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Comorbidity of mood and substance use disorders in patients with binge-eating disorder: associations with personality disorder and eating disorder pathology†

Daniel F. Becker^{a,*} and Carlos M. Grilo^b

^aDepartment of Psychiatry, University of California, San Francisco, USA

^bDepartment of Psychiatry, Yale University School of Medicine, New Haven, Connecticut, USA

Abstract

Objective—Binge-eating disorder (BED) is associated with elevated rates of mood and substance use disorders, but the significance of such comorbidity is ambiguous. We compared personality disorder and eating disorder psychopathology in four subgroups of BED patients: those with mood disorders, those with substance use disorders, those with both, and those with neither.

Method—Subjects were 347 patients who met DSM-IV research criteria for BED. Semistructured interviews evaluated lifetime DSM-IV axis I disorders, DSM-IV personality disorder features, and eating disorder psychopathology.

Results—Among these patients, 129 had co-occurring mood disorder, 34 had substance use disorder, 60 had both, and 124 had neither. Groups differed on personality disorder features, with those having mood disorder and both mood and substance use disorders showing the highest frequencies. Although groups did not differ on body mass index or binge eating frequency, they did differ on eating disorder psychopathology with the groups having mood disorder and both comorbidities demonstrating higher eating, weight, and shape concerns. No differences were observed between groups with respect to ages of onset for specific eating behaviors, but some differences were observed for ages of disorder onset.

Conclusion—Mood and substance use disorders co-occur frequently among patients with BED. Compared with previous work, the additional comparison group (those with both mood and substance use disorders) and the control group (those with neither) afforded better discrimination regarding the significance of these comorbidities. Our findings suggest approaches to subtyping BED based on psychiatric comorbidity, and may also have implications for treatment.

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*Corresponding author at: 100 S. San Mateo Dr., San Mateo, CA 94401, USA., Tel.: +1 650 696 4005; fax: +1 650 696 4001., beckerdf@sutterhealth.org (D.F. Becker).

Conflict of Interest

The authors have no competing interests to report.

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Keywords

binge-eating disorder; comorbidity; depression; diagnostic subtyping; obesity; substance use disorders

Introduction

Studies of binge-eating disorder (BED) have demonstrated that it is a frequently occurring disorder with prevalence rates exceeding those of anorexia nervosa and bulimia nervosa combined, that it is also distributed more broadly across age, gender, and ethnic groups, and that it is at least as stable and as chronic as these two well-validated eating disorders [1,2]. BED has been shown to aggregate in families, and to be associated with obesity and with elevated rates of medical and psychiatric comorbidities [1,3–5]. These findings suggest the importance of further characterizing BED in order better to understand its pathogenesis and clinical manifestations. One approach to understanding diagnostic categories is through examination of potential subtypes. Initial approaches with BED have included subtyping by negative/depressive affect [6,7]—and, subsequently, subtyping by psychiatric comorbidity [8].

Based on etiologic and maintenance models of BED, Stice and colleagues [7] used cluster analysis to subtype three samples of women along dietary restriction and negative affect dimensions. Their analysis revealed a pure dietary subtype and a mixed dietary-depressive subtype—the latter of which was seen as a more severe variant of BED, characterized by higher rates of mood and anxiety disorders, of personality disorders, and of eating, shape, and weight concerns. This subtype also demonstrated poorer social adjustment and response to treatment.

Grilo and colleagues [6] replicated this cluster analysis in 101 patients with BED, and found that the mixed subtype was characterized by greater eating disorder psychopathology and psychological disturbance. Using the same sample, they also examined subtyping by the presence or absence of major depressive disorder, finding that those with this comorbid condition demonstrated higher depression/negative affect scores and lower self-esteem scores, as well as higher levels of concern about weight.

Peterson and colleagues [8] revisited the subtyping of BED based on psychiatric comorbidity—this time utilizing both mood disorders and substance use disorders. Noting that these two disorder groups co-occur frequently with BED, they considered BED patients with and without mood disorders, and with and without substance use disorders. Among their sample of 84 women, patients with a history of mood disorder were found to have higher levels of depression/negative affect, lower self-esteem, higher frequency of binge eating, and lower dietary restraint. Those with a history of substance use disorder were found to binge eat more frequently and to be more impulsive. These investigators concluded that individuals with histories of either mood disorder or substance use disorder have a more severe form of BED—and that subtyping along these lines may have clinical utility.

