Eating disorders and obsessive–compulsive disorder: A dimensional approach to purported relations

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ABSTRACT

The purpose of this research was to investigate the specificity of purported relations between symptoms of eating disorders (ED) and obsessive–compulsive disorder (OCD). Whereas most research has focused on diagnostic comorbidity or between-groups analyses, this study took a dimensional approach to investigate specific relations among symptoms of anorexia, bulimia, and OCD, as well as panic, depression, and general distress in a student sample ($N = 465$). Results were that all symptoms showed significant zero-order correlations, including all ED–OCD pairings. After removing general distress variance, however, none of three OCD scales significantly predicted anorexia; only compulsive washing among OCD scales significantly predicted bulimia. Hierarchical multiple regression demonstrated that panic and depression out-performed OCD in predicting bulimia symptoms. Overall, symptoms of ED and OCD did not show unique relations at the level of core dimensions of each construct. A possible link between bulimia and compulsive washing is worth further study.

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1. Introduction

There is longstanding interest in possible relations between obsessive–compulsive disorder (OCD) and eating disorders (ED), particularly anorexia nervosa (AN). Among the first reports, Palmer and Jones (1939) provided four case studies of AN as demonstrating "the basic personality of compulsion neurosis" (p. 857). Waller, Kaufman, and Deutsch (1940) reached a similar conclusion for two patients with AN in suggesting that the "personality structure . . . follows the lines recognized as compulsive obsessive" (p. 15). Due in part to these personality-based clinical similarities, DuBois (1949) argued for re-naming AN as *compulsion neurosis with cachexia*. Although that name change was not adopted, its suggestion reflected the view of some researchers that AN was related closely to OCD, perhaps even a variant of it.

In the current Diagnostic and Statistical Manual (DSM; American Psychiatric Association [APA], 2000), a predominantly descriptive classification system, ED and OCD are assigned separate categories. Nevertheless, researchers continue to examine potential relations between OCD and both AN and bulimia nervosa (BN). Evidence for such a link includes substantial diagnostic comorbidity, with OCD estimated to occur in 10–40% of AN patients and 0–40% of BN patients (Halmi et al., 2005). Some research suggests that the rate of OCD comorbidity is higher in AN versus BN samples (e.g., Godart et al., 2006; Thornton & Russell, 1997), but others have found no difference (e.g., Halmi, 2005; Milos, Spindler, Ruggiero, Klaghofer, & Schnyder, 2002). In primary OCD patients, lifetime rates of ED range from 13% to 42% (Tamburrino et al., 1994 cited in Grabe, Thiel, & Freyberger, 2000; Rasmussen & Eisen, 1992; Rubenstein, Pigott, L'Heureux, Hill, & Murphy, 1992). These estimates generally are lower than for comorbid OCD in ED

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samples, but are substantial. Other evidence for possible ED–OCD relations includes similar scores by ED and OCD groups on measures of general anxiety, eating pathology, and OCD symptoms; neurochemical commonalities, including the importance of serotonin-based systems; areas of common neuropsychological impairment (e.g., Jarry & Vaccarino, 1996; Pigott et al., 1991; Sherman et al., 2006); and family studies (e.g., Halmi et al., 1991). Such evidence is the basis for contention that ED and OCD are related, perhaps even belonging to a purported *obsessive–compulsive spectrum* (e.g., Hollander & Rosen, 2000).

1.1. Statement of the problem

Research on ED–OCD relations has not only provided interesting insights, but also presents important limitations. One is a lack of specificity in comparisons. That is, much of this research relies on comparisons between a targeted patient group and healthy controls. For example, it has been shown that individuals with ED score higher than controls on OCD measures (e.g., Morgan, Wolfe, Metzger, & Jimerson, 2007), although this finding is not invariant (e.g., Joffe & Swinson, 1987). At face value this finding might suggest an association between these conditions; namely, that individuals with ED show elevated OCD symptomatology. With such a design, however, it is unclear whether those findings reflect a specific ED–OCD relation or simply an artifact of comparing disordered and non-disordered groups on a measure of psychopathology. For example, individuals with ED also tend to show symptoms of non-OCD anxiety disorders (e.g., panic, social anxiety) and depression (Godart et al., 2006). To assess possibility of specific ED–OCD relations, as opposed to the nonspecific finding that individuals with ED show additional symptoms characteristic of other *DSM* disorders, comparisons between individuals with ED and non-clinical controls are not optimal.

