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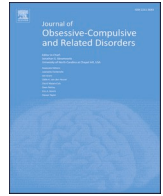
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The relationship between eating disorders and OCD symptom dimensions: An explorative study in a large sample of patients with OCD

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ABSTRACT

Objectives: This study aimed to describe lifetime and current rates of occurrence of comorbid eating disorders (ED) in a large clinical OCD sample, and to investigate whether comorbid ED in OCD (OCD+ED) are associated with specific demographic, somatic or clinical characteristics.

Method: Data were obtained from the Netherlands Obsessive Compulsive Disorder Association (NOCDA) study. A sample of 419 participants with lifetime OCD was evaluated on co-occurrence with ED.

Results: Lifetime comorbidity with ED occurred in 44 patients (10.5% of the sample), a frequency that exceeds prevalence rates in the normal population. Patients with OCD+ED were on average overweight compared to OCD-ED. The OCD+ED group reported more aggression and checking symptoms and had a younger age of onset of OCD. Further, more comorbidity with MDD, social phobia, PTSD, and depression and anxiety symptoms was reported.

Conclusion: Patients with OCD+ED seem to clinically represent a sub-group of OCD with more severe psychopathology, and specifically with trauma-related factors and comorbid anxiety and depressive symptoms. Future studies using a longitudinal design should focus on whether patients with OCD+ED differ regarding course characteristics from patients with OCD-ED. Finally, comorbidity with depression, social anxiety and trauma should be taken into account in treatment of patients with OCD+ED.

Increasing evidence suggests that obsessive compulsive disorders (OCD) and eating disorders (ED) share phenomenological overlap. A recent network analysis by Dingemans and colleagues (Dingemans, Volkmer, Mulken, Vuijk, & van Rood, 2022) showed that OCD and ED share obsessive and compulsive features and it was argued that the frequent co-occurrence may suggest a shared etiological basis. Although a few studies have focused on occurrence and clinical presentation of ED in OCD (Bang et al., 2020; Sallet et al., 2010), the evidence focuses mainly on the occurrence and presentation of comorbid OCD in ED and especially anorexia nervosa (AN) (Halmi et al., 2012; Mandelli, Draghetti, Albert, De Ronchi, & Atti, 2020) and to a lesser extent on

comorbid ED in OCD. The present study contributes to this knowledge by examining the prevalence and clinical presentation of ED in OCD. We will first discuss the evidence of comorbid OCD in ED and then discuss the evidence of comorbid ED in OCD followed by the aim of our study.

Increased rates of both current and lifetime OCD co-morbidity have been reported in ED, and patients with ED often engage in food-related obsessions/compulsions (Halmi et al., 2005; O'Brien & Vincent, 2003). It has been argued that the binge-eating and purging behaviors observed in ED may serve a similar purpose as typical obsessions and compulsions seen in other psychiatric disorders including OCD to reduce levels of anxiety, and overall negative affect (Altman & Shankman, 2009; Drakes,

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Fawcett, Rose, Carter-Major, & Fawcett, 2021). Two large meta-analyses have investigated the co-occurrence of OCD with ED (Drakes et al., 2021; Mandelli et al., 2020). Prevalence of lifetime OCD in ED was found to be 13.9–18% and of current OCD to be 8.7–15%. More specifically, people with AN were at greatest risk of reporting comorbid OCD. Drakes et al. (2021) found the binge-purge subtype of AN to have the greatest risk, while Mandelli et al. (2020) showed the restrictive subtype of AN to be at greatest risk of developing comorbid OCD. Patients with binge eating disorder (BED) showed the lowest risk. Furthermore two longitudinal studies found that childhood OCD formed a risk factor for the occurrence and persistence of ED in adulthood (Buckner, Silgado, & Lewinsohn, 2010; Micali et al., 2011).

