Are student cohorts with psychopathology representative of general clinical populations? The case for OCD

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ABSTRACT

A longstanding assumption suggests that college student cohorts are not representative of clinical cohorts as students are perceived as 'high functioning' which may limit generalizability. Yet little research has compared the profile of DSM disorders among students to those reported in community or treatment-seeking samples, particularly in the context of obsessive-compulsive disorder (OCD). To address this gap in the literature, we compared the profile of DSM OCD in college students, to treatment-seeking and community OCD samples, and student subsamples with other DSM disorders, or with no diagnosis. 529 students from two US and one Belgian university were screened using semi-structured interviews and completed self-report questionnaires. 36 students met DSM criteria for OCD. Comparison with non-OCD diagnoses (n = 183), and non-clinical student controls (n = 311) yielded expected differences on symptomatic OCD measures and comorbidity profiles. Comparisons with published OCD samples yielded a similar profile. Therefore, OCD in students is similar to OCD in clinical samples, with minor differences. We conclude that when appropriately screened, students are a viable population for the study of OCD. This may enhance research into OCD, allowing researchers without access to clinical cohorts to contribute to the field.

1. Introduction

Much of the research in psychology is conducted using college[1] student cohorts. Indeed, a review of publications in six psychology journals found that 68% of studies utilized college student cohorts (Gallander Wintre, North, & Sugar, 2001). A similar review of studies published in the Journal of Personality and Social Psychology found that 67% of American studies, and 80% of non-American studies specifically relied on *psychology* student cohorts (Arnett, 2008). Considering this longstanding trend, there is an ongoing discourse concerning the ability to generalize from student cohorts to the general population in psychology research. Indeed, the ability to generalize from such samples is inherently limited by the narrow age range, and the notion that students are a particular population that putatively may be more functional, which may further limit generalizability. Interest in this potential selection bias and related issues with sample homogeneity among students has been a subject of multiple investigations. For example, a second

order meta-analyses of 30 meta-analyses concluded that "… *student subjects were found to be slightly more homogeneous than those of nonstudent subjects. Moreover, effect sizes derived from college student subjects frequently differed from those derived from nonstudent subjects both directionally and in magnitude*" (Peterson, 2001, p. 1).

The problem of generalizability described above may be different in the specific context of psychopathology, in that student cohorts endorsing psychiatric symptoms may be more akin to traditional community cohorts endorsing psychiatric symptoms. For example, a study assessing student samples from 59 countries found that variability in terms of personal and attitudinal variables may be similar between students and non-student samples (Hanel & Vione, 2016). In addition, prevalence rates of most disorders have been found to be similar between student and non-student cohorts (Blanco et al., 2008). Notwithstanding the natural supposition that every person who meets criteria for a DSM disorder is *ipso facto* a 'clinical participant', funding agencies, peer-reviewers and journal editors appear to largely reject the notion

that it is possible to study DSM disorders via student populations, even in cases where a careful and rigorous clinical screening has been employed.

In contrast to the prominence of college cohorts in psychology more broadly, there is a surprising dearth of research examining students who meet formal diagnostic criteria for psychological disorders, and even fewer studies employ a formal structured or semi-structured interview to ascertain diagnoses. This is surprising, particularly given that there are clear indications of the significant burden of psychopathology among college students. For example, a recent study comprising more than 20,000 college students from around the world found that 94% of college students report meaningful levels of stress in at least one of six areas (Karyotaki et al., 2020). There are also multiple indicators of a persistent rise in psychological problems among college students. In a large study, Lipson, Lattie, and Eisenberg (2019) assessed data from 196 campuses and found that rates of lifetime diagnosis of DSM disorders increased from 22% in 2007, to 36% in 2017. From an administration perspective, 95% of counseling center directors report a consistent increase in the number of students with severe psychopathology (Gallagher, 2013), but only between 15% and 25% of students who require care are seen by mental health care professionals (Blanco et al., 2008; Eisenberg, Golberstein, & Gollust, 2007). The COVID-19 pandemic has amplified this trend. Research examining the psychological impact of the COVID-19 pandemic on students clearly indicates a significant worsening across multiple mental health and subjective well-being outcomes (Charles, Strong, Burns, Bullerjahn, & Serafine, 2021; Fruehwirth, Biswas, & Perreira, 2021; Wang et al., 2020).

Since many studies in psychology utilize college samples, and that the prevalence and burden of psychopathology in college students is both pervasive and progressive, it is remarkable that only a small body of literature has examined DSM disorders in this population. One reason may be that, as opposed to 'treatment-seeking' samples recruited from outpatient and inpatient settings, student samples are generally regarded as 'non-treatment seeking', and putatively perceived as higher functioning and less severe clients. This argument, however, is debatable because in terms of the ability to generalize from 'treatment-seeking' samples to the general population, it is estimated that approximately 70% of individuals meeting criteria for DSM disorders are not 'treatment-seeking' and may not receive treatment (Thornicroft, 2007). It should also be acknowledged that college students may be treatment-seeking, given findings that most students with psychological problems would seek treatment (McLafferty et al., 2017). The notion that college students are especially *high* functioning is also debatable, particularly because psychological problems in students have been associated with significantly poorer everyday and psychosocial functions compared to their non-clinical peers (Beiter et al., 2015). Thus, the need to study psychopathology in college students is clear, but an unanswered question remains, namely, whether it would be legitimate to conduct psychopathology research and study certain disorders using college students who meet criteria for DSM disorders, and to generalize to non-student clinical populations.