A second limitation involves over-reliance on a classification system that suffers from extensive between-category overlap, within-category heterogeneity, and quasi-arbitrary diagnostic cut-offs. Others have provided compelling arguments for merits and shortcomings of dimensional and categorical conceptualizations of psychopathology (e.g., Brown & Barlow, 2005; Frances & Widiger, 1986; Widiger & Clark, 2000; Widiger & Samuel, 2005) and these will not be repeated here. However, one recent consideration of the current ED categories is worth noting: Wonderlich et al. (2007) cautioned in their critical review of ED classification that "the eating disorder diagnoses remain best construed as open and falsifiable diagnostic constructs in need of further scientific study" (p. 167). This conclusion is not unique to ED but applies to most disorder categories (Widiger & Clark, 2000). However, rather than provide another analysis that relies on these "in-progress" categories, the current study will approach possible ED–OCD relations from the perspective of multiple continuous constructs.

A third obstacle that complicates matters is an unfortunate use of the terms *obsessive* and *compulsive* to describe symptoms not specific to OCD. Black, Goldstein, Noyes, and Blum (1994) identified this problem when noting a tendency to refer to so-called "compulsive" behaviors within several *DSM* conditions, including ED, substance abuse, and pathological gambling. Aragona and Vella (1998) re-stated this concern noting a risk of "engendering confusion between impulses and compulsions" (p. 203). Since then, however, Matsunaga, Iwasaki, Yamagami, and Kaye (1999) refer to the "obsessive pursuit of thinness" and "compulsive calorie counting" of patients with AN (p. 407); Milos et al. (2002) refer to the "obsessional character" of ED symptoms (p. 284); Sherman et al. (2006) define AN as "characterized by food-related and weight-related obsessions and compulsive dietary restrictions" (p. 468). Such language also is included in *DSM* (APA, 2000) when describing the "obsessive measuring of body parts" typical of AN patients (p. 584). It seems that the terms *obsessive* and *compulsive* have become so commonplace that they are used nonspecifically. This is unfortunate and has been argued elsewhere that such confusion of terms hinders progress in disentangling similarly named constructs, such as OCD and obsessive–compulsive personality disorder (Pfohl & Blum, 1991; Wu, Clark, & Watson, 2006). Perhaps not central to empirical data analysis per se, this issue appears to affect our acceptance of supposed associations.

1.2. Foundation for the current study

The assessment of multiple continuous dimensions – instead of focusing solely on diagnostic status – has contributed to progress in a range of psychopathology domains. Perhaps the best example involves mood and anxiety disorders (e.g., Barlow, Chorpita, & Turovsky, 1996; Clark & Watson, 1991; Mineka, Watson, & Clark, 1998). Saddled with consistently high comorbidity between conditions such as major depression and generalized anxiety disorder, researchers turned to the study of hierarchically arranged dimensions that greatly informed understanding of these disorders and their defining symptoms. Current structural models (e.g., Mineka et al., 1998) include a broad, nonspecific dimension (i.e., general distress or negative affect) shared by many disorders as well as narrower, specific symptoms that are relatively unique to each disorder (e.g., anhedonia in depression, autonomic hyperarousal in panic). These models account for observed comorbidity and disentangle common from unique components comprising these disorders. Recently, OCD researchers recognized these advances and increasingly target several continuous dimensions within the heterogeneous construct of OCD. In this way, focus has moved away from subgroups of patients with one primary OCD symptom or another (e.g., checkers versus washers) toward a finite number of dimensions (e.g., checking, washing) that can be examined for differential correlates with external variables, including correlations with symptoms of other conditions and response to treatment. In fact, Mataix-Cols, Rosario-Campos, and Leckman (2005) highlighted increased attention on dimensional analyses to be an important goal for OCD research. With this goal in mind, the current study will not focus on group similarities or differences (e.g., individuals with ED versus those with OCD), but instead will study the relations between dimensions of ED and dimensions of OCD.

