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Associations of Elevated Weight Status with Symptom Severity and Treatment Outcomes in Binge/Purge Eating Disorders

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Abstract

Objective: Binge-eating and purging behaviors commonly co-occur with overweight. However, little is known about the potential associations of elevated weight status with eating disorder severity or treatment outcomes. Thus, the present study compared binge-eating and purging patients with low, normal, and high weight statuses on eating disorder and mood symptoms at treatment admission, and tested whether weight status was associated with symptom change over treatment.

Method: The sample included 135 adult female patients in an intensive outpatient program, who completed self-assessments at admission and discharge. MANOVAs compared the groups at treatment admission, and multilevel models examined changes over time.

Results: At admission, the high-weight group reported greater fasting frequency than the normal-weight group, and higher shape and weight concerns than the low-weight group. Over time, the high-weight group additionally showed higher eating disorder psychological symptom severity than the normal-weight group. The groups did not differ on mood symptoms at admission. Longitudinal results indicated that the groups showed comparable symptom improvements over treatment.

Discussion: These findings highlight the severity of higher-weight patients with bulimia nervosa. Additionally, although these patients may present with more severe symptoms, their response to an intensive treatment may be comparable to that of normal- or lower-weight groups.

Keywords

eating disorders; bulimia nervosa; binge eating; purging; overweight; treatment outcome

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Conflict of Interest

The authors have no conflict to declare.

Introduction

Binge eating and purging are transdiagnostic eating disorder behaviors associated with significant medical and psychosocial problems (Mitchell, 2016). Although the seriousness of these behaviors at a low weight is highlighted by a separate Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (*DSM-5*) diagnostic classification—anorexia nervosa, binge-eating/purging subtype (AN-BP)—individuals “within the normal weight or overweight range” (American Psychiatric Association, 2013, p. 347) are grouped together in bulimia nervosa (BN). Despite an increase in the comorbidity between BN and high weight over the last few decades – paralleling the rise in obesity rates – most research on these “binge/purge eating disorders” and their subthreshold variants (B/P eating disorders) has focused on individuals with either low or normal body mass indexes (BMIs; i.e., 24.9 kg/m^2). While the relevance of past elevated weight to B/P symptoms has been demonstrated in research focused on weight suppression (Lowe, Piers, & Benson, 2018), there is little known about how current elevated weight status relates to the symptom severity of B/P eating disorders.

To our knowledge, only four studies have focused on B/P behaviors at an elevated weight status, and findings have been mixed. Some found individuals with BN who are at higher weights report less frequent binge eating (Masheb & White, 2012; Mitchell et al., 1990) or vomiting (Mitchell et al., 1990), but others found that these behaviors were unrelated to higher weight status (Hudson et al., 1988; Rotella et al., 2013). Findings from studies comparing individuals with B/P behaviors at low (AN/BP) and normal/high weights (BN) have been similarly mixed, with one study finding them in a single latent class (Wade, Crosby, & Martin, 2006), and another finding them separate (Keel et al., 2004). Additionally, the potential influence of elevated weight status on treatment for B/P behaviors, and vice versa, remains unknown. Improved understanding of how weight status, across the full range of BMIs, relates to B/P eating disorder symptomatology may be critical in informing conceptualization of and interventions for individuals with these behaviors.

The current transdiagnostic study sought to (1) compare patients of low, normal, and high weight statuses who engage in B/P behaviors at treatment admission; and (2) test whether weight status is associated with symptom improvement over the course of treatment. Given current cultural norms that value thinness, patients with eating disorders who are at higher weights are presumably farther from their ideal weight and may thus experience greater shape and weight concerns, as well as other eating disorder and mood pathology. Thus, we hypothesized that (1) individuals at higher weights would exhibit more severe eating disorder and mood symptoms than their normal-weight counterparts, and (2) improvement in symptoms over treatment would vary by weight status. Additionally, we explored whether weight changes over treatment differed by weight status.

Method

Participants

Participants were 135 adult (range: 18–59 years) female patients admitted to treatment in a partial hospitalization program for eating disorders. Treatment procedures are described in

the supplement. Because data collection began prior to the publication of the DSM-5 (APA, 2013), patients were diagnosed using the 2010 draft criteria (which were largely consistent with those in the published DSM-5 apart from minor wording differences; APA, 2010), and were included in the study if they met criteria for AN-BP, BN, or subthreshold AN-BP or BN. Diagnoses were made by staff psychiatrists using unstandardized, semi-structured interviews.