Although limited research exists, studies that administered a psychometrically valid diagnostic interview to ascertain DSM diagnosis in students generally find rather similar clinical profiles when compared to non-student young adults. For example, Vázquez and Blanco (2008) found that compared to non-student young adults, students meeting criteria for major depressive disorder presented a similar clinical profile. If this type of research becomes acceptable, where it would be appropriate to study any disorder via well screened (i.e., via a valid semi-structured diagnostic interview procedure) student samples, hundreds of higher education institutions around the world in which researchers have no direct access to treatment-seeking populations would be able to contribute to the literature and our understanding of psychopathology.

One of the most under-researched disorders in college students is obsessive-compulsive disorder (OCD). OCD is a burdensome disorder that affects 1–2.5% of the population (Fawcett, Power, & Fawcett, 2020;

Ruscio, Stein, Chiu, & Kessler, 2010) and is characterized by intrusive unwanted thoughts (obsessions), and repetitive behavioral or mental rituals (compulsions) that are performed to alleviate or avoid the distress and anxiety that result from obsessions (American Psychiatric Association, 2013). Given its elevated prevalence and the vast body of research available on OCD, the dearth of research assessing DSM OCD in college students is startling, especially considering the evidence pointing to the pervasiveness of elevated obsessive-compulsive symptoms in college students (Torres, Cruz, Vicentini, Lima, & Ramos-Cerqueira, 2016), and an increase in the prevalence of OCD in this population (Oswalt et al., 2020). Despite calls to address obsessive-compulsive phenomena in college populations (e.g., Sulkowski, Mariaskin, & Storch, 2011), we were able to identify only three small studies to date that directly examined OCD in college cohorts using a valid semi-structured diagnostic screening interview. One study was conducted in Turkey, one in Saudi Arabia, and one in the US (Sternberger & Burns, 1991; Sultan et al., 2021; Yoldascan, Ozenli, Kutlu, Topal, & Bozkurt, 2009). Another study focused exclusively on trends of prevalence rates of OCD in college students (Oswalt et al., 2020), and not on the nature of OCD in students. The dearth of this type of research is increasingly worrisome, particularly given evidence regarding the extent of the burden of OCD among college students and its association with poorer educational attainment (Pérez-Vigil et al., 2018), and elevated risk of suicide (Huz et al., 2016).

It is plausible that the extremely limited research into DSM OCD in college students stems from the notion that students with OCD do not represent the common OCD profile seen among treatment-seeking individuals. However, given that most individuals struggling with psychological problems are not treatment-seeking, two related outstanding questions remain.

1. *Are there differences between students with DSM OCD versus non-student 'treatment seeking' individuals with OCD?*
2. *If such differences exist, what are the variables of concern, and would these differences justify precluding student OCD data from being generalized and utilized to understand OCD?*

Notably, although OCD research utilizing college students has been contributing to our understanding of OCD vis-à-vis analogue OCD samples for decades (for a review see Abramowitz et al., 2014), to our knowledge, no research to date utilized DSM OCD in college students to study OCD.

To fill this gap in the literature, the present study's aim was to conduct a comprehensive investigation into OCD in college students, including the administration of clinical interviews, and self-report measures to assess general and OCD related symptoms in two US universities and one European university. We hypothesized that DSM defined OCD in college students may be similar to that reported in 'treatment-seeking' clinical samples, in terms of primary comorbidities, types of symptom dimensions, and distress related to symptoms.

2. Method

2.1. Participants

The sample was comprised of 530 undergraduate students recruited from two large universities in the United States and one university in Belgium. Participants were sorted into three groups based on their clinical status, as ascertained via DSM-IV or DSM-5 (American Psychiatric Association, 2013) clinical diagnostic interviews. The groups included students meeting OCD diagnosis ($n = 36$), a clinical control sample (CC) of students diagnosed with at least one DSM disorder other than OCD (CC $n = 202$), and a non-clinical control sample (NCC) of students who did not meet criteria for any lifetime DSM disorder (NCC $n = 293$). Participants were primarily females (OCD = 69.4%, CC = 63.2%, NCC = 68.3%) in their early twenties (OCD, $M = 20.03$, $SD =$

2.26; CC, $M = 20.62$, $SD = 3.46$; NCC, $M = 20.13$, $SD = 3.45$). Of the OCD group, 7 participants were medicated (18%), with 4 participants taking more than one medication. Three participants (8%) were taking SSRIs, 3 (8%) were on neuroleptics, and 4 (11%) were taking stimulant medication. Demographic information for each individual site can be found in Table 1. This study was approved by the respective Institutional Review Boards in accordance with the declaration of Helsinki.

2.2. Procedure

All participants provided informed consent, were screened with a semi-structured clinical interview, and completed several self-report psychological measures. Procedures and data collection methods are outlined below for each site separately.