Prevalence rates of comorbid ED in clinical studies of OCD are also increased, with rates of up to 11% ED in clinical samples of OCD (Bang et al., 2020; Sallet et al., 2010). Across studies that have examined the frequencies of ED in patients with OCD, frequencies differ with respect to the different types of ED (Bang et al., 2020; Brakoulias et al., 2017; LaSalle et al., 2004; Lochner et al., 2014; Sallet et al., 2010). Bang et al. (2020) found in 132 patients with OCD no overall between-group differences in ED symptoms. Garcia et al. (2020) examined prevalence of ED and disordered eating behavior amongst women with major depressive disorder and anxiety disorders including OCD ($n = 30$) and reported that 13% met criteria for a lifetime ED and 39% reported engaging in at least one disordered eating behavior (e.g., binge eating) (Garcia et al., 2020). Brakoulias et al. (2017) compared 3711 adult patients with primary OCD on comorbidity across countries and continents. Current and lifetime prevalence rates were on average resp. 2.4% and 5.5% for AN and resp. 1.8% and 5.0% for bulimia nervosa (BN) (BED was not taken into account). And finally, Lochner et al. (2014) examined lifetime comorbidity in an outpatient sample of 457 patients with OCD. Outcomes as assessed with the Mini-International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998) to diagnose any current psychiatric comorbidity according to the DSM-IV criteria, showed a large difference between countries with lifetime occurrence of AN up to 36% with an average of 3.2%, lifetime BN up to 30% with an average of 1.64% and lifetime BED up to 14% with an average of 3.6%. However, both studies of Bang et al. (2020) and Garcia et al. (2020) were limited in sample size and looked little or not at all at the clinical presentation of OCD or at other forms of comorbidity and comorbid symptoms. This latter has been investigated in two large clinical OCD cohort studies (Brakoulias et al., 2017; Lochner et al., 2014).

Sallet et al. (2010) were one of the few to investigate the prevalence and clinical correlates of ED in a large clinical sample of 815 patients with OCD. They reported that 11.3% of the patients had ED co-morbidity, with proportions of BED being highest; 7.2%, followed by 2.1% AN and 2.0% BN respectively. Interestingly, overall severity of OCD did not differ between the eating disordered subgroups, but the ED subtypes differed on occurrence of OC symptom dimensions. Further, the group with co-morbid ED (OCD+ED) contained more women, and showed higher rates of other comorbid DSM-IV axis-I disorders, more anxiety and depression symptoms and higher rates of previous suicide attempts.

Few studies to date have investigated somatic markers of ED in patients with OCD, with body mass index (BMI in kg/m^2) being mostly studied (Hennighausen, Rischmuller, Heseke, Remschmidt, & Hebebrand, 1999; Sallet et al., 2010). It is important to include somatic markers such as BMI since it can play a role in treatment in several ways. Substantial weight loss can lead to obsessive thoughts and compulsive behaviors and at the same time these obsessions and compulsions can be a maintaining factor complicating the ability to profit from treatment (Kaye, Fudge, & Paulus, 2009). In case of AN, the dietary behavior and resulting weight loss can take the form of (strong) habitual behavior that persists over time and is resistant to change (Walsh, 2013). The relationship between AN and OCD is far more complicated than BMI alone, but information regarding the weight status can add to the understanding of the symptoms of patients with both (lifetime) disorders.

In the first small study with 51 adolescents with OCD, 17 patients had a low BMI comparable to the weight criterion of AN, and five of these low weight patients had a comorbid ED. BMI was found to be especially reduced in male patients with OCD. In the Brazilian OCD cohort (Sallet et al., 2010), the opposite was found: the mean BMI of the group with OCD+ED was higher ($26.6 \text{ kg}/\text{m}^2$) than in patients with OCD-ED ($24.1 \text{ kg}/\text{m}^2$), and most patients with ED in this study were diagnosed with BED (Sallet et al., 2010). A drawback of this study was that BMI estimates were mostly based on patients' reports instead of actual measurements. Reversely, a recent study on OCD in patients with ED found that patients with OCD+ED had a lower average BMI, which might be explained by a relative overrepresentation of AN in this study (Drakes et al., 2021).

The aim of the present study is to replicate previous findings by cross-sectionally examining demographic, clinical, family history and somatic characteristics in a large Dutch group of patients with OCD and comorbid ED (OCD+ED) compared to patients with OCD without ED (OCD-ED) using both categorical diagnoses of ED as assessed with structured interviewing, self-report scales and with BMI indices. Previous findings are extended by measuring BMI in all patients (instead of self-reporting) as well as measuring hip and waist circumference and asking patients about their physical state on health. Patients were also asked about the occurrence of OCD and other psychiatric symptoms in first-degree relatives.

We specifically focused on replication and extension of the following findings:

1. OCD+ED will predominantly consist of BED comparable to previous studies (Lochner et al., 2014; Sallet et al., 2010), and this group will -as a consequence-display elevated BMIs.
2. Patients with OCD+ED patients will show more severe OC symptom severity, more co-morbid diagnoses, and higher levels of anxiety and depression symptoms compared to patients with OCD-ED.