Measures

Weight Status.—Height measured at admission and weight measured at admission and discharge were used to calculate BMI (kg/m^2).

Eating Disorder Symptomatology.—Eating disorder symptoms were assessed using the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008). The EDE-Q measures the frequency of objective binge eating, vomiting, laxative use, exercise, and fasting. As its original factor structure has received limited empirical support (see Rand-Giovannetti, Cicero, Mond, & Latner, 2020), a four-factor model (Friborg, Reas, Rosenvinge, & Ro, 2013) found to be best-fitting out of twelve models (Rand-Giovannetti et al., 2020) was used instead. The internal consistency of the subscales ranged from acceptable to excellent across the time points (Shape and Weight Concerns $\alpha = 0.93 - 0.95$; Preoccupation and Restriction $\alpha = 0.79 - 0.82$; Dietary Restraint $\alpha = 0.88$; Eating Concerns $\alpha = 0.70 - 0.73$).

Depression.—Depressive symptoms were measured using the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996). Internal consistency within the present sample was excellent ($\alpha = 0.90 - 0.92$).

Anxiety.—Anxiety symptoms were measured using the trait questions in the State-Trait Anxiety Inventory (STAI-T; Spielberger, 2010). The internal consistency for the STAI-T ranged from $\alpha = 0.89 - 0.96$.

Statistical Analysis

Multivariate analyses of variance (MANOVAs) were used to compare the weight groups on EDE-Q behavior frequencies and subscale scores, and BDI-II and STAI-T scores at treatment admission. Multilevel models (MLM) with the NW group as the reference group examined changes in eating disorder symptoms, depressive and anxiety symptoms, and BMI from admission to discharge across groups. These models flexibly address the nested structure of our longitudinal data. Repeated measurements of the dependent variable nested within participants were included at Level 1. Weight status and the interaction between weight status and time were modeled at Level 2. Time was modeled as a factor, which allowed flexibility in modeling nonlinear effects and variation in time between assessments. Participants with missing data at discharge did not differ from those without missing data on any of the baseline variables of interest ($ps > .17$). Therefore, data were assumed to be missing at random, and full information maximum likelihood (FIML) in the MLMs accounted for missing data. To correct for multiple comparisons in the longitudinal analyses, alpha was set *a priori* at 0.01.

Additionally, reliable change index (RCI) scores were calculated (Jacobson & Truax, 1991) to assess for clinically meaningful symptom reduction (i.e., $RCI > 1.96$) within each weight status group (see Supplement).

Results

Participant Demographics

Based on admission BMI, the sample was divided into three weight groups using the Centers for Disease Control (CDC, 2020) guidelines—a high-weight group (HW; BMI > 24.9 ; range: 25.01–49.52; $n=37$), normal-weight group (NW; BMI between 18.5–24.9; range: 19.28 – 24.83; $n=77$), and low-weight group (LW; BMI < 18.5 ; 15.50 – 18.40; $n=21$). The groups did not differ significantly on age ($F(2, 132) = 1.01, p = .37$, partial $\eta^2 = 0.02$), education ($F(2, 131) = .18, p = .84$, partial $\eta^2 = 0.003$), or race ($X^2(8, N = 134) = 11.87, p = .16$, Cramer's $V = .21$; Table 1). Ethnicity significantly differed by group ($X^2(2, N = 131) = 6.93, p = .03$, Cramer's $V = .23$), with a significantly higher percentage of the HW group identifying as Latino or Hispanic. Total length of stay (in days) also differed significantly by group ($F(2, 132) = 3.38, p = .04$, partial $\eta^2 = 0.05$). Thus, the cross-sectional analyses included ethnicity as a covariate, and the longitudinal analyses included ethnicity and length of stay as covariates.

