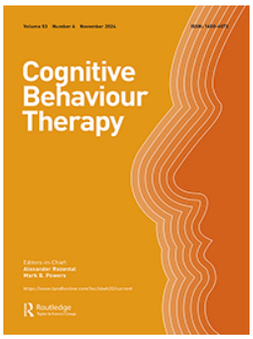

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Correlates of depression in individuals with obsessive compulsive disorder

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ABSTRACT

The existing literature examining the correlates of depression in individuals with obsessive compulsive disorder (OCD) is characterized by inconsistent results. The aim of the current study was to replicate and extend the literature by exploring whether various clinical and demographic factors are related to the occurrence of depression in a large sample ($N = 243$) of individuals with OCD (M age = 33.00; SD = 12.47; 74% female). Individuals with OCD who had elevated comorbid depressive symptoms [Patient Health Questionnaire-9 item (PHQ-9) ≥10] scored significantly higher on all OCD symptom subtypes (p range < .001–.048), had greater obsessive and compulsive severity ($ps < .001$), scored higher on perfectionism ($p < .001$), and had higher disgust sensitivity and propensity scores ($ps < .001$) compared with individuals who did not have comorbid depressive symptoms (PHQ-9 < 10). Of these variables, obsession severity ($\beta = 0.22$, $p = .004$), OCD contamination subtype ($\beta = 0.16$, $p = .032$) and perfectionism ($\beta = 0.25$, $p < .001$) were found to be associated with depressive symptoms on the PHQ-9. The findings of this study contribute to the understanding of factors which are associated with depression comorbidity in individuals with OCD.

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Depression; obsessive-compulsive disorder; mental health

Obsessive compulsive disorder (OCD) is a chronic disorder that rarely remits without treatment (Melkonian et al., 2022). The disorder is common, affecting approximately 3.6% of the population in any 12-month period (Australian Bureau of Statistics, 2022). OCD additionally results in significant economic costs, encompassing direct medical costs and indirect costs related to productivity losses (Knapp et al., 2000; Strouphauer et al., 2023). Depressive disorders frequently co-occur with OCD, with lifetime comorbidity rates estimated as high as 48% (Sharma & Math, 2019). Patients with OCD with a comorbid depressive disorder appear to be significantly more impaired than their non-depressed counterparts, reporting lower quality of life (Ruscio et al., 2010), lowered

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occupational functioning (Ruscio et al., 2010; Tükel et al., 2006) and higher rates of suicide attempts (Kamath et al., 2007; Torres et al., 2007). Additionally, comorbid depression tends to predict poorer psychological treatment response and early drop out in pharmacological and psychological treatment for OCD (Keeley et al., 2008).

Given the significance of such findings, it is important to identify individuals with OCD who may be at greater risk of developing depression to intervene early and adapt treatment accordingly. The literature to date examining factors associated with depression in OCD have investigated disorder-specific features of OCD related to both the nature and course of the disorder (e.g. symptom severity and symptom subtype), as well as non-specific variables which are transdiagnostic or related to the personal characteristics of the patient (e.g. demographics). However, this literature is relatively scarce, and findings across studies are largely inconsistent. Additionally, despite these variables explaining a significant proportion of variance within the relationship between OCD and depression (estimated as 51% by Yap et al., 2012, and 58% by; Buchholz et al., 2019), there remains a number of unexplored variables, such as perfectionism and disgust, which are transdiagnostic concepts and may be help further reveal the relationship between OCD and depression. The existing literature examining variables which predict depression in OCD is summarized below, as well as other transdiagnostic variables which may also be relevant to the co-occurrence of depression in OCD.

Symptom chronicity

Some research suggests that a chronic course of OCD is associated with an increased risk of a comorbid depressive disorder (Diniz et al., 2004; Perugi et al., 1997). This may be due to longer illness duration being associated with greater loss of functioning and disability in occupational and psychosocial domains (Coluccia et al., 2016). However, this finding has not always been replicated (Dell'osso et al., 2013; Ravizza et al., 1997). Notably, a large ($N = 376$) community-based study found no relationship between depression and OCD symptom duration (Dell'osso et al., 2013). Overall, the limited literature which exists examining the relationship between OCD symptom chronicity and comorbid depression is conflicting and requires further examination.

Symptom severity

The relationship between OCD symptom severity and depression has been frequently examined. This literature suggests that OCD patients with comorbid depression have higher obsession and compulsion severity (Hong et al., 2004; Tükel et al., 2006) when compared to their non-depressed counterparts, and this independently predicts symptoms of depression (Altintas & Taskintuna, 2015). This may reflect current research which suggests more severe obsessions and compulsions are associated with reduced quality of life and greater impairment across social and occupational domains, thus being associated with greater psychological distress (Coban & Tan, 2019; Remmerswaal et al., 2020). However, despite this, there is also research which reports inconsistent findings. For example, a study published by Besiroglu et al. (2007) found that greater obsession, but not compulsion severity is associated with depressive symptoms in OCD, and obsession severity was further found to predict a diagnosis of a depressive disorder.