1. Method

The data for the present study were obtained from the baseline data of the Netherlands Obsessive Compulsive Disorder Association (NOCDA) study, an ongoing multicentre longitudinal naturalistic cohort study on the course of OCD, in which data are collected each two years prospectively. Recruitment took place from September 2005 to November 2009. An extensive description of the design and patient cohort can be found elsewhere (Schuurmans et al., 2012). Participants were individuals aged 18 years or over, with a lifetime diagnosis of OCD, as determined by the Structural Diagnostic Interview for DSM-IV disorders (SCID I; (First, Spitzer, Gibbon, & Williams, 1996).

Those patients with a lifetime and/or current diagnosis of ED will be referred to as the OCD+ED group and those patients without a lifetime and/or current ED will be referred to as OCD-ED group. Patients were referred to one of the mental health care centers that participated in the NOCDA study for evaluation and treatment. Exclusion criteria was an inadequate understanding of the Dutch language for the purposes of the completion of interviews and self-report questionnaires. The study was approved by the VUmc Medical Ethical Committee in October 2005 and all participating centers have acquired permission to cooperate in this study from their own Medical Ethical Committees.

1.1. Participants

In total, 419 participants with a lifetime diagnosis of OCD were included in the study. The mean age of the participants was 36.6 years ($SD = 10.92$ years) with an age range of 18–79 years, the female ratio was 55.8%, and 37.6% of all participants had a higher vocational or university degree (Master's). OCD severity as measured with the severity scale of the Yale-Brown Obsessive-Compulsive Scale (YBOCS)

(Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989) was on average 19.89 (SD = 8.10). All other Axis I diagnoses were assessed using the SCID I, including current or past eating disorders, comprising AN, BN and BED. Patients were categorized according to their clinical diagnosis to avoid excessively stringent diagnostic criteria, e.g. a patient with an ED-not otherwise specified diagnosis who fulfilled all criteria for AN but still menstruated, was labeled AN.

1.2. Measurements

OCD+ED and OCD-ED groups were compared regarding their body mass index (BMI), physical health, comorbidity and age at onset (SCID-I), OCD symptoms and severity (Y-BOCS, PI-R), other comorbid symptoms such as anxiety (Beck Anxiety Inventory; BAI) and depression (Beck Depression Inventory; BDI), and other clinical and sociodemographic information, such as age of onset and family history.

1.2.1. Demographic and personality characteristics

Sociodemographic information was assessed using a structured questionnaire involving questions regarding age, gender, marital status, family history and nationality.

1.2.2. Body mass index and physical health

To calculate the body mass index (BMI in kg/m²), height and weight were measured as part of a medical examination as well as information regarding hip and abdominal circumference. Participants were additionally asked to rate their physical state of health on a 5-point Likert scale ranging from 1 (very good) to 5 (very bad) and were asked about the number and type of medication they were currently taking.

1.2.3. Structured Clinical Interview for DSM-IV axis I disorders (SCID-I)

SCID-I is a diagnostic semi-structured interview used to determine DSM-IV-TR Axis I disorders (major mental disorders) (First, Spitzer, Gibbon, & Williams, 1996). In addition to current (i.e., one month) and lifetime diagnoses for all patients, the age of onset was determined retrospectively. The inter-rater reliability of the Dutch version of the SCID-I is good (Lobbestael, Leurgans, & Arntz, 2011).

1.2.4. Y-BOCS symptom checklist

The (number of) current subtypes of OCD were assessed using a minimally modified version of the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) symptom checklist that was available in Dutch (du Mortier et al., 2019). The checklist consists of 80 statements of which participants have to indicate if they ever experienced the obsession or compulsion (lifetime) or if they are currently experiencing the obsession or compulsion. A score <7 indicates no OCD. This checklist has shown excellent validity and reliability (Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989) and has a repeatedly shown a four factor structure (Bloch, Landeros-Weisenberger, Rosario, Pittenger, & Leckman, 2008) providing information on symptom severity in the following symptom dimensions: an aggression/checking factor, a symmetry/ordering factor, a contamination/washing factor and a hoarding factor.

1.2.5. Y-BOCS severity

OCD symptom severity was assessed using the 10-item rater administered Y-BOCS severity scale (Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989), which reliably measures current severity of obsessions and compulsions with total scores ranging from 0 to 40. A score of 0–7 is considered subclinical and 8–15 mild according to Wootin & Tolin (Wootin & Tolin, 2016) and a score of 0–13 is considered mild (but no disorder) according to Storch and colleagues (Storch et al., 2015).