Baseline Group Differences

Eating Disorder Symptoms.—Table 1 presents raw means and standard deviations for all outcome variables at admission. The MANCOVA on EDE-Q behavior frequency revealed a significant difference across weight status groups ($F(10,226) = 2.73, p = .003$, partial $\eta^2 = 0.11$, Pillai's Trace = 0.22). Follow-up contrasts indicated that both LW and HW groups reported significantly greater fasting frequency compared to the NW group, $ps < 0.004$. Additionally, the LW group reported significantly less binge eating compared to the NW group, $p = .02$. There was also a significant group difference on EDE-Q subscale scores ($F(8,234) = 2.39, p = .02$, partial $\eta^2 = 0.08$, Pillai's Trace = 0.15). Follow-up contrasts indicated that the HW group had significantly higher scores on all EDE-Q subscales than the NW group ($ps < .03$) and higher Shape/Weight Concerns than the LW group ($p = .046$). The NW group had the lowest Eating Concern scores, $ps < .048$.

Depression and Anxiety Symptoms.—Results indicated no differences across groups in BDI and STAI-T scores at admission ($F(4,246) = 2.00, p = .10$, partial $\eta^2 = 0.03$, Pillai's Trace = 0.06).

Group Differences over Treatment

Table 1 presents raw means and standard deviations for all outcome variables at discharge, and Table 2 presents results from MLM comparing weight status groups over time.

BMI.—There was a significant Weight Status \times Time interaction, such that the LW group showed a significantly greater increase in BMI compared to the NW group, $p < .001$. Post-hoc pairwise comparisons showed that the LW ($p < .001$) showed a significant increase in BMI from admission to discharge, while the NW and HW groups did not ($ps > .03$).

Eating Disorder Symptoms.—There was a significant main effect of time such that all EDE-Q behaviors (except laxative use) and subscale scores decreased from admission to discharge. A significant main effect of weight status on EDE-Q behavior frequency indicated that across treatment, the LW and HW groups reported greater fasting frequency than the NW group. There was also a main effect of weight status on EDE-Q scores, such that the HW group reported significantly higher EDE-Q subscale scores (except Dietary Restraint) than the NW group. No weight status \times time interactions were statistically significant.

Depression and Anxiety Symptoms.—There was a significant main effect of time on both BDI and STAI-T scores, such that the scores decreased from admission to discharge across groups. There were no significant main effects of weight status, or weight status \times time interactions.

RCI Scores.—The percentages of patients achieving meaningful clinical change (i.e., RCI > 1.96) are presented in Table 1. Chi-square tests showed that the percentages of patients with meaningful symptom reduction did not differ by weight status (p s $> .20$), except for EDE-Q Eating Concerns ($p = .005$). Using alpha of .01 for multiple comparisons in longitudinal analyses, post-hoc tests did not reveal any statistically significant differences, p s $> .02$.

Discussion

Our results suggest that, at treatment admission, patients with B/P behaviors and at higher weights are more severely symptomatic than patients at normal weights, and have greater body-related concerns than patients at lower weights. In contrast to prior findings of fewer binge-eating and vomiting episodes in overweight compared to normal-weight patients with BN (Mitchell et al., 1990), we found the higher-weight group to be comparable to the normal-weight group on both behaviors. Unexpectedly, the higher-weight group also reported more frequent fasting than the normal-weight group. Over treatment, all three groups showed a decrease in eating disorder and mood symptoms and only patients at low weights gained weight over the course of treatment. However, across treatment, patients at higher weights reported more frequent fasting and greater shape/weight concerns, preoccupation and restriction, and eating concerns than patients at normal weights. These results all highlight the severe psychological symptoms of patients with B/P behaviors at higher weights. Of note, all three groups were equally likely to achieve clinically meaningful symptom reduction in treatment, except regarding eating concerns. Therefore, although the higher-weight group may present with more severe psychological symptoms at admission, their response to intensive outpatient treatment may be largely comparable to that of normal- and lower-weight groups.

Consistent with prior observations (Bulik et al., 2012), roughly 30% of our treatment-seeking sample with B/P behaviors were at higher weights. Many (28.1%) of the patients in this high-weight group had an obese BMI (CDC, 2020). The reported elevated shape and weight concerns in these patients may have promoted a greater desire for weight loss through restriction and greater self-reported fasting frequency. These patients may also fear further weight gain as a result of prescribed regular eating. However, our results indicate that

remission can be achieved without significant weight gain and inadvertent exacerbation of medical complications related to obesity. In addition, in line with prior research (Masheb & White, 2012), we found the largest proportion of Hispanic/Latino patients in the higher-weight group. Given the high obesity prevalence among ethnic minority populations (Kumanyika, 2019), more research on B/P eating disorders in these groups is needed.