Texas State University. Undergraduate students from Texas State University were recruited as part of a large neuropsychological study via ads and flyers. All participants completed several self-report psychological measures including the Depression Anxiety and Stress Scale (DASS-21) and the Obsessive-Compulsives Inventory-Revised (OCI-R) and were interviewed by highly trained graduate-level research assistants using the MINI semi-structured clinical interview (version 7.0). Exclusion criteria were brain injury or significant neurological disease, age >65, and lack of basic English comprehension. Sample composition recruited from this site included OCD (n = 15), CC (n = 129), and NCC (n = 132).

University of Miami. Students were recruited from Introductory Psychology courses. Those interested in participating completed a battery of screening measures at the beginning of the academic semester. Exclusion criteria included experience with mindfulness or meditation (Çek, Reese, Broos, & Timpano, 2022) bipolar disorder, psychotic symptoms, or current suicidality. Additionally, to obtain greater representation of individuals with elevated obsessive-compulsive symptoms (OCS) severity, 64% of participants were pre-selected for scoring above the clinical cut-off (>4) on the OCI-R (Foa et al., 2002) obsessing subscale. Participants completed clinical and diagnostic interviews (including the

MINI 6.0 and the Y-BOCS) with a trained doctoral-level clinician, as well as a set of questionnaires and experimental procedures. Sample composition recruited from this site included OCD (n = 12), CC (n = 35), and NCC (n = 50).

University of Ghent. The data from Ghent University was collected as part of two separate studies in 2013 and 2015. For the 2013 data collection, participants were invited to complete the Maudsley Obsessive-Compulisive Inventory (MOCI) online. Individuals who scored either a 0 or 5 or higher on the cleaning subscale were invited to complete the study and completed a semi-structured interview (the MINI 6.0 was used in one study (OCD n = 7) and the SCID in the other (OCD n = 2). For the 2015 data collection, undergraduate students were recruited online. No specific exclusion criteria were put in place. More detailed descriptions of data collection procedures can be found elsewhere (De Putter, Cromheeke, Anholt, Mueller, & Koster, 2018; De Putter & Koster, 2017). Sample composition recruited from this site included OCD (n = 9), CC (n = 38), and NCC (n = 111).

2.3. Measures

2.3.1. Semi-structured interviews

The Mini Neuropsychiatric Interview (MINI; Sheehan et al., 1998; Sheehan et al., 1997). is a semi-structured diagnostic interview evaluating the presence of 17 common psychiatric diagnoses. The MINI has demonstrated good psychometric properties, including concurrent validity with the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders (Sheehan et al., 1997). The DSM-IV version was used in the Miami and Ghent site, and the DSM-5 version was used in the Texas site.

The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-IV; First, Spitzer, Gibbon, & Williams, 2002) is a widely used semi-structured clinical interview developed to assess psychopathology using criteria set forth by the DSM-IV. The SCID-IV demonstrates good psychometric properties (First, 1997). This measure was utilized in the Ghent site in one of the two Ghent samples.

The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman, Price, Rasmussen, Mazure, Delgado et al., 1989; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989) is the gold standard interview-based measure for the assessment of OCD symptoms. The Y-BOCS is a structured clinical interview designed to measure symptom characteristics and severity in OCD patients. The Y-BOCS's 10-item severity scale was used in this study. The scale assesses the severity of obsessions and compulsions on a 5-point scale from 0 (*no symptoms*) to 4 (*severe symptomatology*). The Y-BOCS has demonstrated good psychometric properties (Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989). In the present study, the Y-BOCS demonstrated adequate to good internal consistency across sites (Cronbach's α = 0.79-0.88). This measure was used in the Ghent and Miami sites.

The Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002) is an 18-item measure of DSM–IV symptoms of OCD. The OCI-R yields several subscale scores including Checking, Washing, Ordering, Obsessing, Neutralizing, and Hoarding. Responses are made on a 5-point scale ranging from *not at all* to *extremely*. The OCI-R has demonstrated very good internal consistency in student samples (0.88; Hajcak, Huppert, Simons, & Foa, 2004). In the present study, the OCI-R demonstrated adequate to excellent internal consistency across sites (α = 0.65-0.90). This measure was used in all 3 sites.

The Maudsley Obsessive-Compulsive Inventory (MOCI; Hodgson & Rachman, 1977) is a 30-item self-report scale that assesses obsessive-compulsive symptoms. All item responses are true/false, and the scale's total scores reflect the total number of items endorsed and the scale demonstrates good psychometric properties in non-clinical samples (Sternberger & Burns, 1990). However, the small number of participants with OCD that completed this measure precludes calculations of internal consistency. This measure was used in the Ghent site.

Table 1
Demographics information for the 3 study groups.

Variable	OCD (n = 36)	CC (n = 183)	NCC (n = 311)	F
	M(SD)	M(SD)	M(SD)	
Age	20.13 (2.52)	20.98 (3.72)	19.93 (3.23)	5.60**
Variable	n (%)	n (%)	n (%)	X^2
% Female	25 (69.4%)	127 (63.2%)	290 (68.3%)	2.48
Race/Ethnicity±				26.33*
White American	12 (41.4%)	76 (48.4%)	80 (45.9%)	
Black American	2 (6.9%)	16 (10.2%)	29 (15.8%)	
Hispanic/Latino American	11 (37.9%)	52 (33.1%)	34 (18.6%)	
Asian American	2 (6.9%)	16 (10.2%)	29 (15.8%)	
American Indian/ Alaskan Native	1 (3.4%)	2 (1.3%)	1 (0.5%)	
Hawaiian/Pacific Islander American	0 (0.0%)	2 (1.3%)	2 (1.1%)	
Other	1 (3.4%)	0 (0.0%)	5 (2.7%)	
GPA±				16.57*
≥2.0	1 (3.6%)	4 (2.6%)	4 (2.3%)	
2.1–2.5	4 (14.3%)	22 (14.2%)	10 (5.6%)	
2.6–3.0	9 (32.1%)	49 (31.6%)	40 (22.6%)	
3.1–3.5	9 (32.1%)	46 (29.7%)	60 (33.9%)	
3.6–4.0	5 (17.9%)	34 (21.9%)	63 (35.6%)	