In addition to conceptual strengths, a practical advantage of dimensional analysis is decreased reliance on using only samples of individuals with a disorder. Although it remains important to study carefully diagnosed patients, dimensional analysis allows for participation by broader groups, including convenience samples of students. The clear advantage of this method is that large samples may be reasonably obtained and provide greater statistical power than smaller clinical samples which are more difficult to access. Within ED, use of student participants is practiced widely and has confirmed the presence and importance of these experiences in such samples (e.g., Davis, Claridge, & Fox, 2000; Fernandez, Malacrne, Wilfley, & McQuaid, 2006; Fischer, Smith, & Anderson, 2003; Forbush, Heatherton, & Keel, 2007; Sherry, Hewitt, Besser, McGee, & Flett, 2004). Moreover, such research has begun to include the participation of both women and men and, in doing so, finds similarities across sex on ED variables. For example, Boerner, Spillane, Anderson, and Smith (2004) compared scores of women and men on several widely-used ED questionnaires and concluded that the two groups produced invariant factor structures, equivalent intercorrelations among ED risk factors, and comparable correlations between risk factors and symptoms. Sherry et al. (2004) reported sex-equivalent results in their confirmatory factor analysis of perfectionism and ED symptoms. Although it is clear that women more frequently than men report eating-related pathology (APA, 2000), Wonderlich et al. (2007) concluded that ED in men "closely resemble" ED in women (p. 176). Within the OCD literature, data suggest that OCD-relevant phenomena are common in non-clinical groups and are dimensional in nature, that high scores on self-report OCD measures predict OCD diagnosis, and that subclinical OCD experiences are similar in content and structure to more severe OCD symptoms (Burns, Formea, Keortge, & Sternberger, 1995; Macdonald & de Silva, 1999; Salkovskis & Harrison, 1984; Sternberger & Burns, 1990; Tolin, Woods, & Abramowitz, 2003). Both of these literatures support the study of students as a reasonable method for better understanding their respective constructs. Although not yet applied to the specific issue of ED–OCD relations, dimensional analyses in a non-clinical sample seem warranted at this time and provide a starting point for clarifying purported relations.

2. Methods

2.1. Participants

Participants were 465 undergraduate psychology students at Northern Illinois University who participated in the study as partial fulfillment of a research exposure requirement. Total sample characteristics included 40% women, mean age 19.2 years, and 65% Caucasian (17% African American, 7% Hispanic, 7% Asian, 1% Native American, 3% other/multi-racial).

2.2. Measures

2.2.1. EAT-26

The eating attitudes test-26 (Garner, Olmsted, Bohr, & Garfinkel, 1982) is a 26-item questionnaire that assesses

experiences related to AN. Ratings are made on a six-point scale ranging from *always* to *never*. Only the three highest foils receive point assignments. Three subscales were derived using factor analysis and provide the same predictive validity as the original 40-item EAT (Garner & Garfinkel, 1979). Adequate to good internal consistency for the EAT-26 total score and meaningful correlations with other measures of eating dysfunction have been reported in both clinical and non-clinical samples (e.g., Berland, Thompson, & Linton, 1997; Garner et al., 1982). The EAT-26 total score will be used in this study as a measure of AN; previous research has established a cut-off of 20 as reflective of clinically significant AN (Garner et al., 1982).

2.2.2. BULIT-R

The bulimia test-revised (Thelen, Farmer, Wonderlich, & Smith, 1991) is a 28-item questionnaire (plus eight unscored weight-control items) designed to assess BN symptoms. Ratings are made on a five-point scale with foils specific to the particular question. It has shown good internal consistency, good diagnostic sensitivity and specificity, and near-unity correlations with the instrument's original version based on *DSM-III* criteria (Thelen et al., 1991). Re-analysis using *DSM-IV* criteria provide comparable estimates of sensitivity and specificity for correctly classifying clinical and non-clinical respondents (Thelen, Mintz, & Vander Wal, 1996). This measure is used widely to assess BN symptoms in non-clinical samples; previous research has established a cut-off of 104 as reflective of clinically significant BN symptoms (Thelen et al., 1996).