1.2.6. Padua inventory-Revised (PI-R)

The PI-R is a self-report questionnaire used to assess the overall severity of OCD symptoms as well as the presence and severity of specific OCD subtypes and has been validated in Dutch (Sanavio, 1988; Van Oppen, Hoekstra, & Emmelkamp, 1995). The PI-R consists of 41 items rated on a five-point scale from 0 (not at all) to 4 (very much). The total score ranges from 0 to 164 with a score below 27 showing very low severity. The most common compulsions are clustered into 5 categories: impulses, washing, checking, rumination and precision (Van Oppen et al., 1995). The PI-R is proven to be reliable and valid (Anholt et al., 2009).

1.2.7. Beck Anxiety Inventory (Bai) (Beck, Epstein, Brown, & Steer, 1988)

The BAI is a self-report inventory used for measuring severity of an individual's anxiety level. It consists of 21 descriptive statements of anxiety symptoms which are rated on a 4-point scale ranging from 0 (not at all) to 3 (Severely; "I could barely stand it"). The cutoffs are: 0–9 normal; 10–18 mild; 18–29 moderate; above 29 severe. The BAI total score is the sum of the ratings for the 21 symptoms and the maximum score is 63 points. A study confirmed the use of the Dutch version of the BAI as an indicator of anxiety severity (Muntingh et al., 2011).

1.2.8. Beck Depression Inventory (BDI-II) (Beck, Steer, & Brouwn, 1996) was used

The BDI-II contains 21 questions, with item score ranges between 0 and 3. Scores between 0 and 13 indicate minimal depressive symptoms; between 14 and 19 mild depressive symptoms; between 20 and 28 moderate depressive symptoms; and between 29 and 63 severe depressive symptoms. The validity of the Dutch version is satisfactory (Schotte, Maes, Cluydts, De Doncker, & Cosyns, 1997).

1.3. Statistical analyses

All statistical analyses were carried out using SPSS version 22.0 and for all statistical outcomes, the Benjamini Hochberg (BH) method using a False Discovery Rate (FDR) of 5% was applied to control for multiple testing. Three 'families' of statistical test were identified and the method was applied per family in line with the Table 1, 2 and 4: general characteristics, OCD symptomatology and comorbidity. First, one month (current) and lifetime ED comorbidity rates were determined using descriptive statistics. Next, two groups were created: OCD+ED and OCD-ED. These groups were compared regarding their demographic characteristics, age of onset, family history, body composition including BMI as a continuous variable, physical health, medication use, OCD symptom dimensions and severity, co-morbidity with other axis I disorders, anxiety and depression severity scores of OCD using univariate ANOVAs and chi-square analyses. The following information was missing: height or weight of 29 patients with OCD (of whom 2 with an ED diagnosis) and age at onset of either OCD or ED of 9 patients with OCD+ED. Finally, outcomes were shown for the different ED subtypes (AN, BN, BED) within the OCD+ED group, but no analyses were done because the sample sizes of the various ED subtypes were too small for statistical testing.

2. Results

Demographic and clinical characteristics of the entire OCD sample (OCD total; n = 419) as well as for the OCD group with ED (OCD+ED; n = 44) and OCD without ED (OCD-ED; n = 375) are presented in Tables 1 and 2.

2.1. Frequency of eating disorders in OCD

The frequency of a lifetime ED in the entire OCD sample was 10.5% (n = 44 of the entire sample of 419 participants; 4 males, 40 females) and within this group, 43.2% (n = 19; 2 males, 17 females) had a current ED. Of the patients with a lifetime ED, 18 patients (40.9%) fulfilled

Table 1

Characteristics of OCD patients with (OCD+ED) and without (OCD-ED) a lifetime eating disorder, and for the whole group (OCD total). The statistical outcomes show the unadjusted p-value as well as the q-value (corrected value using the Benjamini Hochberg method) for the significant ($p \leq .05$) results.