Note. OCD=Students meeting DSM criteria for obsessive-compulsive disorder; CC=clinical controls-Students meeting criteria for other DSM disorders; NCC=Non-clinical controls-Students without any DSM disorder; GPA=Grade point average; ± Data available from the Texas and Miami sites only: OCD (*n* = 29), CC (n = 159), NCC (*n* = 186); *p < .05, **p < .01.

The Depression, Stress, Anxiety Scale-21 (DASS-21; Lovibond & Lovibond, 1995) is a self-report questionnaire that measures the severity of depression, anxiety, and stress symptoms. Items are scored from 0 (*did not apply to me at all over the last week*) to 3 (*applied to me very much or most of the time over the past week*). The internal consistency of the three subscales was found to be good to excellent in non-clinical samples with α = 0.91, 0.80, and 0.84 for depression, anxiety, and stress, respectively (Sinclair et al., 2012). In the present study, the DASS-21 subscales demonstrated adequate to good internal consistency across sites (α = 0.73-0.89). This measure was used in the Texas and Miami sites.

2.4. Analytical plan

To be able to compare combined data from the three sites, a data harmonization procedure was employed. As a first step, we examined data from each site to identify irregularities. Several self-report constructs of interest were measured by different instruments (e.g., grade point average, depressive symptoms). Therefore, several steps were taken to harmonize the data before merging. In order to harmonize demographic data that was categorical/ordinal in at least one site and continuous in at least one other, such as grade point average (GPA), we used the categorical/ordinal categorization. To facilitate the harmonization of symptom measures we worked with published benchmarks from each measure to establish severity groups (e.g., subclinical, mild, moderate, severe).

Chi-square tests with Fishers' exact test were employed when necessary and Multivariate Analyses of Variance (MANOVA) were conducted to examine differences between the OCD, CC, and NCC groups on demographic and clinical variables. Lastly, severity and co-morbidity patterns in the OCD group were then compared to U.S. and international clinical OCD (Schuurmans et al., 2012; Torres et al., 2016) and community (Adam, Meinlschmidt, Gloster, & Lieb, 2012; Crino, Slade, & Andrews, 2005; LaSalle et al., 2004; Ruscio et al., 2010) samples to compare current and lifetime co-morbidity patterns. To control for familywise inflation of type I error, for each set of analyses, multiple comparisons were corrected using the false discovery rate (FDR) method (Benjamini & Hochberg, 1995).

3. Results

Demographic information for the OCD group, the student group meeting criteria for other DSM disorders (CC), and the non-psychiatric control group (NCC) from the 3 sites is presented in Table 1. The NCC group (M = 19.93, SD = 3.23) was significantly younger than the CC group (M = 20.98, SD = 3.72; p = .004). Differences were also found on race and ethnicity between the groups ($X^2(4) = 26.22, p = .01$). Notably, the American samples were racially heterogeneous with 41%–48% White Americans. No differences were found on overall GPA. However, there was a significant difference in the proportion of high GPA (i.e., GPA≥3.6) where the OCD (17.9%) and the CC (21.9%) groups had significantly lower proportions of high GPA compared with the NCC (35.6%) group [$X^2(2) = 9.32, p = .01$].

Table 2 presents comparisons of symptomatic outcomes between the three groups. In terms of the OCI-R, an overall difference was found between the groups (Wilk's Lambda = 0.867, $F(14) = 5.318$, p < .001). Univariate analyses showed a significant difference between the groups on all OCI-R subscales. Games-Howell planned contrasts revealed a significant difference between the groups on OCI-R scores, where the OCD group scored significantly higher than the NCC on all OCI-R scores (p's ranging from <.001 to .04). Compared to the CC group the OCD group scored higher on all OCI-R scales (p's range from <.01 to .02). After correcting for multiple comparisons, the OCD group scored significantly higher than the NCC group on the OCI-R total score, and its checking, obsessing, and ordering subscales, and higher than the CC group on all OCI-R scales.

Analyses of the Y-BOCS outcomes (available from the Ghent and

Table 2
OCD symptoms-severity measures across study samples.