2.2.3. MASQ

Mood and anxiety symptom questionnaire (Watson & Clark, 1991) contains 62 items assessing general distress, panic, and depression. Each item is rated on a five-point scale ranging from *not at all* to *extremely*. Several studies provide reliability and validity evidence including good internal consistency and both convergent and discriminant validity with respect to other measures of anxiety and depression (e.g., Watson et al., 1995a, 1995b). For the current study, the two MASQ general distress scales were combined to create one composite "general distress" scale for ease of interpretation. These two scales correlate very highly (e.g., range = .61–.78 in Watson et al., 1995a) and support this merging. The primary strength of the MASQ is its separate assessment of autonomic arousal and anhedonia. That is, whereas many measures of anxiety and depression are saturated with nonspecific variance, these two MASQ scales assess content that is relatively specific to each panic and depression (Mineka et al., 1998).

2.2.4. SCOPI

Schedule of compulsions, obsessions, and pathological impulses (Watson & Wu, 2005) is a 47-item questionnaire. Its three OCD scales (checking, cleanliness, and rituals) and two additional scales (pathological impulses and hoarding) were developed primarily using factor analytic methods. Ratings are made on a five-point scale ranging from *strongly agree* to *strongly disagree*. Its scales have demonstrated good internal consistency and retest reliability (Watson & Wu,

2005). Scores on each of the three OCD scales distinguish OCD from both non-OCD psychiatric and non-clinical samples, and have shown specific relevance to OCD beyond ratings of general distress (Wu & Watson, 2005). Focus of the current study is on the three specific OCD scales: checking, cleanliness, and rituals.

2.2.5. OCI-R

Obsessive–compulsive inventory-revised (OCI-R; Foa et al., 2002) is an 18-item revision of the original instrument (Foa et al., 1998). Six 3-item scales assess checking, washing, ordering, obsessing, neutralizing, and hoarding. Responses are made on a five-point scale ranging from *not at all* to *extremely*. Previous research generally supports internal consistency and short-term retest reliability (Foa et al., 2002). This version offers psychometric improvement over the original instrument, which suffered from inconsistent support for its seven-factor structure (Foa et al., 2002; Wu & Watson, 2003). Focus of the current study is on three scales: checking, washing, and ordering.

2.2.6. PI-WSUR

Padua Inventory–Washington State University Revision (Burns, Keortge, Formea, & Sternberger, 1996) is a 39-item questionnaire with five scales: checking, contamination, grooming, harm impulses, and harm thoughts. Ratings are made on a five-point scale ranging from *not at all* to *very much*. The scales demonstrate adequate internal consistency and good retest reliability over 6 months (Burns et al., 1996). This revision is used widely and offers improved discriminant validity over the original instrument in that items which showed high correlations with "worry" were removed. Focus of the current study is on the checking, contamination, and grooming scales.

The three OCD measures used in this study have shown good convergent and discriminant validity with one another (Wu & Carter, in press). In particular, all three instruments provide strong markers of checking, washing, and rituals. These three domains consistently are identified across OCD measures (e.g., Summerfeldt, Richter, Antony, & Swinson, 1999; Wu & Watson, 2005) and represent its core. For this study, three composite scales measuring checking, washing, and rituals (created by combining the parallel scales from the three instruments) were used. This method provides broad coverage of these symptoms, minimizes the limitations of any one instrument, and reflects the underlying *constructs* of these OCD symptoms more robustly than does any individual scale. We have argued for the utility of including multiple OCD symptom measures elsewhere (Wu & Carter, in press).

2.3. Procedure

After obtaining written informed consent for this IRB-approved protocol, students completed these and other questionnaires unrelated to the current analyses in small groups (7–20 students per group). Administration took on average 45–60 min. Data were entered using a NCS OpScan 4U® optical scanner and statistical analyses were performed using SAS®.

2.4. Hypotheses and data analysis

First, descriptive statistics and internal consistencies were computed for all scales, both overall and by sex. Comparisons with previous results were facilitated by the use of standardized T scores[1]. Regarding internal consistency, these scales all have demonstrated at least moderate coefficient alphas and this facet of reliability was examined in the current sample.