These inconsistent findings may reflect critical differences in how depression is measured and analyzed, however further research is needed to clarify the relationship between symptom severity and depression.

Symptom subtype

Several studies have examined the relationship between OCD symptom subtype and depression. Most of the results of this work suggest that higher scores on the unacceptable thoughts subtype, which typically features obsessions related to morality, aggression, and sex, are associated with depression in OCD (Hasler et al., 2005; Hong et al., 2004), and these types of obsessions further predict a depression diagnosis (Besiroglu et al., 2007). However, other studies have also implicated other OCD subtypes. For example, using a large ($N = 815$) clinical sample, Quarantini et al. (2011) found that unacceptable thoughts, symmetry, and contamination obsessions are associated with a current depression diagnosis. More recent research has also found that in addition to unacceptable thoughts, symmetry-related obsessions are also predictive of depressive symptoms in OCD (Buchholz et al., 2019). Overall, the literature is largely inconsistent around the relationship between OCD symptom subtypes and depression.

Demographics: age and gender

The demographic characteristics of individuals who develop depression in OCD has been explored, with literature tending to focus on the role of age and gender. There is some research to suggest females are more likely than males to develop depression (Benatti et al., 2020; Labad et al., 2008; Torresan et al., 2012), however there is also conflicting research which suggests there is no relationship at all (Hong et al., 2004; Lochner et al., 2004), which is supported by a systematic review of the literature (Mathis et al., 2011). Similarly, in relation to age, research largely reports that there are no significant age differences between depressed and non-depressed individuals with OCD (Tükel et al., 2006).

Overall, the existing literature examining predictors of depression in OCD is characterized by a relatively small number of studies with inconsistent findings. There may be a number of reasons for these inconsistencies. Firstly, there are important methodological differences across studies with some studies examining depression as a dichotomous variable, and others examining depressive symptoms as a continuous variable. Comparison of findings across studies may therefore be inappropriate. Second, OCD is considered an extremely heterogeneous disorder, and the purported subtypes are measured in different ways. For example, some studies use self-report measures such as the Yale-Brown Obsessive Compulsive Scale (Y-BOCS-SR; Goodman et al., 1989) or Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010) to assess the subtypes, whilst others use a clinician administered diagnostic interview. Similarly, different assessment tools are also often used across studies to measure depression. Overall, these differences may contribute to the inconsistencies reported in the literature and indicate a need for additional research. Furthermore, there may also be other variables that are more predictive of depression than those already examined in the literature and these variables are summarized below.

Perfectionism

Research has highlighted the significant role perfectionism plays in both the development and exacerbation of certain psychopathologies as a transdiagnostic construct (Egan et al., 2011; Kaçar-Başaran & Arkar, 2023; Limburg et al., 2017; Pinto et al., 2017). Perfectionism is defined as the pursuit of unrealistic high standards and critical self-evaluations when these standards are not met (Frost et al., 1990). Such perfectionistic tendencies may not only contribute to the perpetuation of obsessive-compulsive symptoms but also significantly increase the vulnerability to depression (Cludius et al., 2022; Frost et al., 2002; Kaçar-Başaran & Arkar, 2023; Smith et al., 2016), which has been confirmed in a meta-analytic review of longitudinal studies (Guzick et al., 2021). The relentless pursuit of perfectionism and the inability to meet unrealistic standards often lead to chronic feelings of inadequacy, self-criticism, and a sense of failure, all of which are hallmark features of depression (Kaçar-Başaran & Arkar, 2023; Smith et al., 2016). Therefore, understanding perfectionism as a transdiagnostic factor provides valuable insights into the comorbidity between OCD and depression and may underscore the importance of addressing perfectionistic beliefs and behaviours in treatment interventions.

Disgust

Disgust is as an emotional response, functioning to protect humans against harm (Davey, 2011). Although universally experienced, disgust has been recognized as a transdiagnostic construct (Clarke et al., 2019), as high disgust sensitivity and proneness has been linked to OCD (B. O. Olatunji & Kim, 2024; Thayer et al., 2021) and other psychological conditions, including depression (Gao et al., 2022; Powell et al., 2013). Within OCD, more severe disgust symptoms may play a role in the development and maintenance of contamination obsessions (Cisler et al., 2009; Rachman, 2004) and within appraisals of obsessions (i.e. sexually inappropriate obsessions) that may lead to disgust at oneself (Berle & Phillips, 2006). Reflecting this, disgust experienced in response to certain obsessions and compulsions may be associated with depression through its involvement in triggering other complex human emotions such as shame and guilt (Davey, 2011). Within the depression literature, high disgust experiences have been associated with emotion regulatory dysfunction and meta-analytic evidence has shown a clear association between elevated self-disgust and depression (Gao et al., 2022). Overall, examining disgust as transdiagnostic factor may offer insight into the interplay between OCD and depression.