Variable	OCD[a] (n = 36)	CC[b] (n = 180)	NCC[c] (n = 298)	F/Contrasts
	M (SD)	M (SD)	M (SD)	
OCI-R				
Total Score	27.61 (13.03)	13.66 (10.22)	13.60 (10.46)	29.24 a>b = c
Checking	4.61 (3.31)	2.19 (2.26)	2.38 (2.74)	13.12 a>b = c
Hoarding	4.36 (3.23)	2.88 (2.53)	2.71 (2.52)	6.54 a>b = c
Neutralizing	2.67 (3.31)	1.08 (1.70)	1.28 (2.15)	8.48 a>b = c
Obsessing	4.89 (3.52)	2.72 (2.67)	2.29 (2.70)	14.44 a>b = c
Ordering	5.78 (3.66)	3.32 (3.03)	3.67 (3.02)	9.59 a>b = c
Washing	3.08 (3.30)	1.30 (1.80)	1.59 (2.28)	9.44 a>b = c
Y-BOCS±				
Total Score	16.53 (4.08)	8.68 (6.74)	5.51 (4.84)	32.27 a>b>c
Obsessions	8.27 (2.31)	4.85 (3.88)	2.90 (2.45)	28.93 a>b>c
Compulsions	8.67 (3.30)	3.53 (3.58)	2.43 (2.79)	25.36 a>b = c

Note. NCC=Non-Clinical Controls; CC=Clinical control group; OCD=Student OCD Sample; OCI-R=Obsessive-Compulsive Inventory Revised; Y-BOCS=Yale-Brown Obsessive-Compulsive Scale; ± Y-BOCS data available for OCD (*n* = 15), CC (*n* = 40), NCC (*n* = 136); > indicates significant difference; = indicates no significant difference.

Miami sites) revealed an overall group difference (Wilk's Lambda = .696, $F(6) = 12.33, p < .001$). Planned contrasts revealed that the OCD group scored significantly higher than the two other groups on the Y-BOCS total and subscores (*p*'s < .0001 – *p* = .001). Furthermore, compared to the NCC group, the CC group was found to have significantly elevated scores on the Y-BOCS total score, (*p* = .02), and the obsessions score (*p* = .01), but no difference was found on the compulsions score (*p* = .14). After correcting for multiple comparisons, all differences remained significant.

Data for depression and anxiety symptoms were available via the DASS-21 anxiety and depression subscales for 50% of the NCC sample (n = 157), 86% of the CC sample (n = 183), and 76% of the OCD sample (n = 29). The OCD group (M = 10.97, SD = 6.81) had significantly higher scores on the DASS anxiety subscale than the NCC group (M = 4.10, SD = 4.94; *p* < .001), but no significant difference was found between the CC group (M = 7.68, SD = 6.39) and the OCD group (*p* = .054). However, the CC group scored significantly higher than the NCC sample (p < .001). A similar trend was found for the DASS depression subscale, where the OCD group (M = 13.59, SD = 11.54), and the CC group (M = 8.23, SD = 8.64) scored significantly higher than the NCC groups (M = 4.50, SD = 6.02), *p* = .001 and *p* < .001, respectively. No significant difference was found between the CC and OCD groups (*p* = .06). All differences remained significant after correcting for multiplicity.

Table 3 presents comparisons of lifetime comorbidity rates between the OCD and CC groups. The CC group had a higher proportion of individuals who met criteria for any affective disorder compared to the OCD group [$\chi^2(1) = 4.44, p = .03$]. However, this difference did not survive correction for multiplicity. In addition, compared to the CC sample, the OCD group had a higher percentage of individuals who had a comorbid diagnosis [$\chi^2(1) = 6.38, p = .01$] and had a higher average number of disorders [$\chi^2(1) = 3.52, p < .0001$]. However, after correcting for multiple comparisons, only the effect of a higher average number of comorbid disorders in the OCD group in comparison to the CC group remained significant.

3.1. Comparison of OCD symptom severity with clinical and community samples

Fig. 1 presents comparisons of symptom severity (i.e., OCI-R Total Score and Y-BOCS Total Score) between the student OCD sample and clinical and community OCD samples. Compared to the student OCD

Table 3
Comorbidity rates among students with OCD and students with other disorders.

Variable	OCD (n = 38)	CC (n = 183)	OCD vs CC	
	%(n)	%(n)	χ^2/t	p
Any Anxiety Disorder	36.8% (14)	33.3% (61)	0.17	.67
Panic Disorder	15.8% (6)	12.0% (22)	0.40	.52
Agoraphobia	2.6% (1)	5.5% (10)	0.53	.46
Social Anxiety Disorder	15.8% (6)	7.7% (14)	2.53	.11
GAD	15.8% (6)	15.8% (29)	0.00	.99
Any Affective Disorder	34.2% (13)	53.0% (97)	4.44	.03
MDD	34.2% (13)	51.4% (94)	3.70	.05
Bipolar I	5.3% (2)	7.7% (14)	0.26	.60
Other				
PTSD	7.9% (3)	3.8% (7)	1.20	.38
ADHD	2.6% (1)	13.7% (25)	3.68	.05
Substance Use Disorder	15.8% (6)	14.8% (27)	0.27	.87
Psychotic Disorder	5.3% (2)	2.7% (5)	0.65	.41
Anorexia Nervosa	2.6% (1)	0.5% (1)	1.52	.21
Bulimia Nervosa	0.0% (0)	7.1% (13)	2.86	.13
Binge Eating Disorder	0.0% (0)	0.5% (1)	0.20	.64
% With Comorbid Diagnosis	100% (32)	85.2% (156)	6.38	.01
Average Number of Disorders	2.26 (1.58)	1.31 (1.00)	3.52	<.001*