Peterson and colleagues [8] acknowledged a few study limitations, including their reliance—for personality and eating disorder psychopathology variables—on self-report measures. Also, they noted that sample size had prevented them from looking at the comorbidity patterns more completely; specifically, they had been unable to include in the analyses those patients who had both mood disorder and substance use disorder, and those with neither. Their post hoc analyses, however, indicated that individuals with a lifetime history of both mood disorder and substance use disorder had more frequent binge eating, more impulsivity, and more depression/negative affect than those with neither comorbidity. These authors concluded that this combination of comorbid conditions may represent a BED subtype characterized by higher levels of distress, eating pathology, and impulsivity.

Given the relatively high co-occurrence rates of mood and substance use disorders among patients with BED [1,3,5,9,10], evaluation of these comorbidities may be relevant to understanding the relationships between BED, mood disorders, and substance use disorders. Examining co-occurring personality disorders has proven elsewhere to be helpful in elucidating similarly complex comorbidity relationships, perhaps because personality psychopathology may be reflective of potential vulnerabilities for the development of axis I psychiatric disorders [11,12]. Moreover, patients with BED have been shown to have elevated rates of personality disorders—especially among clusters B and C [9,10,13,14]—and specific personality traits have been suggested as endophenotypes among obese individuals with BED [4].

The aim of this study was to explore further the possibility of subtyping BED by comorbidity with mood and substance use disorders. We evaluated the effect of having a history of one or both of these disorder types in a study group sufficiently large to permit comparison of subgroups with either comorbidity, along with subgroups having both or neither. The utility of this approach to subtyping BED was evaluated by comparing these subgroups with respect to personality pathology, eating disorder psychopathology, and associated psychological factors.

Method

Subjects

Subjects were a consecutive series of 347 treatment-seeking patients who met DSM-IV [15] research criteria for BED. This study group consisted of 259 (75%) women and 88 (25%) men, ranging in age from 18 to 60 years ($M = 44.7$, $SD = 9.2$). A majority of subjects (81%) were Caucasian, and most (84%) had either attended college or graduated from college.

Procedures and assessments

Subjects responded to media advertisements soliciting individuals with concerns about binge eating and weight for participation in treatment studies within an urban medical school setting. To be included in the study, subjects had to be between 18 and 60 years of age and had to meet full research diagnostic criteria for BED. Individuals were excluded if they were receiving ongoing professional treatment for eating or weight problems—or if they had certain medical conditions that may influence eating or weight (e.g., diabetes or thyroid

disease), or had a severe psychiatric illness that could interfere with the assessment process (e.g., psychosis or bipolar disorder). Assessments were administered by trained doctoral-level research clinicians who were monitored to maintain reliability. Full IRB review and approval were obtained. After complete explanation of the study procedures, written informed consent was obtained from all subjects.

Semistructured diagnostic interviews were administered to all subjects. DSM-IV axis I disorders, including BED, were assessed by administration of the Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Edition (SCID-I/P) [16]. For this study, lifetime axis I diagnoses were utilized—although a current diagnosis of BED was used to help ascertain the study group. Interrater reliability for the axis I diagnoses used in this report, as reflected by kappa coefficients, ranged from 0.68 to 1.0; kappa for current BED diagnosis was 1.0. Where disagreements occurred, final research diagnoses were established by the best-estimate method, following the LEAD (longitudinal, expert, all data) standard [17].

DSM-IV axis II personality disorders were assessed by the Diagnostic Interview for DSM-IV Personality Disorders (DIPD-IV) [18]. This semistructured diagnostic interview assesses for all DSM-IV personality disorders and criteria. The DIPD-IV requires that criteria must be present and pervasive for at least two years, and that they must be characteristic of the person during adulthood. Kappa coefficients for the personality disorder diagnoses ranged from 0.58 to 1.0. For the purposes of this study, individuals were considered to have features of a personality disorder if they either met full diagnostic criteria for the disorder or were one trait shy of meeting full criteria. We elected to utilize this broader concept of personality disorder features, rather than strict diagnostic criteria, because the DIPD-IV is a relatively conservative instrument.