In summary, the co-occurrence of depression with OCD is common (Sharma & Math, 2019) and is associated with reduced patient outcomes (Ruscio et al., 2010; Tükel et al., 2006), however the existing literature exploring predictors of depression in OCD is limited and characterized by inconsistent results. Likely, this is due to many factors, including the heterogenous nature of OCD presentations, differing methodological procedures and small sample sizes. Considering this, there is an urgent need for further research which replicates and extends upon the current literature and addresses some of these shortcomings. Therefore, the aim of this study was to explore correlates of depression in individuals with OCD using data from a large clinical sample of individuals

presenting for treatment. Given the state of the literature as highlighted above, the current study makes no a priori hypotheses, however, will explore whether factors including OCD symptom subtypes, OCD symptom severity, OCD symptom duration, gender, age, perfectionism, and disgust are associated with depressive symptoms in individuals with OCD.

Methods

Design

The current study is a secondary data analysis from a single group open trial (Wootton et al., 2023) which examined the effectiveness of a self-guided internet delivered cognitive behavioural therapy (iCBT) program for OCD. The current study is cross-sectional and adheres to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; Von Elm et al., 2007) guidelines.

Participants

Two hundred and forty-three participants were included in the study. Participants were recruited between February 2020 and December 2021. Participants were recruited for the study from: 1) the International OCD Foundation website, 2) social media advertisements, 3) through direct emails to clinicians and researchers, 4) prominent mental health consumer pages and 5) Google advertisements. Interested participants applied via the eCentreClinic website, a specialist research clinic in Sydney, Australia which develops and evaluates internet delivered psychological treatments.

To be included in the study participants were required to meet the following eligibility criteria assessed via an online questionnaire upon application: 1) English speaking, 2) aged ≥ 18, 3) reliable internet, 4) have no suicidal plans or intention, 5) score ≥ 7 on one subscale of the DOCS, (6) score ≥ 14 on the Y-BOCS-SR, and 7) meet criteria for OCD on the Diagnostic Interview for Anxiety, Mood, Obsessive-Compulsive, and other Neuropsychiatric Disorders (DIAMOND; Tolin et al., 2018), which was administered in a self-report format. Participants were excluded if they had a recent history of attempted suicide or self-harm. In total, 528 participants applied to participate in the study and 205 people were excluded for not meeting eligibility criteria. Of the 323 people who provided a successful application, 243 completed pre-treatment questionnaires and were included in the current study. For a detailed breakdown of the study flow, see Figure 1.

Procedure

Interested participants read about the study online via the eCentreClinic website. Participants then reviewed the participant information sheet and completed the consent form before proceeding on to the screening questionnaires. As participants applied through an online portal for the study, duplicate applicants were automatically screened by the system by cross-checking registered names and email addresses. Procedures from the outcome study can be found in other

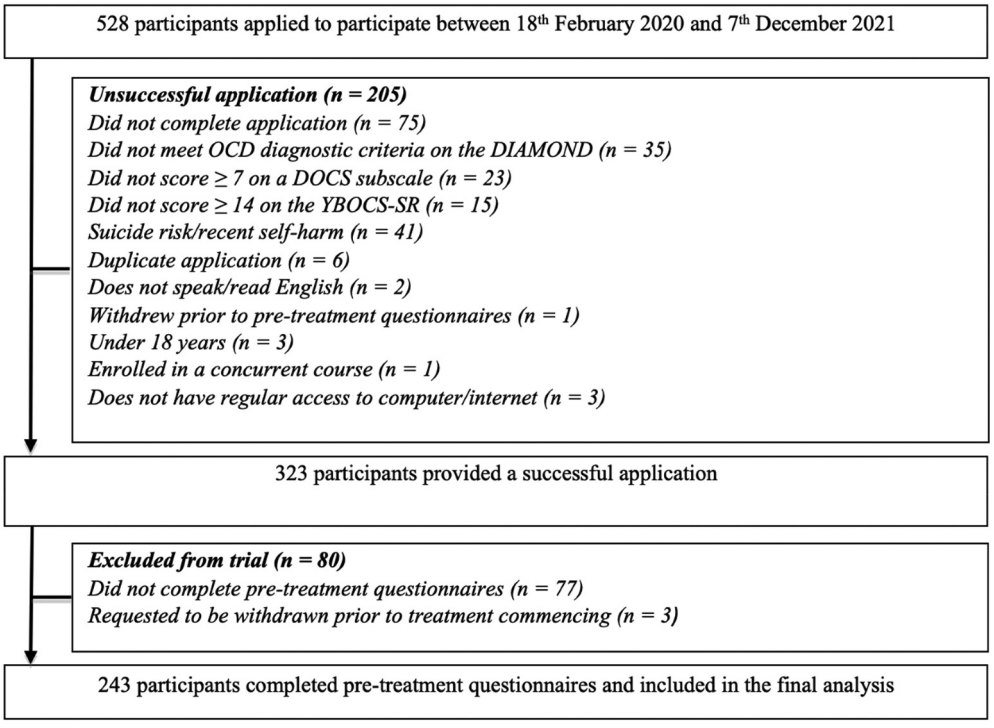

Figure 1. Study flow.

publications (e.g., Wootton et al., 2023). Briefly, eligible participants were invited via email to participate in the study and given access to the 8-week online course. Further questionnaires became available for participants to complete at pre-treatment, mid-treatment, post-treatment, and 3-month follow-up. This study uses the application and pre-treatment data only. Ethics approval for the original open trial was obtained from the Human Research Ethics Committee (HREC) of Macquarie University, Sydney, Australia (5201701075). The use of the existing data for the current project was approved by the Medical and Human Research Ethics Committee at The University of Technology Sydney (ETH21–6276).