Note. GAD = Generalized Anxiety Disorder; MDD = Major Depressive Disorder; PTSD=Post-Traumatic Stress Disorder; ADHD = Attention-Deficit/Hyperactivity Disorder[1]; * significant difference that survived correction for multiplicity.

sample (M = 16.5, SD = 4.08), large clinical samples reported significantly higher total Y-BOCS scores, including Abramovitch, Abramowitz, Riemann, and McKay (2020; n = 1339, M = 25.4, SD = 6.51, p < .0001), Torres et al. (2016; n = 1,001, M = 25.51, SD = 7.512, p < .0001), Abramowitz and Deacon (2006, n = 167, M = 23.80, SD = 5.25, p < .0001), and Schuurmans et al. (2012; n = 419, M = 19.89, SD = 8.1, p = .01). However, no significant differences were found for the OCI-R total score between the OCD student sample (M = 27.61, SD = 13.03) and several community and clinical OCD samples, including Abramovitch et al. (2020; n = 1339, M = 25.11, SD = 12.72), Henrich, Heine, and Norenzayan (2010; n = 186, M = 26.3, SD = 12.8), and Abramowitz and Deacon (2006; n = 167, M = 27.02, SD = 13.22).

Since the OCI-R scores in the student OCD sample were equivalent to scores reported in clinical and community samples, but significantly lower on the Y-BOCS scores, we opted to conduct a post hoc analysis to explore the nature of this discrepancy. Specifically, we speculated that students with OCD may have relatively less time to engage in compulsions (or experience obsessions) compared to non-student samples with OCD. Therefore, we opted to examine the distribution of two items from the Y-BOCS that directly assess time spent with obsessions and compulsions (items 1 and 6 respectively). We obtained Y-BOCS data from a recent large OCD psychometric study (OCD n = 500; Abramovitch et al., 2020) and examined the distribution of these items in the clinical sample, and in the present study's student sample. The distribution of duration of symptoms per day engaging in compulsions, and time occupied by obsessive thoughts clearly suggests that students spent significantly less time experiencing those symptoms [$X^2(1)$=8.66, p=.03]. Specifically, only 8.3% of students with OCD reported engaging in both types of symptoms for 3–8 hours per day, and no student with OCD reported engaging with these symptoms for 8 hrs or more per day. However, in clinical OCD samples 33% were occupied by obsessions for 3–8 hrs per day (and additional 34% reported >8 hrs per day), and 32% of the clinical sample engaged in compulsions 3–8 hrs per day, and an additional 17% reported >8 h per day.

3.2. Comparison of rates of comorbidity in clinical samples

Table S1 (see supplementary materials) presents comparisons of lifetime comorbidity rates between the student OCD sample and U.S. and international clinical OCD samples. No significant differences were found between the student OCD group and any of the clinical samples on

rates of comorbid panic disorder, agoraphobia, social anxiety disorder (SAD), generalized anxiety disorder (GAD) bipolar I, posttraumatic stress disorder (PTSD), attention deficit/hyperactivity disorder (ADHD), psychotic disorder, bulimia nervosa, anorexia nervosa, and binge eating disorder. In addition, no difference was found between the groups on the prevalence of 'any comorbidity'. However, the three comparison groups had significantly higher rates of 'any affective disorder' (range 61%–64%) than the students OCD group (34%). Likewise, the three comparison groups had significantly higher rates of major depressive disorder (MDD; range 57%–67%) compared to the students OCD group (34.2%). Additional comparisons indicated that the Torres et al. (2016) sample had significantly higher rates of 'any anxiety disorder' (70%) compared to the student OCD group (37%), but no such difference was found when compared to the NOCDA (42%) study (46%; Schuurmans et al., 2012). Similarly, whereas a significant difference was found in the rates of substance abuse disorders (SUDs) between the student OCD group (16%) and the LaSalle et al. (2004) study (37%), there were no significant differences on SUDs when compared to the NOCDA (11%), and the Torres (11%) studies.

3.3. Comparison of rates of comorbidity in community samples

Table S2 (see supplementary materials) presents comparisons of lifetime comorbidity rates between the student OCD sample and U.S. and international community samples. No differences were found between the student OCD group and any of the community samples across individual disorders other than a significantly higher prevalence of comorbid SAD in the Ruscio et al. (Ruscio et al., 2010) sample (44%) compared to the student OCD sample (16%). In addition, comparison on the rates of 'any anxiety disorder' yielded a significant difference between the Ruscio et al. (2010) sample (75%), compared to the student OCD sample (37%), but no differences were found with the Adam et al. (2012) sample (67%) and the Crino et al. (2005) sample (61%). Finally, comparisons between the groups on 'any affective disorder' indicated that compared to the student OCD sample (34%) the Ruscio et al. (2010) and the Adam et al. (2012) samples had significantly higher rates (63%, and 70%, respectively), but not with the Crino et al. (2005) sample (55%).

4. Discussion

To our knowledge, this is the first study to examine the clinical profile of students who meet DSM criteria for OCD using a semi-structured interview. The primary goal of the present investigation was to examine DSM defined OCD in college students from two American and one Belgian universities.