To assess the attitudinal, affective, and behavioral features of eating disorder psychopathology, and to confirm the BED diagnosis, the Eating Disorder Examination (EDE) [19] was administered. The EDE is a semistructured interview that assesses the core and associated psychopathology of eating disorders. This instrument focuses on the preceding 28 days, with the exception of diagnostic items for which DSM-IV stipulates specific time-frames or duration criteria. Included in the EDE interview is a module that assesses the DSM-IV research criteria for BED. The EDE assesses the frequency of different forms of overeating, including “objective bulimic episodes” (OBE)—defined as eating an unusually large quantity of food while experiencing subjective loss of control—which corresponds to the DSM-IV definition of a binge eating episode. In addition to providing a global score, the EDE has four subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern. The Restraint subscale reflects attempts to restrict food intake in order to influence weight or shape; the Eating Concern subscale reflects the degree of concern about eating; and the Weight Concern and Shape Concern subscales measure the degree of concern about weight and shape, respectively, and the extent to which these concerns influence self-evaluation. The items assessing features of the four subscales are rated on 7-point forced-choice scales (0 to 6), with higher scores reflecting greater severity or frequency. The EDE is a well-established method for assessing eating disorder psychopathology [20] and has demonstrated good interrater and test-retest reliability in BED

[21]. In the present study, interrater reliability of the EDE was examined in 42 subjects. For binge eating episode frequency, the Spearman rho coefficient was 0.99; for the EDE subscales, Spearman rho ranged from 0.87 to 0.97.

Height and weight were measured during the evaluation process, and body mass index (BMI) was calculated. Structured clinical interviews inquired about weight- and eating-related historical variables, including ages at onset of obesity, dieting, and binge eating. Ages at onset of BED, mood disorder, and substance use disorder were determined from the SCID-I/P.

Subjects also completed self-report inventories to assess associated psychological functioning. The Beck Depression Inventory (BDI), 21-item version [22], is a well-established and widely used inventory of the symptoms of depression—and, more generally, of negative affect [23]. The Rosenberg Self-Esteem Scale (RSES) [24] is a 10-item measure of global self-esteem, which is widely used and psychometrically well-established [24]. A higher total score reflects greater self-esteem.

Statistical analysis

Based on the SCID-I/P, subjects were divided into those with co-occurring mood disorder but no substance use disorder, those with co-occurring substance use disorder but no mood disorder, those with both mood and substance use disorders, and those with neither. These four subgroups were first compared with respect to the frequencies of personality disorder features. After groups were compared on having the features of any personality disorder, groups were further compared with respect to personality disorder cluster. Then, comparisons were made by specific personality disorder whenever frequencies were sufficient to permit statistical analysis. Chi-square tests of independence were performed on the subgroups to test for significant differences among these frequencies.

Analysis of variance (ANOVA) was used to compare the four subgroups with respect to variables related to weight (BMI), eating behavior (binge eating frequency—i.e., number of OBEs during the previous month), eating disorder psychopathology (EDE global and subscale scores), and psychological functioning (BDI and RSES scores). ANOVAs also compared the four subgroups with respect to developmental and historical variables that are relevant to disordered eating behavior, including ages at onset of obesity, dieting, and binge eating as well as the ages of onset for BED, substance use disorder, and mood disorder. When ANOVAs revealed significant overall group differences, Scheffe's post hoc tests were performed to determine which specific groups differed significantly.