The next step was to examine zero-order Pearson correlations among the symptoms. Sex-based descriptives were provided, but the total sample was used in this analysis to maximize variance. Based on previous research, three predictions were made: (1) the EAT-26 and BULIT-R would be significantly correlated with one another and comprise the strongest correlation coefficient involving these two measures; (2) the EAT-26 and BULIT-R both would show significant correlations with general distress; (3) the EAT-26 and BULIT-R both would show significant correlations with OCD, autonomic arousal (panic), and anhedonia (depression). Whereas predictions were not made as to potential differences in the pattern of correlations involving the EAT-26 versus the BULIT-R, such differences were explored.

With a large sample, correlations among many measures are significant (i.e., statistically greater than zero); the more compelling issue involves the pattern and specificity of correlations. To test this, hierarchical multiple regressions were conducted for each EAT-26 and BULIT-R entered separately as dependent variables. At step 1, sex and general distress were entered and expected together to significantly predict both EAT-26 and BULIT-R scores; at step 2, the OCD scales were entered as a block; at step 3, MASQ anxious arousal and anhedonic depression were entered. The purpose of these regressions was to provide a measure of discriminant validity with respect to a purported ED–OCD association. Specifically, it was predicted that once general distress was entered, OCD would not predict AN or BN symptoms better than symptoms of panic and depression. Such a finding would suggest that observed zero-order correlations are accounted for largely by general distress and would not support a unique ED–OCD relation.

3. Results

3.1. Descriptive data and internal consistency

Means and standard deviations are reported in Table 1. Overall, the current group scored similarly to previous groups on all measures. That is, the total group scored

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[1] Group means for all measures are presented as T scores to make clearer comparisons between the current groups and large normative groups for each measure. For the EAT-26, this included 140 students reported in Garner et al. (1982); for the BULIT-R, this included students reported in Fernandez et al. (2006); for the OCD scales, this included 805 students reported in Wu and Carter (in press); for the MASQ, this included 1038 students reported in Watson et al. (1995a, 1995b) and 778 students reported in Wu and Carter (in press). The mathematical equation for converting each raw score to T score (resulting in a M of 50 with a SD of 10) was: T score $= [(M_{\text{current group}} - M_{\text{normative group}})/SD_{\text{normative group}}] \times 10 + 50$.

Table 1
Means (T scores), standard deviations, and internal consistency overall and by sex

Scale	Total (N = 436–457)			Men (N = 279–292)			Women (N = 155–162)			Women vs. men	
	M	SD	α	M	SD	α	M	SD	α	t	
EAT-26[a]	46.7	8.2	.84	45.6	6.9	.80	48.7	9.9	.87	3.55	***
BULIT-R[b]	49.7	9.3	.92	49.0	8.7	.92	51.1	10.1	.93	2.19	*
OCD											
Checking	48.6	8.5	.95	48.6	8.3	.95	48.5	8.8	.95	.15	ns
Washing	48.6	8.0	.92	47.9	7.8	.92	49.7	8.1	.92	2.42	*
Rituals	48.1	7.9	.91	48.0	8.0	.92	48.0	7.6	.89	.02	ns
MASQ											
General distress	49.3	10.0	.95	48.6	9.8	.95	50.4	10.1	.94	1.88	ns
Anxious arousal	51.3	12.4	.91	51.2	12.4	.91	51.1	12.3	.90	.08	ns
Anhedonic depression	53.5	9.6	.88	53.0	9.6	.88	54.4	9.8	.88	1.44	ns

Two participants did not report sex. N's are variable due to pair-wise deletion resulting from missing data. ns = not significant, $p > .05$.

[a] Thirty-three participants scored ≥ 20 on the EAT-26, the clinical cut-off for AN.

[b] Five participants scored ≥ 104 on the BULIT-R, the clinical cut-off for BN.

* $p < .05$.

*** $p < .001$.

within .2 SD on six of the eight scales and within .35 SD on the other two. Women scored significantly higher than men on EAT-26, BULIT-R, and OCD washing. However, these differences appear to be modest. Coefficient alphas (Table 1) show that the scales were internally consistent in the total sample, as evidenced by values ranging from .84 to .95. Men and women generally showed similar levels of internal consistency; all values were acceptable and at least .80. These values are consistent with those reported in previous research with these measures and support their reliability.

