above	89.2	16.8*	(5.1–55.9)	65.9	3.9*	(2.8–5.7)	61.2	3.3*	(2.5–4.3)	32.1

CI confidence intervals; *DSM-IV* Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; *OCD* obsessive–compulsive disorder; *OCS* obsessive–compulsive symptoms; *OR* odds ratios from logistic regression adjusted for age and gender, ‘No OCS’ as a reference group

\*  $p < 0.05$

<sup>a</sup> With nicotine dependence

<sup>b</sup> In the DIA-X/M-CIDI, possible psychotic disorder included the experience of psychotic symptoms of delusions or hallucinations combined with speaking to a doctor about the symptoms

<sup>c</sup> Major depressive disorder, dysthymic disorder, bipolar I disorder, bipolar II disorder, single hypomanic episode

<sup>d</sup> Panic disorder with/without agoraphobia, agoraphobia without panic disorder, social phobia, any simple phobia, phobic disorder not otherwise specified (NOS), generalized anxiety disorder

<sup>e</sup> Animal, natural environment, blood-injection-injury, situational type

<sup>f</sup> Somatization disorder, undifferentiated somatization disorder, somatic symptom index SSI 4/6 (according to Escobar et al. [16] four somatoform symptoms for males and six for females), pain disorder, hypochondriasis

<sup>g</sup> Anorexia nervosa, atypical anorexia nervosa (all DSM-IV criteria for anorexia are met except D or all are met except A, but BMI <18.5), bulimia nervosa, atypical bulimia nervosa (all DSM-IV criteria for Bulimia met, except C criteria or except B criteria)

<sup>h</sup> These associations are based on a small number of comorbid cases ( $\leq 2$ )

Consistent with the previous epidemiological and clinical studies that reported decreased prevalence rates of DSM-IV OCD in the elderly [8, 18, 37, 50, 57], our subjects in the older age group (age: 50–65 years) showed a lower prevalence rate of subthreshold OCD and OCS compared to the younger age group (age: 18–34 years).

We were able to replicate previously reported strong associations between OCD and substance abuse/dependence [9, 50], mood [8, 10, 22, 31, 50, 57], anxiety [2, 8, 9, 22, 31, 50, 57] and somatoform disorders [22]. In addition, we also found strong associations between subthreshold OCD and these same disorders consistent with previous

**Table 4** Impairment and health-care utilization in OCD, subthreshold OCD and OCS (weighted data)

	OCD ( <i>n</i> = 30)			Subthreshold OCD ( <i>n</i> = 188)			OCS ( <i>n</i> = 346)			No OCS ( <i>n</i> = 3,617) %
	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI	
Impairment <sup>a</sup>	60.1			19.9			21.1			7.2
Adjusted for gender and age		19.0*	(9.0–40.2)		3.1*	(2.0–4.7)		3.4*	(2.5–4.6)	OR = 1.0
Adjusted for gender, age and comorbid disorders <sup>b</sup>		3.8*	(1.1–12.6)		1.4	(0.9–2.3)		1.9*	(1.3–2.8)	OR = 1.0
Health-care utilization <sup>c</sup>	68.2			36.3			36.6			19.5
Adjusted for gender and age		8.8*	(4.0–19.5)		2.4*	(1.7–3.4)		2.4*	(1.9–3.2)	OR = 1.0
Adjusted for gender, age and comorbid disorders <sup>b</sup>		2.1	(0.8–5.4)		1.3	(0.9–2.0)		1.5*	(1.1–2.1)	OR = 1.0

CI confidence intervals; OCD obsessive–compulsive disorder; OCS obsessive–compulsive symptoms; OR odds ratios from logistic regression, ‘No OCS’ as a reference group

\*  $p < 0.05$

<sup>a</sup> Based on the items of disability days (complete or partial) (yes/no)

<sup>b</sup> Comorbid disorders include mental disorder due to general medical condition, any substance abuse/dependence, possible psychotic disorder, any mood disorder, any anxiety disorder other than OCD, any somatoform disorder/syndrome, any eating disorder

<sup>c</sup> Presented in form of a variable ‘at least minimal intervention’: a combination of questions for “Having ever sought any psychological or psychiatric treatment due to mental problems or been recommended by a doctor to do so” (yes/no)

research [2, 3, 9, 22]. Unlike most studies, however, we additionally examined the association between OCS and these disorders. Results suggest that the mere presence of OCS is associated with increased odds for having substance, mood, anxiety, and somatoform disorders in the subjects with OCS compared to subjects with No OCS.