Results

The overall group of patients with BED included 189 subjects who had a lifetime mood disorder; of these, 165 were diagnosed with major depressive disorder, 23 had dysthymic disorder, and 12 had depressive disorder NOS. The overall group had 94 subjects with a lifetime substance use disorder; of these, 78 were diagnosed with an alcohol use disorder and 56 had a drug use disorder. Subjects were divided into four subgroups based on the presence or absence of mood and substance use disorders: 129 (37%) subjects had a mood

disorder but no substance use disorder; 34 (10%) subjects had a substance use disorder but no mood disorder; 60 (17%) subjects had both a mood disorder and a substance use disorder; and 124 (36%) subjects had neither. Statistical analysis revealed no differences between these groups with respect to age, ethnicity, or level of education. Differences were noted with respect to gender, with the group having comorbid substance use disorder demonstrating a relatively higher proportion of male subjects ($\chi^2 = 20.3$, $df = 3$, $p < 0.001$).

Within our overall group of patients with BED, the most frequently occurring personality disorder features were avoidant (23%), obsessive-compulsive (19%), paranoid (7%), and borderline (6%) features. Table 1 compares the frequencies of these personality disorder features across subgroups. Inspection of the table reveals that subjects with co-occurring mood disorders, and with both mood and substance use disorders, were more likely to have features of any personality disorder. This was also true for clusters A and C—but, only subjects with both mood and substance use disorders were more likely to have features of cluster B personality disorders. Within clusters A, B, and C, features of paranoid, borderline, and avoidant and obsessive-compulsive personality disorders, respectively, occurred at frequencies sufficient to permit analysis. The patterns for these individual personality disorders were similar to those for the clusters. The groups with both comorbidities and with mood disorder alone were more likely to have features of paranoid personality disorder. The group with both comorbidities had a greater frequency of borderline features. Finally, the groups with both comorbidities and with mood disorder alone had more avoidant and obsessive-compulsive features.

Because we chose to utilize sub-threshold personality disorder features, instead of diagnostic threshold personality disorders, we additionally examined the latter to ensure that this approach had not biased our results. Chi-square tests revealed the same patterns, across the four groups, for avoidant and obsessive-compulsive personality disorders (significant at the $p < .001$ and $p < .01$ levels, respectively). The patterns for paranoid and borderline personality disorders also held—although, due to smaller cell sizes, chi-square tests were no longer statistically significant.

Table 2 summarizes findings, across subgroups, for clinical variables and for variables related to eating disorder psychopathology and psychological functioning. ANOVAs revealed no significant differences between subgroups for BMI. Although the ANOVA revealed a significant overall group difference for binge eating frequency, post hoc tests revealed no significant differences between the subgroups. ANOVAs also revealed significant overall group differences for the EDE global score, as well as for the Eating Concern, Shape Concern, and Weight Concern subscales. Post hoc tests revealed that, for the EDE global score, the mood disorder group had higher scores than the substance use disorder group—and the group with neither comorbidity. For the Eating Concern subscale, the mood disorder group had higher scores than the group with neither comorbidity. For the Shape Concern subscale, the mood disorder group had higher scores than the substance use disorder group and the group with neither comorbidity and the group with both comorbidities had higher scores than the substance use disorder group. And, for the Weight Concern subscale, the group with both comorbidities had higher scores than the substance use disorder group and the group with neither comorbidity. Finally, significant differences

between groups were also observed for the BDI and RSES scores—and, in both instances, the groups with mood disorder and with both comorbidities had higher scores than the other two groups.

Table 3 summarizes data concerning the ages of onset for specific behaviors relevant to the development of BED—as well as for the three diagnoses, or diagnostic categories, under consideration. ANOVAs revealed no group differences for onset of obesity, dieting, or binge eating. Differences in age of onset were demonstrated, however, for BED; specifically, it occurred earlier in the group with both comorbidities than in the group with comorbid substance use disorder only. No significant group differences were observed for the onset of substance use disorder. Mood disorder, however, occurred earlier in the group with both comorbidities than in the group with comorbid mood disorder only.

Discussion

Although important to our understanding of BED—and to our development of etiologic and treatment models—the relationship between BED and co-occurring psychiatric disorders has received relatively little attention [25]. Mood and substance use disorders are both observed at greater frequencies in those with BED than in comparison groups of obese persons without BED [1,5,10]. In this study, we re-examined previous findings indicating that co-occurrence with either a mood disorder or a substance use disorder will result in a more severe form of BED [8]. Our large BED study group had high rates of mood and substance use disorders, 54% and 27%, respectively—and 17% of subjects had both. This combined comorbidity group—along with our control group with neither comorbidity allowed for a more refined examination than was possible in the previous study.