First, we compared students with OCD with clinical control students (CC) and non-clinical control students (NCC). Results indicated no difference in demographics, and in overall GPA between the 3 student samples. Interestingly, however, when GPA was stratified, the percent of students with high GPA was twice as large in the NCC group compared to the OCD group. This finding corresponds to research findings indicating that OCD is associated with a meaningful decrease in educational attainment across the lifespan, including college (Pérez-Vigil et al., 2018). As hypothesized, the student OCD sample endorsed higher OCD severity ratings compared to the two student control samples, which did not differ from one another. Critically, we saw the same pattern across both self-report and interview-assessed OCD symptoms.

When compared with published data from clinical OCD cohorts, students with OCD had similar severity rating as measured by the OCI-R, but lower severity scores on the Y-BOCS. Although Y-BOCS scores were only available for half the OCD student sample, and analyses were therefore likely under-powered, it is nevertheless intriguing to consider potential reasons for this distinction. First and foremost, it is important to highlight the methodological and conceptual differences between the two measures. The OCI-R assumes a nomothetic approach and assesses
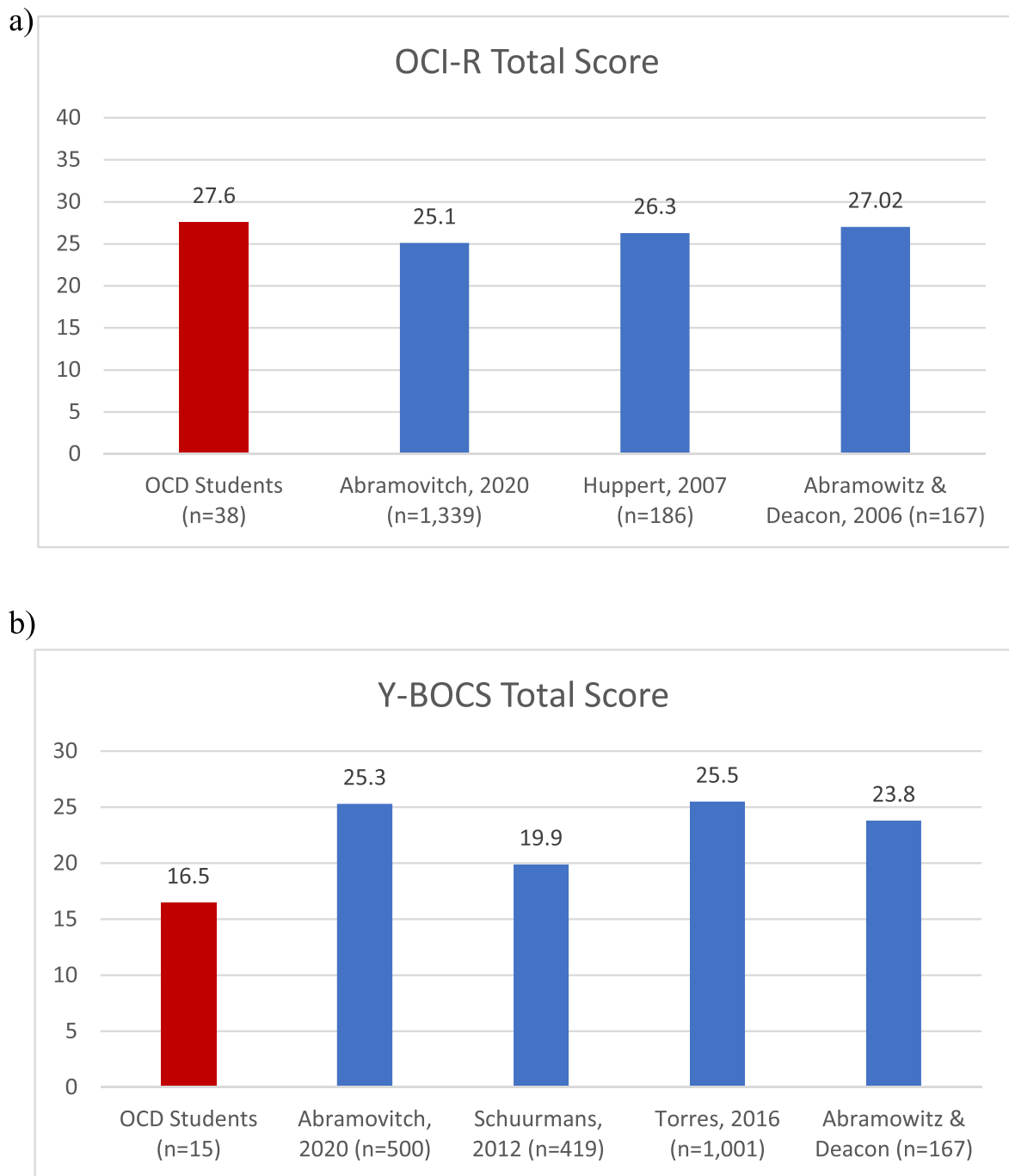
a)

OCI-R Total Score

OCD Students (n=38)	Abramovitch, 2020 (n=1,339)	Huppert, 2007 (n=186)	Abramowitz & Deacon, 2006 (n=167)
27.6	25.1	26.3	27.02

b)

Y-BOCS Total Score

OCD Students (n=15)	Abramovitch, 2020 (n=500)	Schuurmans, 2012 (n=419)	Torres, 2016 (n=1,001)	Abramowitz & Deacon (n=167)
16.5	25.3	19.9	25.5	23.8