	OCD+ED (n = 44)		OCD-ED (n = 375)		OCD total (n = 419)		Between groups			
	Mean	SD	Mean	SD	Mean	SD	F	p	η_p^2	q
BMI	27.73	6.44	24.79	4.98	25.10	5.22	11.99	.001	.030	.005
Age	34.41	9.03	36.86	11.10	36.60	10.92	1.98	.16		
Age onset OCD	15.15	6.69	18.84	9.83	18.46	9.61	5.21	.023	.014	.010
Age onset ED	20.35	7.95								
Physical state of health	2.41	0.79	2.32	0.73	2.33	0.73	0.65	.42		
Number of medication	2.72	1.70	2.17	1.43	2.24	1.48	4.47	.035	.015	.015
Hip circumference	98.93	35.48	93.11	31.84	93.72	32.24	1.29	.26		
Waist circumference	87.84	30.02	82.45	27.92	83.01	28.16	1.45	.23		
	%		%		%	χ^2 /Fisher	p			
≥First degree relative with OCD	40.9%		40.8%		40.8%	5.39	.61			
≥First degree relative with other psychiatric symptoms	77.3%		68.3%		69.2%	2.97	.97			
Marital status						4.21	.24			
Never married	54.5%		61.1%		60.4%					
Married	38.6%		32.5%		33.2%					
Divorced	4.5%		6.1%		6.0%					
Widowed	2.3%		0.3%		0.5%					

Note. OCD = obsessive compulsive disorders, ED = eating disorders, BMI = body mass index.

Table 2

Results are presented for obsessive compulsive symptom dimensions and severity as measured with the Y-BOCS and overall severity of OCD symptoms as well as the presence and severity of specific OCD subtypes as measured with the Padua Inventory-Revised in patients with OCD with (OCD+ED) and without (OCD-ED) a lifetime ED diagnosis, and for the whole group (OCD total). The statistical outcomes show the unadjusted p-value as well as the q-value (corrected value using the Benjamini Hochberg method) for the significant ($p \leq .05$) results.

	OCD+ED (n = 44)		OCD-ED (n = 375)		OCD total (n = 419)		Between groups			
	Mean	SD	Mean	SD	Mean	SD	F	p	η_p^2	q
Y-BOCS symptoms										
Aggression and checking <u>lifetime</u>	7.98	4.27	6.55	4.15	6.70	4.18	4.63	.032	.011	.015
Symmetry and ordering <u>lifetime</u>	4.59	2.96	3.84	3.16	3.92	3.15	2.24	.14		
Contamination and washing <u>lifetime</u>	3.32	2.90	3.01	2.79	3.04	2.80	0.48	.49		
Hoarding <u>lifetime</u>	0.25	0.49	0.42	0.75	0.40	0.73	2.08	.15		
Y-BOCS severity										
Obsessions	10.86	5.15	9.80	4.23	9.91	4.34	2.32	.13		
Compulsions	9.89	4.86	10.74	4.38	9.98	4.82	1.21	.27		
Total severity	21.61	8.32	19.69	8.07	19.89	8.10	2.16	.14		
Padua Inventory-Revised										
Impulses	8.53	6.70	5.50	6.16	5.83	6.29	9.11	.003	.022	.004
Washing	13.51	11.64	10.83	11.07	11.12	11.15	2.23	.14		
Checking	14.26	8.23	13.35	7.65	13.44	7.71	0.53	.47		
Rumination	25.05	7.72	21.96	8.84	22.29	8.77	4.81	.03	.012	.012
Precision	7.65	6.39	6.50	5.92	6.62	5.97	1.43	.23		
Total	69.05	24.97	58.13	28.03	59.30	27.89	5.96	.02	.015	.008

Note. OCD = obsessive compulsive disorders, ED = eating disorders, Y-BOCS = Yale Brown Obsessive Compulsive Scale.

criteria of AN, 9 patients (20.5%) of BN, and 17 patients (38.6%) of BED. Of the patients with a current ED, 3 patients fulfilled criteria of AN (16%), 4 patients (21%) of BN, and 12 patients (63%) of BED. In all further analyses here-under, we report on between-group differences with respect to lifetime ED diagnoses (i.e., OCD+ED vs OCD-ED).

2.2. Comparing OCD+ED vs. OCD-ED

2.2.1. Characteristics and family history of OCD (Table 1)

As expected, female:male ratio was much larger in the OCD+ED group than in the OCD-ED group, $\chi^2(1) = 24.51, p < .001$; OCD+ED: 90.9% (40 women and 4 men) versus 51.7% (194 women and 181 men) in the OCD-ED group. Marital status did not differ between the groups. No differences were found between OCD+ED and the OCD-ED groups in number of affected first degree relatives with OCD symptoms. The age at onset of the OCD+ED group was not significantly different from the age at onset of the OCD-ED group.

2.2.2. OCD symptom dimensions and severity (Table 2)

On the PI-R, patients with OCD+ED reported more impulsive urges, but did not differ on any of the other subscales or total scores from the patients with OCD-ED. No between-group differences were found in Y-

BOCS symptoms or severity ratings.