Measures

All questionnaires were administered online via the eCentreClinic secure software system. The demographic questionnaire and OCD module of the DIAMOND (Tolin et al., 2018) was completed at point of application. All other clinical measures which are relevant to the current study were administered at pre-treatment.

Demographic questionnaire

The demographic questionnaire collected information on participant age, gender, relationship status, education status, medication use and OCD symptom duration.

Diagnostic Interview for anxiety, mood, obsessive-compulsive, and other neuropsychiatric disorders (DIAMOND; Tolin et al., 2018)

The DIAMOND OCD module was used to assess diagnostic status. The DIAMOND is designed as a clinician-administered diagnostic tool that assesses the DSM-5 criteria for OCD. The DIAMOND, when delivered in a clinician-administered format, has been shown to have convergent validity with established self-report measures of OCD and excellent test-retest reliability ($k = .83$; Tolin et al., 2018). In the current study the DIAMOND was administered in a self-report format.

Patient health questionnaire 9-item (PHQ-9; Kroenke et al., 2001)

The PHQ-9 is measure of depressive symptoms. Items are rated on a 4-point scale with scores summed to produce a total score ranging between 0–27. Scores are classified as: 0–4 (none), 5–9 (mild), 10–14 (moderate), 15–19 (moderately severe) and, 20–27 (severe), with a score of ≥ 10 recommended as the clinical cut score for diagnosing a depressive disorder (Kroenke et al., 2001). The PHQ-9 has been shown to be a valid and reliable measure (Kroenke et al., 2001), although recent studies indicate higher cut-offs may be appropriate (Titov & Andersson, 2022). Internal consistency of the scale in the current sample was good (α = .86).

Yale brown obsessive compulsive scale (self report) (Goodman et al., 1989)

The Y-BOCS-SR is a 10-item measure of OCD severity with items rated on a 5-point scale. Items 1–5 are summed to produce a total score on the obsession severity subscale, and items 6–10 are summed to produce a total score on the compulsion severity subscale. A total OCD severity score can also be produced by summing all 10 items on the measure. Total scores that range from 0–13 are considered mild, 14–25 moderate, 26–34 moderate-severe, and 35–40 severe (Storch et al., 2015). The Y-BOCS-SR has been shown to be a valid and reliable measure (Alafsson et al., 2010) and correlations between the self-report and clinician-administered scales are high (Federici et al., 2010). Internal consistency of the scale in the current sample was good (α =.83).

Dimensional obsessive compulsive scale (DOCS; Abramowitz et al., 2010)

The DOCS is a 20-item measure used to assess the severity of the 4 most empirically validated subtypes of OCD (contamination, responsibility, unacceptable thoughts, and symmetry). Items are rated on a 5-point scale with a total score out of 20 calculated for each subscale. Scores ≥ 7 on any subscale indicate clinical relevance. The DOCS has been shown to be a valid and reliable measure (Abramowitz et al., 2010). Internal consistency of the scale in the current sample was good (α=.88).

Clinical perfectionism questionnaire (CPQ; Fairburn et al., 2003)

The CPQ is a 12-item measure of perfectionism. Items are rated on a 4-point scale and summed to produce a total score between 12 and 48. Higher scores indicate higher clinical perfectionism. The CPQ has been shown to be a valid and reliable measure (Dickie et al., 2012). Internal consistency of the scale in the current sample was good (α=.82).

Disgust propensity and sensitivity scale- revised (DPSS-R; Fergus & Valentiner, 2009)

The DPSS-R is a 12-item measure of disgust. Items are rated on a 5-point scale, with six of the items summed to produce a total score on the disgust propensity subscale, whilst the other six items are summed to produce a total score on the disgust sensitivity subscale. Higher scores indicate greater disgust propensity or sensitivity. The DPSS-R has been shown to be a valid and reliable measure (B. Olatunji et al., 2007). Internal consistency of the DPSS-R in the current sample was excellent (α = .91).

Data analysis

All analyses were conducted using SPSS version 28 with a two-tailed alpha set at 0.05. To ensure suitability of data for the main analyses, tests of assumptions were completed as preliminary analyses, along with descriptive statistics of the sample. Following this, depressed (PHQ-9 ≥ 10) and non-depressed (PHQ-9 < 10), groups were compared on demographic and clinical information using independent sample *t*-tests for continuous variables and chi-square tests of independence for categorical variables. Cohens *d* effect sizes and 95% confidence intervals were further generated for all between-group comparisons. Based on recommendations, Cohens *d* effect size may be interpreted as small (*d* = 0.2), medium (*d* = 0.5), and large (*d* = 0.8; Lakens, 2013).