Fig. 1. Comparison between students with OCD and published clinical and community OCD samples on the a) OCI-R and b) Y-BOCS total scores.

distress related to quintessential OCD symptoms, whereas the Y-BOCS takes an idiographic approach, assessing several outcomes pertaining to an examinee's most disabling obsessions and compulsions. In the latter approach, interviewers identify each participant most significant obsessions and compulsions and inquire about aspects related to those specific symptoms such as frequency, duration of symptoms per day, interference etc. Therefore, a person may rank strong distress concerning a particular symptom such as the need for symmetry on the OCI-R but this individual may experience these symptoms infrequently, whereas a similar distress rank may be attributed to a symptom they encounter multiple times a day. Second, while the OCI-R was completed

via self-report, the Y-BOCS was conducted as an interview by trained and reliable raters. There is a rich literature discussing discrepancies between self-report and interview-based measures of psychiatric disorders, the conclusion being that one may not necessarily be more accurate than the other, but that both approaches are characterized by pros and cons. Issues to consider include introspective abilities, social desirability or impression management, and/or demand characteristics (Brenner & DeLamater, 2016). Past studies on the Y-BOCS have been somewhat discrepant, with some indicating that self-report is associated with greater severity (Steketee, Frost, & Bogart, 1996) and others supporting the opposite finding (Federici et al., 2010). A third consideration is that the time range assessed with the Y-BOCS pertains to the past week, whereas the OCI-R asks about symptoms pertaining to the past month. Finally, the Y-BOCS scores are heavily influenced by multiple items

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[1] The terms 'college' and 'university' are used interchangeably.

assessing time with symptoms and time free of symptoms. These differences are known to result in modest correlations between the two measures (Abramovitch et al., 2021; Abramowitz & Deacon, 2006). Our post-hoc exploratory analyses of the OCI-R and Y-BOCS scores revealed that students with OCD report the same level of distress resulting from OCD symptoms but report fewer hours per day experiencing/engaging with these symptoms. This may reflect higher functioning associated with OCD in our student samples compared to typical clinical samples but could also speculatively suggest that having a regular schedule within a structured environment (e.g., attending classes while living in a dorm) may be helpful in limiting the impact of compulsions.

In terms of comparing the comorbidity profiles between the CC and OCD groups, we found no differences in the rates of any anxiety disorder; however, a numerically (albeit nor significantly) higher proportion of participants in the CC sample met criteria for an affective disorder or ADHD. Considering composite comorbidity indices, all participants with OCD met criteria for any comorbidity, and additionally had a significantly higher average number of comorbid disorders. These findings are generally in line with the clinical literature on OCD that indicates comorbidity is the norm rather than the exception, and that anxiety disorders are the most common comorbid conditions (LaSalle et al., 2004; Schuurmans et al., 2012). Most notably, the comorbidity pattern noted in our sample was extremely similar to that seen in community samples, and only minimal differences emerged compared to clinical samples. The latter was particularly relevant with respect to the proportion of those with more severe comorbidities (LaSalle et al., 2004). Given that bipolar was an exclusionary criterion for the Miami site, these differences may be an artifact due to sampling, though it may also reflect more general severity differences between treatment-seeking, community, and university samples.

4.1. Limitations

The present investigation should be interpreted in light of several limitations. Although the sample was fairly diverse from an ethnic and racial perspective, with over half of the American samples self-describing as a minority, it nevertheless is the case that they might not be truly representative of young adults in general (Kovess-Masfety et al., 2016). A second limitation is that the comparison with the community and treatment seeking clinical samples were conducted using archival data from published studies. Although there is every reason to trust the integrity of the data from these published studies, it is recommended that future research should conduct a direct comparison between samples. While all three sites used in-person reliable gold-standard semi-structured interviews for clinical screening, there were some notable differences in the procedures. For example, the Miami site that interviewed participants using the MINI, also included several clinical exclusion criteria (e.g., bipolar disorder), and used a recruitment approach that over-samples individuals endorsing obsessions during a pretesting session. In contrast, the Texas sample did not have a pre-screening procedure in place and did not employ any clinical exclusion criteria. Finally, two different versions of the MINI were used in the Texas (7.0) site versus the Miami and Ghent sites (MINI 6.0) which corresponds to DSM-IV. However, the changes in criteria between the two versions is not expected to lead to meaningful diagnostic differences. It is also important to note that the Y-BOCS scores among students with OCD were found to correspond to mild severity. Although Y-BOCS scores were not available for all students with OCD, and that the OCI-R severity score was similar to those reported in clinical OCD samples, it is possible that individuals with more severe OCD dropped out of college or did not attend college. Therefore, although our results indicate that OCD in students is clinically and phenomenologically similar to OCD in other populations, samples of students with OCD may not represent the full range of OCD severity. Finally, the present study did not include standardization of procedures between sites. However, all interviewers across sites were highly trained graduate level resreach assistants that went through rigorous training.

5. Conclusion

The conclusions of the present investigation are first and foremost that OCD in college student samples appears similar to OCD in community samples, across phenomenological and comorbidity considerations. Differences noted between our sample and published treatment-seeking samples appear to point to a lower prevalence of more severe comorbidities in the student sample. Thus, the broader conclusion of our investigation is that OCD—if carefully diagnostically screened—can effectively be studied using college students.

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