We found that personality pathology in general—and cluster A and cluster C pathology in particular—was found at higher frequencies in the groups with both comorbidities and with mood disorders alone. This pattern also held at the level of the individual personality disorders. Cluster B pathology—and borderline personality pathology in particular—was found more frequently only in the group with both mood and substance use disorders. With respect to the finding that the groups with mood disorders and with both comorbidities have more personality pathology in general, this echoes the observation by Stice and colleagues [7] that their dietary-depressive group had elevated rates of personality disorders. The finding that cluster C pathology—in particular, avoidant and obsessive compulsive personality disorder features—are more frequent in the mood disorders and combined comorbidities groups reinforces the observation that a confluence of perfectionism, rejection avoidance, and depressive affect may contribute to binge eating in young women [26].

With respect to the finding that cluster B pathology was found more frequently only in the group with combined comorbidities, it is worth noting that Peterson and colleagues [8] found higher levels of impulsivity in their subjects with comorbid substance use disorders—although, due to limited sample size, they were not able to tease apart this comorbidity from those that may have had both mood and substance use disorders. Post hoc analyses, however, suggested that their combined comorbidity group was characterized by greater impulsivity.

We found no significant differences between groups for BMI or binge eating frequency. We did find significant differences between groups, however, with respect to eating disorder psychopathology—both globally and for eating, shape, and weight concerns in particular. Here, the mood disorder group and the group with both comorbidities generally showed more severity than the substance use disorder group and the group with neither comorbidity—which differed little from each other. Peterson and colleagues [8] also found higher eating disorder psychopathology severity in their mood disorder group—but did not find such differences in their comparison with respect to substance use disorders. Along similar lines, Stice and coworkers [7] found a large elevation in eating, shape, and weight concerns in their dietary-depressive group—and Grilo and colleagues [6] reported that their dietary-negative affect subtype was characterized by higher levels of eating disorder psychopathology. Not surprisingly, we also found higher BDI scores and lower self-esteem scores in our mood disorder and combined comorbidity groups—results that are congruent with those reported in the prior investigations of subtyping by mood disorder or negative affect [6–8].

These findings support the view that eating disorder psychopathology in binge eaters may be partly rooted in affective distress, and that affective disturbance signals a more disturbed variant of BED [6,7]. While not all those examining these relationships have found evidence for increased eating disorder psychopathology at the confluence of BED and affective disorder [25], such divergences from our results are likely due to sampling and methodological differences. Several studies, however, do support the relationship between negative affect and eating-related pathology among individuals who binge eat, and even suggest that negative affect together with eating disorder psychopathology contribute to maladaptive eating patterns, and to the development or maintenance of BED [27–30]. The findings regarding heightened eating disorder psychopathology—particularly the substantially greater shape and weight concerns among those with mood disorders are—clinically important. A number of studies have found that the presence of elevated shape and weight concerns signals greater disturbance in patients with BED [31], and that it prospectively predicts significantly worse treatment outcomes [32,33].

Our examination of onset ages for specific eating-related behaviors revealed no differences between groups. We did, however, find some differences for age of onset for disorders. BED had its onset significantly earlier in the combined comorbidity group than in the group with substance use disorders—and mood disorder occurred earlier in the combined group than in the group with mood disorders. These results suggest that—although the course of eating-related behaviors may be consistent across comorbidity—groups the onset age for both mood disorder and BED may be affected by the other disorders. As is the case for mood and substance use disorders, BED is relatively chronic and demonstrates a protracted course [2]. We might expect, therefore, that these disorders may overlap within individuals and that their developmental courses could affect one another.