Consistent with clinical studies that have documented frequent comorbidity between OCD and bipolar disorders [25, 33, 35, 42, 43], this sample revealed strong associations between bipolar disorders and OCD, subthreshold OCD and OCS (ORs  $\geq 4.7$ ). The association between bipolar disorders and the varying definitions of OCD was stronger than the association between the OCD definitions and major depression. This is compatible with previous reports that found a higher co-occurrence of OCD and bipolar disorders than OCD and major depression in the ECA study [6] and in the Zurich study [3].

Of special interest is our finding of the strong association between possible psychotic disorder with OCD, subthreshold OCD and OCS groups (ORs  $\geq 4.1$ ). Our finding showed that 39.3% of the subjects with OCD, 6.5% of the subjects with subthreshold OCD, and 7.3% of the subjects with OCS met diagnostic criteria of possible psychotic disorder. The frequent co-occurrence of OCD and psychotic disorders are well documented in epidemiological and clinical studies [4, 9, 16, 17, 27, 39, 41, 45, 46, 55]; and possible pathophysiological overlapping between OCD and psychotic disorders has been suggested [24, 56]. Nevertheless, in a study by de Haan and colleagues [12] psychotic disorders were present in only 1.7% of patients with OCD, and De Haan and colleagues [13] suggested that treatment of psychosis induces OCS or OCD in some patients with a primary diagnosis of psychosis. Indeed,

using a prospective longitudinal design, de Haan and colleagues [11] found that severity of OCS was associated with duration of antipsychotic treatment using olanzapine in hospitalized young patients with psychosis. There is also a case report in which OCS arose during the use of antipsychotic in a non-psychotic, bipolar patient [30]. On the other hand, van Nimwegen and colleagues [58] demonstrated a significant and clinically relevant decrease in the presence of OCS with antipsychotic treatment in a 6-week, randomized and double-blind multi-center study in young in- and outpatients with psychosis. De Haan and colleagues [11] suggested that genetic variation in patients with schizophrenia might be related to increase or decrease in OCS during antipsychotic treatment. Future epidemiological and clinical studies should scrutinize the relationship of these disorders in more detail.

Finally, our findings are consistent with previous studies that found strong impairment and frequent use of health-care in subjects with OCD [3, 23, 32, 50, 54, 57] and in subjects with subthreshold OCD [2, 9, 23]. Moreover, we additionally found that the presence of OCS alone has considerable impact on impairment and health-care utilization. Importantly, the associations between OCS and impairment and health-care utilization remained significant, even after adjusting for comorbid mental disorders.

The findings of this paper should be interpreted in light of several limitations. First, although the GHS-MHS examined a wide range of mental disorders, several disorders that are supposed to be related to OCD were not included, such as several OC spectrum disorders (e.g. body dysmorphic disorder, pathologic grooming habits, and impulse control disorders). Second, the GHS-MHS data are based on the respondents’ self-reports and are based on



their recollections; recall bias could have influenced in some cases the accuracy of information (e.g. impairment, health-care utilization). Third, health-care use was measured for lifetime, while diagnoses covered the previous 12 months. Fourth, as the number of subjects with DSM-IV OCD was small ( $N = 38$ ), some cells in the analyses of comorbidity were very small.

In spite of these limitations, our findings suggest that subjects not only with subthreshold OCD but also with only OCS, both not currently captured by DSM-IV OCD criteria, nevertheless show substantial comorbidity, impairment and health-care utilization. This should be taken into account in future conceptualization and classification of OCD (DSM-V and ICD-11). Moreover, this may have implications for clinical practice, in a way that even subjects with OCS only may require attention. Finally, future studies that focus on subjects with OCS only are highly warranted to increase our understanding of this condition.

Taken together, the strong associations obtained in our study between the presence of subthreshold OCD, OCS and comorbidity, impairment, or health-care utilization suggest that the presence of the full spectrum from OCS through full diagnostic OCD has important implications for the diagnosis, intervention, and quality of life of those affected.

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