2.2.3. Somatic markers and medication

Of all patients with OCD, 3.3% (n = 14) were underweight (BMI <18.5 kg/m²) and 38.9% (n = 163) were overweight (BMI >25.0 kg/m²) of whom 14.8% (n = 62) were obese (BMI >30 kg/m²). The mean BMI in OCD+ED was higher (they were averagely overweight) than in the OCD-ED group (they had on average a normal weight), see Table 1. Physical health scores nor hip and waist circumference differed significantly between the groups. Patients on average rated their physical health as 'good' or 'sometimes good and sometimes bad'. Hip and waist circumference were on average in the normal range (Molarius, Seidell, Sans, Tuomilehto, & Kuulasmaa, 1999); WHO 2008) for men and women (hip 94–105 cm in men and <97–108 cm in women; waist <94 cm in men and <80 cm in women). Patients with OCD+ED did not differ from the patients with OCD-ED with respect to medication use.

2.2.4. Within-ED subgroup comparisons (Table 3)

Although the sample sizes of the various ED subtypes were too small for statistical testing, the average score is shown for a number of relevant characteristics. Looking at the BMI, patients with OCD + AN (n = 18) had on average a normal BMI, patients with OCD + BN (n = 9) were

Table 3

Clinical and sociodemographic information of patients with OCD with a clinical lifetime diagnosis of anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED).

	AN (n = 18)		BN (n = 9)		BED (n = 17)	
	%/Mean	(SD)	%/Mean	(SD)	%/Mean	(SD)
% women	88.9%		88.9%		94.1%	
Age	34.67	8.82	33.00	8.25	34.88	10.06
Age onset ED	17.88	7.09	23.33	7.74	21.77	8.56
Age onset OCD	15.69	7.34	13.00	7.28	15.93	5.65
BMI	24.65	3.96	27.75	7.45	30.99	6.77
Physical health	2.22	0.73	2.56	0.53	2.53	0.94
Number of medication	2.75	1.95	3.13	1.96	2.42	1.17
Hip circumference	90.06	34.92	94.67	39.66	110.59	32.52
Waist circumference	81.72	24.55	83.00	37.32	96.88	30.71

Note. OCD = obsessive compulsive disorders, ED = eating disorders, BMI = body mass index.

overweight and patients with OCD + BED (n = 17) were in the obese range. The OCD preceded the ED in 47% (n = 8) of the patients with OCD + AN, in all patients with OCD + BN (n = 9) and in most (79%; n = 13) of the patients with OCD + BED.

Co-morbidity with other axis I disorders (Table 4). Compared to OCD-ED, patients with OCD+ED were diagnosed significantly more with comorbid current and lifetime psychiatric disorders, including major depressive disorder, social phobia and PTSD.

Anxiety and depression severity scores (Table 4). In addition, the OCD+ED group reported on average higher levels of depression (in the moderate severity range) and anxiety (in the moderate to severe range) than the OCD-ED group (level of depression in the mild range and level of anxiety in the mild to moderate range). With respect to the BAI somatic and subjective subscales, patients with OCD+ED scored significantly higher both on physiological arousal and on subjective anxiety than patients with OCD-ED.

3. Discussion

The primary aim of this paper was to replicate and extend previous studies on the relationship between ED and OCD, by studying frequency of occurrence and clinical characteristics of ED comorbidity in a relatively large group of adult patients with OCD. We first examined lifetime and current prevalence of ED in the entire OCD sample and our findings

Table 4

The number and type of co-morbid Axis I diagnoses (besides OCD and ED) that differ significantly between patients with OCD with (OCD+ED) and without (OCD-ED) lifetime ED, and the level of depression (BDI) and anxiety (BAI). The statistical outcomes show the unadjusted p-value as well as the q-value (corrected value using the Benjamini Hochberg method) for the significant (p < .05) results.

	OCD+ED (n = 44)		OCD-ED (n = 375)		F	P	η^2_p	q
	Mean	SD	Mean	SD				
Number of current SCID diagnoses	2.64	1.54	1.71	1.11	25.17	<.001	.057	.005
Number of lifetime SCID diagnoses	4.18	1.39	2.51	1.32	62.36	<.001	.13	.009
<i>Specific SCID diagnoses</i>	%	N	%	N	χ^2 /Fisher	p		
Major depressive disorder	72.7	32	54.7	205	5.23	022		045
Posttraumatic stress disorder	15.9	7	3.2	12		002		027
Social phobia	40.9	18	21.1	79		004		036
Somatoform disorders	11.4	5	4.5	17		068		050
<i>Tic screening</i>								
Tic disorder	45.5	20	25.1	93	8.18	004		041
<i>Anxiety and depression</i>								
BDI total scale	20.35	9.89	14.70	9.96	12.38	<001	03	014
BAI total scale	23.43	12.71	16.57	11.68	12.69	<001	03	018
BAI somatic subscale	12.98	8.74	8.63	7.64	11.81	001	03	023
BAI subjective subscale	10.43	4.80	7.97	5.14	8.95	003	02	032