Following univariate analyses, all variables were examined within a Spearman's correlational analysis. Based on recommendations, correlation coefficients may be interpreted as weak (*r* = ≤ 0.39), moderate (*r* = 0.4 to 0.69) and strong (*r* = ≥ 0.7; Schober et al., 2018). The variables entered were the PHQ-9, gender, age, OCD symptom duration, DOCS contamination, responsibility, thoughts, and symmetry subscales, Y-BOCS-SR obsession and compulsion subscales, CPQ, and DPSS-R sensitivity and propensity subscales. Variables which were significantly correlated with depression were then entered into a multiple linear regression to determine which factors were associated with depressive symptoms (using the PHQ-9 as a continuous variable). Due to inconsistencies within the literature, forced entry analyses were used. Importantly, gender and age were not included in the regression analyses as covariates, as these variables were not significantly correlated with any other variables. Based on recommendations, variables should not be entered as covariables if they are not significantly correlated with the outcome variables at baseline (Permutt, 1990; Senn, 1994). With a sample of *N* = 243 and nine predictors within the model and assuming alpha set at 0.05, the analyses were adequately powered (>.80) to detect a medium effect size ($f^2 = 0.25$).

Results

Participants

Demographic and clinical information describing the sample is reported in Table 1. In summary, participants were on average aged in their thirties (age range 18–78) and the majority were female (74%). Participants primarily lived in the United States of America (30%), Australia (26%), and Europe (18%). Participants on average had been living with symptoms of OCD for 16 years (*SD* = 11.89) and waited 10 years before treatment (*SD* = 10.42).

Table 1. Demographic and clinical information of participants.

Variable	Overall (n = 243)	Depressed (n = 144)	Non-depressed (n = 99)	Test statistic and p value
Age, *M* (*SD*)	33 (12.47)	33 (12.70)	33 (12.18)	$t = 0.29$, $p = .772$
Gender (female)	179 (74%)	103 (72%)	76 (78%)	$x^2 = 2.02$, $p = .365$
Relationship status				$x^2 = 3.89$, $p = .273$[b]
Single	128 (53%)	77 (54%)	51 (52%)	
Married/De facto	97 (40%)	57 (40%)	40 (40%)	
Divorced/Separated	9 (4%)	3 (2%)	6 (6%)	
Widowed	9 (4%)	7 (5%)	2 (2%)	
Education				$x^2 = 5.49$, $p = .240$
Year 10	9 (3.7%)	7 (4.9%)	2 (2%)	
Year 12	51 (21%)	35 (24%)	16 (16%)	
Trade Qualification/diploma/ certificate	48 (20%)	29 (20%)	19 (19%)	
Bachelor's degree	86 (40%)	44 (31%)	42 (43%)	
Master's or doctoral degree	49 (20%)	29 (20%)	20 (20%)	
Employment[a]				
Working	149 (61%)	87 (60%)	62 (63%)	$x^2 = 0.08$, $p = .775$
Unemployed	46 (19%)	25 (17%)	21 (22%)	$x^2 = 3.28$, $p = .194$
Student	46 (19%)	30 (21%)	16 (16%)	$x^2 = 0.77$, $p = .380$
At home parent	19 (8%)	13 (9%)	6 (6%)	$x^2 = 0.72$, $p = .397$
Registered sick or disabled	8 (3%)	5 (4%)	3 (3%)	$p = 1.000$[c*]
Retired	15 (6%)	9 (6%)	6 (6%)	$x^2 = 0.00$, $p = .952$
Country				$x^2 = 32.47$, $p = .256$
United States	74 (30%)	40 (28%)	34 (34%)	
Australia	63 (26%)	38 (26%)	25 (26%)	
Canada	26 (11%)	22 (15%)	4 (4%)	
Europe	43 (18%)	26 (18%)	17 (17%)	
Asia	21 (9%)	12 (9%)	9 (9%)	
Other	16 (7%)	6 (4%)	10 (10%)	
Mental Health Medication (% yes)	106 (44%)	69 (48%)	37 (37%)	$x^2 = 2.65$, $p = .103$
Years before OCD treatment, *M* years (SD)	10 (10.42)	9.9 (9.84)	10.1 (11.26)	$t = 0.14$, $p = .891$

Participant data self-report at point of application. Percentages are rounded to the nearest whole number.
[a]Participants could indicate more than one category.
[b]Likelihood ratio chi square test as 20% cells $n \leq 5$.
[c]p value for two-sided Fisher's exact test as cells $n \leq 5$.