3.2. Zero-order correlations

Table 2 reports raw correlations among the symptoms. First, the highest value in the matrix is the correlation between the EAT-26 and the BULIT-R ($r = .53$). This was expected and demonstrates the convergent validity between these two measures of ED. However, this value is not so high as to suggest redundancy, and so the measures remained separate for subsequent analyses. Regarding OCD, both the EAT-26 (range = .15–.20) and BULIT-R (range = .28–.30) correlated significantly with all

Table 2
Zero-order correlations with dimensions of eating pathology

Scale	EAT-26	BULIT-R	
BULIT-R	.53	–	
OCD			
Checking	.20	.28	ns
Washing	.19	.30	*
Rituals	.15	.28	**
MASQ			
General distress	.32	.43	*
Anxious arousal	.25	.40	**
Anhedonic depression	.16	.39	**

Note: N = 429 for EAT-26. N = 453 for BULIT-R. Values $\geq .15$ significant at $p < .01$. All others significant at $p < .0001$. For comparing across row: ns = not significant, $p > .05$.

* $p < .05$.

** $p < .01$.

three OCD scales. The BULIT-R values were significantly greater than the EAT-26 values for washing and rituals.[2] Regarding the MASQ, both the EAT-26 and the BULIT-R correlated significantly with general distress; the BULIT-R correlation was significantly higher than for the EAT-26. The same pattern was found for MASQ anxious arousal and anhedonic depression: correlations with the EAT-26 and BULIT-R both were significant, somewhat stronger in magnitude than correlations with the OCD scales, and significantly higher for the BULIT-R versus the EAT-26.

3.3. Hierarchical regressions

Hierarchical regressions for predicting EAT-26 and BULIT-R scores are reported in Table 3. For the EAT-26, sex and MASQ general distress were entered in step 1 and produced a significant result ($F_{2,424} = 31.97$, $p < .001$) with an R^2 of .13. Examining the individual contributions, both sex (.16) and general distress (.31) provided a significant β. The OCD scales were entered at step 2 and did not significantly improve prediction ($F_{3,421} = 1.56$, ns) with an R^2 change of .01.[3] Individually, none of the three OCD scales offered a significant β. Similarly, neither anxious arousal ($t_{423} = .79$, ns) nor anhedonic depression ($t_{423} = .04$, ns) significantly predicted EAT-26 scores beyond general distress when entered separately as step 2 ($\Delta R^2 = .00$ for both).

Turning to the BULIT-R, sex and MASQ general distress were entered at step 1 and produced a significant result ($F_{2,447} = 51.37$, $p < .001$) with an R^2 of .19. Of note, only general distress (.42) but not sex (.07) provided a significant β. The OCD scales were entered at step 2 and provided a significant result ($F_{3,444} = 6.71$, $p < .001$) with an R^2 change of .03. Individually, however, only washing

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[2] Significance tests followed the equation provided by Kenny (1987) for comparing correlated correlations.

[3] The multiple regression was repeated using each of the three EAT-26 subscales (dieting, bulimia, oral control) as the dependent variable and the result was the same in each instance. That is, the three OCD scales did not produce a significant ($p > .05$) increase in prediction for any of these subscales after sex and general distress were entered in step 1.