The current study was limited by the use of a treatment-seeking, female-only sample that may not be representative of eating disorder populations in the community. Another limitation is the use of self-report questionnaires only; because no bloodwork was collected, we were unable to corroborate patients' self-report of their eating disorder behaviors, or assess medical complications or physical symptoms relevant to low and high weights across the groups. Additionally, as patient diagnoses were made by psychiatrists using unstandardized, semi-structured interviews, their reliability and validity were not able to be established. Lastly, a substantial number of patients were lost to follow-up, potentially limiting the generalizability of these findings to patients with poor outcome. Nonetheless, this is the first study, to our knowledge, to examine B/P eating disorder pathology across patients with a wide range of BMIs in the same analysis. The cross-sectional and longitudinal data allowed us to examine baseline differences, as well as symptom changes over time.

Eating disorders in individuals who are at higher weights may go undetected by providers, despite their comparable or greater symptom severity. Overall, our findings highlight a need for increased research, clinical, and public health attention to B/P symptoms in the context of a higher weight status.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon request.

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Table 1

Sample Characteristics at Admission and Discharge.

Variable	Admission			Discharge			RCI		
	LW (n = 21)	NW (n = 77)	HW (n = 37)	LW (n = 16)	NW (n = 43)	HW (n = 20)	LW (n = 16)	NW (n = 43)	HW (n = 20)
Ethnicity (% Hispanic/Latino)	19.0%	13.7%	35.1%	-	-	-	-	-	-
Race (% White)	66.7%	75.3%	63.9%	-	-	-	-	-	-
Age	25.80 (8.45)	27.57 (9.52)	29.53 (11.42)	-	-	-	-	-	-
Education (years)	15.10 (2.49)	15.13 (2.33)	14.86 (2.03)	-	-	-	-	-	-
BMI (kg/m ²)	17.51 (0.74) ^a	21.88 (1.37) ^b	29.08 (5.36) ^c	20.31 (1.25)	22.57 (1.73)	30.95 (6.37)	-	-	-
Length of Stay (days)	-	-	-	122.76 (83.88) ^a	81.56 (68.20) ^b	82.49 (48.55)	-	-	-
EDE-Q	-	-	-	-	-	-	-	-	-
Shape/Weight Concerns	4.80 (1.47) ^a	4.71 (1.38) ^a	5.52 (0.74) ^b	3.99 (1.87)	3.52 (1.65)	3.97 (1.69)	50.0%	35.9%	55.0%
Preoccupation/Restriction	4.10 (1.70)	3.63 (1.53) ^a	4.47 (1.23) ^b	1.94 (1.54)	1.67 (1.28)	1.95 (1.35)	64.3%	41.0%	47.4%
Dietary Restraint	4.05 (2.11)	3.51 (2.00) ^a	4.32 (1.82) ^b	2.10 (1.70)	1.64 (1.41)	1.58 (1.69)	64.3%	48.7%	63.2%
Eating Concerns	3.54 (1.35) ^b	2.87 (1.57) ^a	3.90 (1.11) ^b	1.81 (1.35)	1.77 (1.16)	2.12 (1.42)	64.3%	17.9%	36.8%
Binge-eating (episodes)	7.79 (9.53) ^a	17.92 (19.35) ^b	17.20 (10.78) ^b	2.31 (3.32)	3.49 (7.24)	2.75 (3.61)	-	-	-
Vomiting (episodes)	16.53 (33.42)	18.38 (38.38)	14.31 (11.90)	2.44 (3.85)	3.72 (9.41)	4.45 (9.56)	-	-	-
Laxative use (episodes)	3.05 (7.69)	1.69 (4.71)	1.65 (4.99)	0.19 (0.75)	0.60 (1.73)	0 (0)	-	-	-
Exercise (episodes)	8.11 (9.74)	7.44 (11.68)	5.97 (9.31)	3.81 (7.50)	1.40 (3.35)	1.45 (4.45)	-	-	-
Fasting (rating)	2.60 (2.11) ^b	1.22 (1.68) ^a	2.37 (2.25) ^b	0.63 (1.09)	0.49 (0.88)	0.85 (0.88)	-	-	-
BDI-II	31.24 (9.77)	25.65 (11.03)	29.24 (12.83)	18.69 (12.29)	16.32 (12.74)	14.61 (11.05)	69.2%	40.5%	50.0%
STAI-Trait	60.35 (4.98)	55.54 (9.46)	57.67 (8.83)	48.09 (14.79)	47.37 (11.16)	46.46 (12.03)	50.0%	39.4%	53.8%