Differences between OCD depressed and non-depressed groups

One hundred and forty-four participants were considered depressed (PHQ-9 ≥ 10) and included in the OCD depressed group, whilst 99 participants did not meet the diagnostic cut point and were included in the OCD non-depressed group. As shown in Table 2, participants in the OCD depressed group ($M = 15.84$, $SD = 4.62$) had significantly higher scores ($p < .001$) on the PHQ-9 compared to individuals within the OCD non-depressed group ($M = 5.65$, $SD = 2.38$). Significant differences between depressed and non-depressed OCD patients were further found on several of the outcome measures. OCD depressed patients scored significantly higher on the Y-BOCS-SR ($p < .001$), the Y-BOCS-SR obsessions subscale ($p < .001$), Y-BOCS-SR compulsion subscale ($p < .001$), the DOCS total ($p < .001$), DOCS responsibility subscale ($p = .048$), DOCS contamination subscale ($p = .002$), DOCS symmetry subscale ($p < .001$), DOCS unacceptable thoughts subscale ($p = .002$), CPQ ($p = .001$), DPSS-R ($p < .001$), DPSS-R sensitivity subscale ($p < .001$), and DPSS-R propensity subscale ($p < .001$). No significant differences were found between depressed and non-depressed

Table 2. Comparison between depressed and non-depressed groups.

Variable	*t*	*M* difference	*p*	Cohens *d*	95% CI
PHQ-9 total	22.46	10.19	<.001[a]	2.63	9.30 to 11.08
Y-BOCS-SR total	4.49	2.91	<.001	0.59	1.64 to 4.19
Y-BOCS-SR compulsion subscale	4.01	1.55	<.001	0.52	0.79 to 2.31
Y-BOCS-SR obsession subscale	3.94	1.37	<.001	0.51	0.68 to 2.05
DOCS total	5.22	8.31	<.001[a]	0.65	5.02 to 11.60
DOCS responsibility subscale	1.99	1.35	.048	0.26	0.01 to 2.69
DOCS contamination subscale	3.08	2.42	.002	0.40	0.87 to 3.99
DOCS unacceptable thoughts subscale	3.20	2.83	.002	0.18	0.88 to 3.69
DOCS symmetry subscale	3.36	2.20	<.001[a*]	0.42	0.86 to 3.54
CPQ total	3.45	2.96	<.001	0.51	1.27 to 4.64
DPSS-R total	5.71	7.25	<.001	0.75	4.75 to 9.76
DPSS-R sensitivity subscale	5.78	3.82	<.001[a*]	0.73	2.47 to 5.17
DPSS-R propensity subscale	4.84	3.44	<.001	0.63	2.04 to 4.84
Gender	1.21	0.09	.229[a*]	0.15	−0.05 to 0.21
Age	0.29	0.47	.772	0.04	−2.74 to 3.69
OCD symptom duration	0.19	0.30	.849	0.01	−2.77 to 3.36

Numbers rounded to two decimal places, except *p*-value. PHQ-9, Patient Health Questionnaire 9-items; Y-BOCS-SR, Yale-Brown Obsessive Compulsive Scale self- report; DOCS, Dimensional obsessive-compulsive scale; CPQ, Clinical Perfectionism Scale; DPSS-R, Disgust Propensity and Sensitivity Scale- Revised; OCD, Obsessive Compulsive Disorder.
[a]Equal variances not assumed.

individuals in terms of age (p =.772), gender (p =.229), and OCD symptom duration (p = .849).

Correlational analyses

Correlational analyses are presented in Table 3. The Y-BOCS-SR obsessive (r=.34; p < .001) and compulsive (r=.26; p < .001) severity subscales, DOCS responsibility (r=.20; p=.002), contamination (r=.21; p =.001), symmetry (r=.19; p=.003), and unacceptable thoughts (r=.26; p < .001) subscales, CPQ (r=.32; p < .001), and DPSS-R sensitivity (r=.31; p < .001) and propensity (r=.29; p < .001) subscales were significantly correlated with the PHQ-9. No significant relationships were found between the PHQ-9 and age (p=.923), gender (p=.180), or OCD symptom duration (p=.961).

Multiple linear regression analysis

A multiple linear regression was performed. No violations of the tests of assumptions were found. Although several outliers were identified within the sample, their influence on the fitted model was small and acceptable as indicated by Cooks distance (Cook's D < 1). A variance inflation factor (VIF) was further generated which indicated no concerns regarding multicollinearity between variables (All VIF's < 2.33). In combination, the predictors within the regression model significantly accounted for 26% of the variance (R^2 = .26, F(9, 233) = 9.23, p < .001). As shown in Table 4, it was found that depressive symptoms are significantly associated with higher scores on the CPQ (p < .001, R^2 = .05), greater Y-BOCS-SR obsession severity (p =.004, R^2 = .03), and higher scores on the DOCS contamination subscale (p = .032, R^2 = .02). The DOCS responsibility, unacceptable thoughts, and symmetry subscales, as well as the Y-BOCS-SR compulsion subscale

Table 3. Means, standard deviations and zero-order correlations.