We note several strengths and limitations of our study as a context for interpreting these results. Strengths include the use of diagnostic and structured interviews that were reliably administered by trained and experienced doctoral-level research clinicians. Also, our large series of patients with BED allowed for an additional comparison group and a control—

group thus affording a more refined analysis. With respect to study limitations, our findings pertain to individuals meeting strict research criteria for BED, and to those responding to advertisements seeking participants for treatment studies. Along this line, it is worth noting that the most frequent reason for excluding respondents was failure to meet full DSM-IV research criteria for BED. Therefore, we do not believe that our selection procedures represent a confound. Nonetheless, our results may not generalize to community samples or to those who might be uninterested in research participation. Additionally, our results may not generalize to BED patients with co-occurring psychosis or bipolar disorder—although exclusions for these reasons were extremely rare. Similarly, these results may not generalize to those with certain co-occurring medical illnesses, such as diabetes or thyroid disease. Also, our results pertain to a broad range of adults with BED, but may not pertain to those under 18 or over 60 years of age. Finally, our assessments were cross-sectional and cannot discern causal or etiologic relationships. Longitudinal studies are needed to understand better the interactions over time between personality pathology, eating disorder psychopathology, and comorbid conditions in individuals with BED.

Despite these limitations, some conclusions can be drawn from the data. In patients with BED, co-occurring mood disorder and co-occurring mood and substance use disorders combined—but not co-occurring substance use disorders alone—are associated with higher levels of personality disorder disturbance, particularly avoidant and obsessive-compulsive features, and higher levels of eating disorder psychopathology. Our results diverge from those reported by Peterson and colleagues [8] insofar as they do not suggest that comorbid substance use disorder is associated with a more severe form of BED. They converge with results from this previous study, however—as well as with the work of others [6,7,34]—in underscoring the potential role of mood disturbance in exacerbating the clinical presentation and course of BED.

These results point to the value of a thorough assessment, in patients presenting with BED, for comorbid psychiatric disorders [25] and for co-occurring mood disorders in particular. Our findings additionally support the potential utility of developing treatment approaches for BED that address dysphoric mood, as well as eating behaviors that may occur within the context of mood disturbance—and that also address the social anxiety, avoidance, rigidity, and perfectionism [6,7,29,35], and especially the heightened shape and weight concerns [32,33], that characterize these patients. Finally, further investigation of the temporal or causal sequences among these co-occurring disorders may help to refine the specific treatments provided and the sequencing of such treatments [4].

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- We examined BED patient groups with and without mood and substance use disorders.
- Both of these disorders co-occur frequently in patients with BED.
- Groups did not differ on body mass index or binge eating frequency.
- Groups with mood disorders did have more personality disorder features.
- Groups with mood disorders also had more concerns about eating, weight, and shape.

Frequencies of Personality Disorder Features in 347 Patients with BED: Comparison by Co-occurrence of Mood and/or Substance Use Disorders

Table 1

| | Mood disorder (N = 129) | | Substance use dis. (N = 34) | | Both (N = 60) | | Neither (N = 124) | | χ^2 (df = 3) |
|----------------------|-------------------------|----|-----------------------------|----|---------------|----|-------------------|----|-------------------|
| | N | % | N | % | N | % | N | % | |
| Any personality dis. | 63 | 49 | 11 | 32 | 35 | 58 | 37 | 30 | 17.9 *** |
| Cluster A | 15 | 12 | 1 | 3 | 7 | 12 | 4 | 3 | 8.6 * |
| Paranoid | 12 | 9 | 1 | 3 | 7 | 12 | 3 | 2 | 8.2 * |
| Cluster B | 9 | 7 | 3 | 9 | 11 | 18 | 6 | 5 | 10.1 * |
| Borderline | 5 | 4 | 2 | 6 | 9 | 15 | 4 | 3 | 11.7 *** |
| Cluster C | 54 | 42 | 7 | 21 | 29 | 48 | 30 | 24 | 16.9 ** |
| Avoidant | 36 | 28 | 4 | 12 | 22 | 37 | 18 | 15 | 15.5 *** |
| Obsessive-compulsive | 32 | 25 | 4 | 12 | 16 | 27 | 15 | 12 | 10.0 * |