Table 3
Hierarchical regressions predicting disordered eating symptoms

	β	SE	ΔR^2	Test statistic	
Predicting EAT-26					
Step 1: sex, general distress			.13	$F_{(2,424)} = 31.97$	***
Sex	.16	.72		$t_{(424)} = 3.62$	***
General distress	.31	.02		$t_{(424)} = 6.84$	***
Step 2: OCD			.01	$F_{(3,421)} = 1.56$	ns
Checking	.04	.03		$t_{(421)} = .60$	ns
Washing	.08	.03		$t_{(421)} = 1.35$	ns
Rituals	−.01	.05		$t_{(421)} = -.15$	ns
Step 2: anxious arousal	.06	.05	.00	$t_{(423)} = .79$	ns
Step 2: anhedonic depression	.01	.03	.00	$t_{(423)} = .04$	ns
Predicting BULIT-R					
Step 1: sex, general distress			.19	$F_{(2,447)} = 51.37$	***
Sex	.07	1.61		$t_{(447)} = 1.65$	ns
General distress	.42	.04		$t_{(447)} = 9.82$	***
Step 2: OCD			.03	$F_{(3,444)} = 6.71$	***
Checking	−.01	.06		$t_{(444)} = -.22$	ns
Washing	.15	.06		$t_{(444)} = 2.59$	**
Rituals	.08	.11		$t_{(444)} = 1.20$	ns
Step 3: AA, AD			.06	$F_{(2,442)} = 16.51$	***
Anxious arousal	.21	.11		$t_{(442)} = 3.21$	**
Anhedonic depression	.24	.06		$t_{(442)} = 5.21$	***
Step 2: AA, AD			.07	$F_{(2,445)} = 21.55$	***
Anxious arousal	.24	.10		$t_{(445)} = 3.86$	***
Anhedonic depression	.27	.06		$t_{(445)} = 5.77$	***
Step 3: OCD			.02	$F_{(3,442)} = 3.57$	*
Checking	−.01	.06		$t_{(442)} = -.14$	ns
Washing	.09	.06		$t_{(442)} = 1.64$	ns
Rituals	.07	.11		$t_{(442)} = 1.14$	ns

Note: $N = 427$ for EAT-26 data. $N = 450$ for BULIT-R data. ns = not significant, $p > .05$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

among the OCD scales provided a significant β (.15). At step 3, anxious arousal ($\beta = .21$) and anhedonic depression ($\beta = .24$) significantly predicted further BULIT-R variance ($F_{2,442} = 16.51$, $p < .001$), with a ΔR^2 of .06. Finally, as an additional test of specificity, steps 2 and 3 were repeated, but in reverse order. That is, in step 2, anxious arousal ($\beta = .24$) and anhedonic depression ($\beta = .27$) significantly predicted BULIT-R scores ($F_{2,445} = 21.55$, $p < .001$; $\Delta R^2 = .07$). At step 3, OCD predicted additional variance ($F_{3,442} = 3.57$, $p < .05$; $\Delta R^2 = .02$), however, none of the three individual OCD scales provided a significant β.

4. Discussion

Whereas most research on ED–OCD relations has focused on categorical diagnoses, this study applied a dimensional approach and came to a largely different conclusion. First, zero-order correlations confirmed that measures of anorexia and bulimia correlated significantly not only with each other, but also with OCD, panic, depression, and general distress symptoms. Comparing the two ED measures, bulimia showed significantly stronger correlations than anorexia with most of the other symptom scales. Once the nonspecific contribution of general distress was removed via regression, however,

none of the OCD scales (or panic or depression) significantly predicted anorexia scores; only compulsive washing among the OCD scales still predicted bulimia. Conversely, both panic and depression significantly predicted bulimia, accounting for more variance than OCD when entered either before or after OCD. These findings do not support a strong association between OCD and either AN or BN.

With respect to conventional analyses, these results suggest that reporting only comorbidity rates involving two targeted disorders is incomplete and potentially misleads the search for specific ED correlates. Disorders in our current system tend to co-occur, but the more useful question asks how specific is the pattern of co-occurrence. This requires a broader approach, such as assessment in targeted ED groups not only of the primary comorbid disorder of interest (e.g., OCD), but also other related disorders to meet the criterion of discriminant validity. This can be accomplished by assessing for at least one other relevant disorder, such as a non-OCD anxiety disorder (e.g., panic disorder).

Another concern involves simple comparisons between individuals with ED versus healthy controls. That is, even when continuous scores are used instead of categorical diagnoses, the group of individuals with ED may show

elevation on other symptoms simply because those experiences are heavily influenced by general distress. If the research focus is ED–OCD, then elevated OCD symptoms are likely; if the focus is ED-depression, then elevated depression is likely. Neither finding will be surprising or particularly informative in the absence of discriminant validity—such as demonstrating that these ED groups show elevated symptoms on *only* OCD measures but not on other anxiety or mood dimensions. Only this level of specificity offers compelling evidence of a unique relation.