													M and *SD*		
Variable	1	2	3	4	5	6	7	8	9	10	11	12	Overall (n = 243)	Depressed (n = 144)	Non-Depressed (n = 99)
1. PHQ.9	–												11.69 (6.33)	15.80 (4.60)	5.65 (2.39)
2. Y-BOCS-SR Compulsion	.26*	–											11.66 (3.04)	12.28 (3.07)	10.74 (2.77)
3. Y-BOCS-SR Obsession	.34*	.59*	–										11.88 (2.74)	12.44 (2.85)	11.07 (2.35)
4. DOCS responsibility	.20*	.26*	.26*	–									9.32 (5.24)	9.87 (5.46)	8.52 (4.81)
5. DOCS Contamination	.21*	.26*	.14**	.16**	–								7.20 (6.13)	8.19 (6.18)	5.77 (5.79)
6. DOCS unacceptable thoughts	.26*	.13**	.33*	.34*	−.16	–							8.85 (5.57)	9.78 (5.69)	7.49 (5.11)
7. DOCS symmetry	.19*	.31*	.19*	.25*	.01	.14**	–						6.12 (5.32)	7.02 (5.61)	4.82 (4.58)
8. CPQ	.32*	.11	.04	.16**	.00	.12	.33*	–					30.74 (6.70)	31.94 (6.92)	28.99 (5.99)
9. DPSS-R sensitivity	.31*	.14**	.10	.22*	.23*	.29*	.25*	.34*	–				13.40 (5.56)	14.96 (5.65)	11.14 (4.60)
10. DPSS-R propensity	.29*	.27*	.16**	.21*	.39*	.19*	.20*	.33*	.69*	–			16.68 (5.68)	18.08 (5.69)	14.65 (5.05)
11. Gender	.09	−.13**	−.03	−.05	−.05	.01	−.02	−.07	−.08	−.08	–		–	–	–
12. OCD symptom duration (years)	.00	.06	.03	−.03	.04	−.08	−.02	.00	−.07	.01	−.07	–	16.46 (11.89)	16.34 (11.55)	16.64 (12.42)
13. Age	.01	.07	−.02	−.09	.06	−.14**	−.12	−.12	−.05	.02	−.03	.66*	33 (12.47)	33 (12.70)	33 (12.18)

Numbers rounded to two decimal places. PHQ-9, Patient Health Questionnaire 9-Item; Y-BOCS-SR, Yale-Brown Obsessive Compulsive Scale self-report; DOCS, Dimensional obsessive-compulsive scale; CPQ, Clinical Perfectionism Scale; DPSS-R, Disgust Propensity and Sensitivity Scale- Revised; OCD, Obsessive Compulsive Disorder.

*Correlation is significant at the 0.01 level (2-tailed).

**Correlation is significant at the 0.05 level (2-tailed).

Table 4. Output of multiple linear regression.

	Multiple Linear Regression						
Variable	B	SE B	*β*	*t*	*p*	95% CI	Part correlation
Y-BOCS-SR Compulsion	0.01	0.16	0.01	0.07	.942	−0.30 to 0.33	.00
Y-BOCS-SR Obsession	0.51	0.17	0.22	2.94	.004	0.17 to 0.85	.17
DOCS responsibility	−0.01	0.08	−0.01	−0.09	.932	−0.16 to 0.15	−.01
DOCS Contamination	0.16	0.07	0.16	2.26	.032	0.01 to 0.31	.13
DOCS unacceptable thoughts	0.15	0.08	0.13	1.92	0.56	−0.00 to 0.30	.11
DOCS symmetry	0.01	0.08	0.01	0.15	.879	−0.14 to 0.16	.01
CPQ	0.24	0.06	0.25	3.92	<.001	0.12 to 0.35	.22
DPSS-R sensitivity	0.15	0.09	0.13	1.58	.116	−0.04 to 0.33	.08
DPSS-R propensity	−0.01	0.10	−0.01	−0.14	.888	−0.20 to 0.18	−.01

Dependent variable: PHQ-9, Patient Health Questionnaire 9-Item and where 0 = non-depressed and 1 = depressed for logistic regression. Numbers rounded to two decimal places, except *p*-value. Y-BOCS-SR, Yale-Brown Obsessive Compulsive Scale self-report; DOCS, Dimensional obsessive-compulsive scale; CPQ, Clinical Perfectionism Scale; DPSS-R, Disgust Propensity and Sensitivity Scale- Revised; OCD, Obsessive Compulsive Disorder.

and DPSS-R sensitivity and propensity subscales were not found to be significantly associated with symptoms of depression (*ps* ≥.05).

Discussion

The current study sought to explore factors which are associated with depression in individuals with OCD, using data from a large clinical sample. As the current literature examining correlates of depression in OCD is characterized by inconsistencies, no a priori hypotheses for the current study were made, however, this study explored whether factors including OCD symptom subtypes, OCD symptom severity, OCD symptom duration, gender, age, perfectionism, and disgust were associated with depressive symptoms and/or a depression diagnosis in OCD.

Findings revealed that when compared to the non-depressed OCD group, the OCD depressed group scored significantly higher on all OCD symptom subtypes (contamination, responsibility, symmetry, and unacceptable thoughts), they had significantly greater obsession and compulsion severity scores, and they scored significantly higher on disgust and perfectionism measures. The groups did not differ in terms of age, gender, or OCD symptom duration. Of these, perfectionism, obsession severity, and OCD contamination subtypes were found to be associated with depressive symptoms.