Note. RCI, Reliable Change Index (percentages of patients reaching RCI > 1.96); LW, low-weight; NW, normal-weight; HW, high-weight; BMI, body mass index; WS, weight suppression; EDE-Q, Eating Disorder Examination Questionnaire (scored using factor structure by Friborg et al. [2013], per recommendations of Rand-Giovannetti et al. [2020]); BDI-II, Beck Depression Inventory-II; STAI-Trait, State-Trait Anxiety Inventory - Trait Anxiety. Descriptive statistics are presented as percentages or means (standard deviations). Superscripts of differing values (a < b < c) indicate significant differences between groups at p < .05.

Table 2.

Multilevel model analyses on symptom change over time.

Outcome of Interest	Intercept	LW	HW	Time (Admit - DC)	LOS	Ethnicity	LW*Time2	HW*Time2
BMI	Est. 22.03**	-4.55**	7.07**	0.65*	<.01	-0.47	2.27**	0.17
	R^2_β	0.22	0.51	0.01	0.01	0.01	0.03	<.01
EDE-Q Shape/Weight Concerns	Est. 4.28**	0.08	0.90*	-1.14**	<.01	0.29	0.15	-0.38
	R^2_β	<.01	0.05	0.08	0.01	0.01	<.01	<.01
EDE-Q Preoccupation and Restriction	Est. 3.33**	0.48	0.89*	-1.94**	<.01	0.25	-0.35	-0.52
	R^2_β	0.01	0.04	0.20	0.01	<.01	<.01	0.01
EDE-Q Dietary Restraint	Est. 2.70**	0.39	0.90	-1.91**	<.01	0.63	-0.23	-0.79
	R^2_β	<.01	0.03	0.14	0.02	0.02	<.01	0.01
EDE-Q Eating Concerns	Est. 2.46**	0.68	1.12**	-1.06**	<.01	0.19	-0.84	-0.70
	R^2_β	0.02	0.08	0.08	0.01	<.01	0.01	0.01
Binge Eating	Est. 33.25	-149.46	-107.53	-14.78**	0.60	63.29	8.34	1.52
	R^2_β	0.02	<.01	0.02	0.02	0.01	<.01	<.01
Vomiting	Est. 137.95	-96.49	-114.90	-20.79*	-0.62	62.83	3.03	15.17
	R^2_β	0.01	0.01	<.01	0.01	0.01	<.01	<.01
Laxative	Est. 124.89	-92.68	-111.08	-0.45	-0.64	60.17	-3.48	-0.49
	R^2_β	0.02	0.04	<.01	0.04	0.02	<.01	<.01
Exercise	Est. 6.84**	1.60	-1.00	-5.44**	<.01	0.42	0.62	1.24
	R^2_β	<.01	<.01	0.05	<.01	<.01	<.01	<.01
Fasting	Est. 0.66	1.32**	1.24**	-0.77*	<.01	0.29	-1.41	-0.70
	R^2_β	0.05	0.07	0.03	0.02	0.01	0.03	0.01
BDI-II	Est. 21.75**	6.07	4.79	-8.65**	0.01	3.13	-4.53	-5.49
	R^2_β	0.02	0.02	0.07	<.01	0.01	0.01	0.01
STAI-Trait	Est. 52.38**	5.37	3.06	-7.28**	<.01	3.30	-5.55	-3.81
	R^2_β	0.03	0.01	0.07	<.01	0.02	0.01	0.01

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Note. Referent group is NW (patients with bulimia nervosa who are in the normal-weight range), EDE-Q, Eating Disorder Examination Questionnaire (scored using factor structure by Friborg et al. [2013], per recommendations of Rand-Giovannetti et al. [2020]); BDI-II, Beck Depression Inventory-II; STAI-Trait, State-Trait Anxiety Inventory - Trait Anxiety.

* indicates significance at the $p < 0.01$ level.

** indicates significance at the $p < 0.001$ level.