Note. OCD = obsessive compulsive disorders, ED = eating disorders, SCID = Structured Clinical Interview for DSM-IV, BDI = Beck Depression Inventory, BAI = Beck Anxiety inventory.

show that 10.5% of the patients with OCD had a lifetime ED diagnosis. This is in line with the findings of Sallet et al. (2010) who found a percentage of 11.3% and it is slightly above the lifetime frequencies occurring in the general population which are generally below 4% for the (broadly defined) eating disorders AN, BN and BED (Smink, 2012). Our hypotheses were that BED was most common and resultantly the OCD+ED group would on average have a higher BMI than those without an ED. AN and BED were the most frequently reported lifetime ED diagnoses in our sample and interestingly, in the patients with OCD with a *current* ED, BED was the most frequently reported ED diagnosis (n = 12). It is therefore not surprising that the OCD+ED group was on average overweight, whilst patients with OCD without ED had on average a BMI in the normal range. More generally, 43% of the OCD+ED group still had a current ED diagnosis, and women were overrepresented. Thus, our hypotheses were supported by the findings.

Our second purpose was to test if indeed the OCD+ED group will show a more severe OCD and general clinical presentation with higher levels of anxiety and depression and more comorbidity. Although overall OC symptoms, symptom severity and age at onset of the OCD did not differ between OCD with or without ED, the OCD+ED group does seem to reflect a group with increased illness severity associated with higher rates of comorbid diagnoses, specifically of major depressive disorder, PTSD, social phobia, and -in line with previous studies- with higher anxiety and depression scores (Brakoulias et al., 2017; Lochner et al., 2014). The results for OC symptom dimensions were less conclusive, as we only found that patients with OCD+ED had higher scores on impulsive urges than patients with OCD without ED. Taken together, in line with the literature (Sallet et al., 2010), these results suggest that patients with OCD+ED represent a sub-group of OCD with more severe comorbid psychopathology than those without a comorbid ED.

Our findings of increased rates of ED in OCD compared to the general population and elevated weight in the OCD+ED group are in line with previous findings (Bang et al., 2020; Brakoulias et al., 2017; Sallet et al., 2010). Moreover, we replicated most of the outcomes of the Sallet et al. study (2010), but there were also subtle differences in study outcomes. For example, lifetime BED was most prevalent in the OCD+ED group in the Sallet et al. study (7.9%), while in the present study both AN and BED lifetime diagnoses were similarly prevalent (resp. 4.3% and 4.1%). Differences in co-occurrence of lifetime and current BED are in line with findings regarding the prevalence of BED in the general population in both countries (Kessler et al., 2013). Age at onset of OCD in both studies did not differ, but in the present study the age at onset was overall higher than in the Sallet et al. study, with an average of 15.2 years for the

OCD+ED group and 18.8 years for the OCD-ED group whilst in the study of Sallet et al., the age at onset of OCD was 11.94 years for the OCD+ED and 12.86 years for the OCD-ED group. The age of the participants was similar in both studies. Considering the low numbers of patients in both studies with OCD+ED, differences between the studies should be interpreted with caution.

We found increased frequencies of impulsive urges in the subgroup of patients with OCD+ED compared to patients with OCD-ED. Impulsivity is a trait that characterizes both OCD and ED, and is thought to underlie both disorders (Altman & Shankman, 2009; Christian et al., 2021). The intensity of this trait differs between patients (some may suffer from impulsivity, while others suffer from rigidity related traits such as perfectionism and yet others from their combination (Christian et al., 2021)). Typically, impulsivity is related to binge eating and loss of control (Halmi et al., 2012; Lavender et al., 2017) and considering the prevalence of lifetime and current binge eating related disorders in the OCD+ED group, it is not surprising that this group reported more impulsive urges. The precise role of impulsivity in OCD is still unclear as there are inconsistencies between studies, for example between self-report and neurocognitive outcomes (Frydman et al., 2020). The current findings may add to this discussion, by suggesting that those who also suffered from (lifetime) eating pathology had higher impulsivity ratings, and this group may particularly benefit from interventions targeting impulsivity instead of targeting solely symptom control.