With a dimensional approach to identifying specific ED correlates, research can assess both common and unique elements simultaneously. Using this method, the current study did not support a specific, direct relation between anorexia and OCD. Modest support was found for a bulimia-washing relation; this finding was not predicted, but is consistent with Hasler et al. (2005), who reported a significant relation between ED diagnosis and contamination/cleaning symptoms. This finding needs replication, but offers a starting point for a potentially informative bulimia–OCD association. However, it bears repeating that this relation was not as strong as that between bulimia and either panic or depression, was not found when panic and depression were entered prior to OCD in the regression analysis, and therefore does not appear to represent a specific bulimia–OCD relation. In fact, the current results confirm that all of these symptoms are correlated to a certain extent. This finding is becoming a truism and again supports those models within which common factors (i.e., general distress) are shared by many disorders. Such factors have been used to account for, and then move beyond, the substantial comorbidity typical of some *DSM* categories. Not accounting for the confounding influence of general distress is problematic, but according to this analysis, neglecting its role may differently affect interpretation of results from one measure versus another. That is, one must consider the *relative* role of general distress for each symptom group. In the current study, measures of anorexia and bulimia both correlated substantially with general distress, but showed significant differences in the strength of those correlations. Focusing on the role of general distress, Watson (2005) re-modeled what currently comprise the mood and anxiety disorders and identified a group of disorders marked primarily by *distress*, versus another group marked primarily by *fear*. This re-classification, by distinguishing conditions based on the relative role of distress versus fear, appears to improve upon the current *DSM* classification of "mood" versus "anxiety" and may better account for empirical correlations/comorbidity rates. Clarification of the role of distress (or fear) within anorexia and bulimia similarly may help to explain empirical correlations between these two conditions and others contained in the Watson (2005) model.

5. Limitations and future directions

Successful with respect to primary aims, this study has limitations. First, it was conducted only on a student sample. Such samples are common for research in both ED and OCD domains; nevertheless they generally provide lower scores on symptom measures than do clinical samples. These findings should be considered preliminary until replicated in a clinical sample that provides a wider range of scores on ED and OCD symptoms.

Second, this study included only one measure of each AN and BN. Parallel to the benefit of having three OCD measures that could be combined to form composite scales, when possible to use an extensive battery, future research would improve on the current method by administering multiple ED measures with known convergent/discriminant properties. This would allow for analysis of relations among *constructs* rather than idiosyncratic scales, which reduces the likelihood of chance findings.

Third, this study used only questionnaire data. Future research might extend these findings by incorporating other sources of data, including interviews, self-reported behaviors (i.e., reports of discrete acts as opposed to general tendencies), and behavioral observations. These methods are difficult due to the internal and private nature of many of the experiences queried in this study, but follow-up studies using such methods nonetheless are warranted. An immediate obstacle is that psychometrically sound, dimensional OCD constructs are best measured by questionnaires at this time.

Although generally not supportive of direct ED–OCD relations, this study does not rule out the possibility that dimensions relevant to ED also may be relevant to OCD. For example, the personality trait of perfectionism has been implicated in both anorexia and OCD (e.g., Frost & Steketee, 1997; Halmi et al., 2005; Lilenfeld, Wonderlich, Piso, Crosby, & Mitchell, 2006; Suzuki, 2005). Reminiscent of early personality considerations of ED and compulsion neurosis (e.g., Palmer & Jones, 1939; Waller et al., 1940), it may be useful to apply dimensional analysis to relevant personality domains. Whereas the validity of distinguishing *Axis I* symptoms from *Axis II* traits is outside the scope of this discussion, future efforts might examine personality traits or profiles linked to dimensions of ED and OCD. The psychopathology–personality literature suggests that there is unlikely to be a one-to-one relation at the level of diagnosis (e.g., a currently recognized personality disorder that specifically maps onto both ED and OCD) but this does not preclude identification of meaningful relations between symptoms and personality traits such as perfectionism or disinhibition (e.g., Wu et al., 2006). This work holds promise for improving our understanding of common variance such as that identified in this study between bulimia and compulsive washing.

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