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 2
Eating Behavior, Eating Disorder Psychopathology, and Psychological Functioning in 347 Patients with BED: Comparison by Co-occurrence of Mood and/or Substance Use Disorders

| | <u>Mood disorder (N = 129)</u> | | <u>Substance use dis. (N = 34)</u> | | <u>Both (N = 60)</u> | | <u>Neither (N = 124)</u> | | <i>F</i> |
|----------------------------|--------------------------------|-----------|------------------------------------|-----------|----------------------|-----------|--------------------------|-----------|---------------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | |
| BMI (kg/m ²) | 38.6 | 7.9 | 37.8 | 7.6 | 37.7 | 6.2 | 36.8 | 6.3 | 1.3 |
| Binge freq. (episodes/mo.) | 18.9 ^a | 12.2 | 14.7 ^a | 8.1 | 19.1 ^a | 12.1 | 15.7 ^a | 9.2 | 2.9 [*] |
| EDE – Global score | 3.0 ^a | 1.0 | 2.4 ^b | 0.9 | 2.9 ^{ab} | 0.9 | 2.5 ^b | 0.9 | 7.5 ^{***} |
| Restraint | 1.9 | 1.5 | 1.9 | 1.3 | 1.8 | 1.3 | 1.8 | 1.1 | 0.4 |
| Eating concern | 2.6 ^a | 2.3 | 1.8 ^{ab} | 1.4 | 2.2 ^{ab} | 1.3 | 1.7 ^b | 1.3 | 5.7 ^{**} |
| Shape concern | 4.0 ^a | 1.0 | 3.1 ^b | 1.2 | 4.0 ^{ac} | 1.2 | 3.4 ^{b,c} | 1.1 | 10.0 ^{***} |
| Weight concern | 3.4 ^{ab} | 1.0 | 3.0 ^a | 1.0 | 3.5 ^b | 1.1 | 3.0 ^a | 1.0 | 6.3 ^{***} |
| BDI score | 19.3 ^a | 8.4 | 13.1 ^b | 7.7 | 21.2 ^a | 9.0 | 13.6 ^b | 7.8 | 17.9 ^{***} |
| RSES score | 27.0 ^a | 5.6 | 30.1 ^b | 5.8 | 26.1 ^a | 5.3 | 30.7 ^b | 5.5 | 14.2 ^{***} |

Note: Means in the same row that do not share superscripts differ significantly ($p < 0.05$), based on Scheffé's post hoc tests.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 3
Age (in years) at Onset of Specific Behaviors and Disorders in 347 Patients with BED: Comparison by Co-occurrence of Mood and/or Substance Use Disorders

| | <u>Mood disorder (N = 129)</u> | | <u>Substance use dis. (N = 34)</u> | | <u>Both (N = 60)</u> | | <u>Neither (N = 124)</u> | | <i>F</i> |
|----------------------------|--------------------------------|-----------|------------------------------------|-----------|----------------------|-----------|--------------------------|-----------|-------------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | |
| Obesity | 15.8 | 9.2 | 18.4 | 12.0 | 14.5 | 8.7 | 16.1 | 9.8 | 1.1 |
| Dieting | 17.5 | 8.5 | 19.7 | 9.2 | 18.1 | 7.9 | 19.7 | 9.2 | 1.6 |
| Bingeing (at least weekly) | 23.4 | 11.6 | 24.6 | 12.3 | 20.2 | 11.6 | 23.2 | 12.1 | 1.3 |
| Binge-eating disorder | 25.6 ^{ab} | 12.3 | 29.9 ^a | 13.1 | 21.4 ^b | 12.2 | 26.9 ^{ab} | 12.7 | 3.9 ^{**} |
| Substance use disorder | -- | -- | 20.8 | 6.2 | 21.4 | 7.2 | -- | -- | 0.2 |
| Mood disorder | 29.9 | 11.9 | -- | -- | 24.9 | 12.1 | -- | -- | 5.7 [*] |

Note: Means in the same row that do not share superscripts differ significantly ($p < 0.05$), based on Scheffe's post hoc tests.

* $p < 0.05$.

** $p < 0.01$.