In all, these findings support viewing subtypes of OCD and ED as symptom dimensions rather than as different diagnostic categories, and support adopting a more transdiagnostic approach across OCD and ED diagnoses, not only in the exploration of etiological relationships but also when designing treatments. Previous research has shown that having both disorders, and in particular having OCD prior to ED, can lead to more persistent OCD (Micali et al., 2011), a poorer prognosis (Carrot et al., 2017) and that it is important to pay attention to both disorders in treatment as it is likely that not all eating disorder symptoms will improve with the OCD (Bang et al., 2020). There may be underlying traits, i.e. impulsivity/loss of control (Altman & Shankman, 2009) that can be targeted instead of purely focusing on symptom reduction.

Interestingly, patients with OCD+ED not only presented with more comorbidity in general, but we also found higher frequencies of PTSD in the OCD+ED group as compared to the OCD-ED group. According to the vulnerability-stress diathesis model, patients who have experienced traumatic events are more likely to develop severe forms of psychopathology (Hazzard et al., 2021; Ojserkis et al., 2017). It would be interesting to investigate whether traumatic events and the tendency to develop PTSD are associated or mediate the development of specific eating disorders, but the small sample size of ED subgroups did not allow to explore this. Future studies in larger samples may further unravel the relationship between OCD, negative life events and onset or persistence of PTSD in OCD+ED subgroups.

4. Strengths and limitations

The present study has several strengths including a large clinical OCD cohort, use of categorical diagnoses of ED as assessed with structured interviewing, and BMI indices as determined using a physical examination. Further, most studies so far that examined the relation between OCD and specific ED have focused mainly on the relation of OCD with AN (Bastiani et al., 1996; Cederlof et al., 2015). From an ED perspective this seems logical considering that OCD is a frequently observed co-morbid condition in patients with AN (Godart, Flament, Perdereau, & Jeammet, 2002; Salbach-Andrae et al., 2008). However, a strength of our study was to not only focus on AN but to explore the whole range of potential ED.

The study also has some limitations that need to be recognized. First, the cross-sectional nature of the study restricts conclusions to correlational associations. Longitudinal studies are needed to explore more causal relationships and to find out about differences in course/

treatment outcome between OCD+/-ED. Further, the ED group consisted of 44 patients and the sample size for subgroup analyses in the three ED subgroups was therefore too small to draw any definite conclusions. The current study combined those with a comorbid lifetime and current ED. It is therefore possible that the differences found between the OCD+ED and the OCD-ED group are mainly driven by the people with a current ED. It would be good to take this into account in future research. Further, the lack of quantitative measurements of eating behavior hampered exploring more subtle relationships between ED and OCD severity.

Finally, our study did not allow to distinguish between AN restrictive and AN binge-purge subtypes that might be meaningful in light of the AN restrictive type being characterized by overcontrol, and the AN binge-purge subtypes by loss of control as well. In future research restrictive versus binge eating subtypes of AN should be distinguished in order to further unravel their relationships with scores on impulsivity and worrying in the OCD+ED group, and to gain further understanding of the relationship between OCD subdimensions and the specific ED.

5. Conclusions and future directions

Patients with OCD+ED seem to clinically represent a sub-group of OCD with more severe psychopathology, with trauma-related factors and comorbid depression interacting with symptom severity. Further, there are indications that patients with OCD differ from patients with OCD with ED symptom dimensions with respect to impulsivity and loss of behavioral control. Future studies using a longitudinal design should focus on whether patients with OCD+ED differ with respect to course characteristics from the OCD group without lifetime ED. Finally, comorbidity with depression, social anxiety and trauma should be taken into account in treatment of patients with OCD+ED. Future longitudinal studies need to find out whether individuals with OCD+ED represent an OCD subgroup with more severe psychopathology and worse outcome. Finally, future treatment studies might benefit with respect to treatment efficacy by tailoring treatment approaches for this subgroup of OCD.

Author statement

Unna Danner: Conceptualization, methodology, formal analysis, investigation, data curation, writing-original draft preparation, writing review & editing, project administration (current study).

Lot Sternheim: Conceptualization, writing-original draft preparation, writing review & editing.

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Declaration of interest

Given her role as an Editorial Board Member, Patricia van Oppen had no involvement in the peer-review of this article and had no access to information regarding its peer-review. All other authors have no competing interests to report.

Data availability

Data will be made available on request.

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