In comparison of findings in the current study to existing literature, it is somewhat surprising that the variables included in the current study only accounted for 26% of the variance, where other studies have found nearly double this (Buchholz et al., 2019; Yap et al., 2012). Whilst this may reflect the heterogenous nature of OCD, it may also be due to differences in assessment method and sample selection which have been addressed as limitations within the current study. Furthermore, within the current study only the contamination OCD subtype was found to be associated with depressive symptoms. This finding is largely inconsistent with previous research, however, perhaps reflect contextual factors present during the period of study recruitment. For example, participants were recruited during 2020/2021 which coincides with the COVID-19 pandemic. It is likely COVID-19 exacerbated contamination related OCD symptoms, and this may partially explain why this subtype predicted depressive symptoms in this study (Guzick et al.,

2021). The COVID-19 pandemic may also have influenced depressive symptoms in the sample (Salari et al., 2020).

Another important finding from the current study is that OCD obsession severity, but not compulsion severity, was associated with depressive symptoms. This finding supports some existing literature (Besiroglu et al., 2007), and may reflect that obsessional thoughts can be experienced as uncontrollable and intrusive, whilst compulsions may reflect effective management strategies an individual uses to manage distress and alleviate obsessions. Despite compulsions causing significant impairment, they may be viewed as positive if they help the individual cope with uncertainty and perceived danger (Bhar & Kyrios, 2005; Masellis et al., 2003). Thus, this highlights that individual differences in the interpretation of obsessions and compulsions might also be an important predictor of depression within OCD. Early research has found that individuals with OCD and co-morbid depression are more likely to interpret obsessions as more negative and perceive more personal control over obsessions (Abramowitz et al., 2007), however few studies have sought to replicate this finding. An interesting avenue for future research would be to explore individual differences in the interpretation of obsessions and compulsions and whether this predicts the occurrence of depression within OCD.

The role of perfectionism in the occurrence of depressive symptoms is another significant finding from the current study. Whilst future research is needed to replicate this novel finding, addressing perfectionism may have important implications in treating comorbid depression in OCD. For example, exposure and response prevention (ERP) is largely recognized as the gold standard treatment for OCD (Hezel & Simpson, 2019), however perfectionism is associated with reduced ERP treatment outcomes (Chik et al., 2007; Frost et al., 2002). Thus, effective treatment of comorbid depression in OCD may require an alternative treatment approach which is transdiagnostic and potentially incorporates a cognitive component (Hood & Antony, 2015).

Limitations

An important strength of the current study is its replication and extension of the current literature. As there is limited research which explores factors associated with depression in OCD, it is important to replicate that which exists, whilst also introduce novel factors to further elucidate the relationship between depression and OCD and increase our understanding of those who may be at greater risk of developing depression. Despite the strengths, the current study is not without limitations. This study used only a single measure of depressive symptoms and diagnostic status was not assessed with a diagnostic interview. This also meant the "depressed" and "non-depressed" groups were determined based on a cut-point on the PHQ-9, however the "non-depressed" group still exhibited mild symptoms of depression ($M = 5.65$), whilst the "depressed" group exhibited moderately severe symptoms ($M = 15.8$). Similarly, the diagnostic status of OCD was determined based on self-report measures of OCD, which research indicates should not inform a diagnosis alone (Reynolds, 2010). Based on this, future studies would benefit from including a multi-modal assessment method which includes a diagnostic interview for both OCD and depression. Another limitation of the current study is its cross-sectional design. As a result of this, the current study is unable to draw causal interferences from the findings and it is unclear the temporal order of diagnoses. For example, it

is unclear if OCD precedes depression or vice versa, which may be an important factor when determining different predictors (Besiroglu et al., 2007), and may contribute to inconsistent findings across studies. It is important for longitudinal studies to be conducted to assess this in the future. Finally, it is a limitation that the current study excluded those at risk or suicide, potentially creating a ceiling effect, and that the sample recruited was predominantly female (74%). Although research suggests females are more likely to experience OCD compared to males (Benatti et al., 2020), the ratio of females to males recruited in the current study was higher than population estimates and may affect the representativeness of the sample.

Conclusion

In conclusion, findings from the current study indicate that the occurrence of depressive symptoms in OCD may be associated with greater obsession severity, perfectionism, and OCD contamination subtypes. However, replication in future studies is important, especially with samples that have been diagnosed with a structured interview. Identifying factors which are associated with depression in OCD is important as it may improve patient outcomes through early intervention and tailored treatments options.

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Clinical trial registration

The clinical trial for the larger study was registered with Australian and New Zealand Clinical Trials Registry (ACTRN12620000146998)

Data availability statement

De-identified data will be made available upon reasonable request.

Ethics approval statement

Ethics approval for the original open trial was obtained from the Human Research Ethics Committee (HREC) of Macquarie University, Sydney, Australia (5201701075). The use of the existing data for the current project was approved by the Medical and Human Research Ethics Committee at The University of Technology Sydney (ETH21–6276).

Patient consent statement

All participants provided consent to take part in the study.

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