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# Overweight and obesity are associated with increased eating disorder correlates and general psychopathology in university women with eating disorders

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## Abstract

**Objective:** Examine how eating disorder (ED) correlates, ED-related clinical impairment, general psychopathology, and ED diagnoses differ across weight statuses in a sample of university women with EDs.

**Method:** Participants were 690 women from 28 U.S. universities who screened positive for an ED (with the exception of anorexia nervosa [AN]) and participated in the Healthy Body Image Program study. ED correlates, ED-related clinical impairment, general psychopathology (i.e., depression and anxiety), and ED diagnoses were compared across weight statuses (i.e., healthy weight, overweight, obesity) using analyses of variance and chi-square tests.

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**Results:** Women with EDs and overweight or obesity had higher levels of, perceived benefit of thinness, depressive symptoms, anxiety, and weight/shape concerns (obesity only) than those with healthy weight ($p$s ≤ .017). Compared to those with healthy weight, those with obesity had higher rates of clinical and sub-clinical binge eating disorder and lower rates of bulimia nervosa ($p$ < .001).

**Discussion:** Overweight and obesity in individuals with EDs, excluding AN, are associated with greater severity of ED correlates, ED-related clinical impairment, and co-morbid general psychopathology. The current study highlights the need to consider weight status in ED treatment and for optimization of ED treatments to address shared risk factors between EDs and overweight and obesity.

### Keywords

treatment; obesity; weight status; eating disorders; college; overweight

## 1. Introduction

The transition from adolescence to young adulthood is a hallmark period for the development and persistence of eating disorders (EDs) and excess weight gain (Lanoye, Brown, & LaRose, 2017; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). EDs and obesity are prevalent among university students (Eisenberg, Nicklett, Roeder, & Kirz, 2011; Lipson & Sonneville, 2017). Approximately 17% of females and 4% of males on college campuses screen positive for an ED (Eisenberg et al., 2011), and nearly 50% of young adults ages 18-24 have overweight or obesity (Nagata, Garber, Tabler, Murray, & Bibbins-Domingo, 2018). EDs and obesity share risk and maintenance factors, including dieting, body dissatisfaction, weight/shape concerns, and unhealthy weight control behaviors – all of which are common among young adults (Goldschmidt, Wall, Loth, & Neumark-Sztainer, 2015). Independently, EDs and obesity are associated with negative health consequences, which may be compounded when these conditions present concurrently (Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008).

Only one study has examined the relationship between weight status and ED risk profile/clinical status among university students (Kass et al., 2017). Those with overweight and obesity demonstrated greater ED pathology and clinical impairment than those with healthy weight or underweight (Kass et al., 2017). However, because this sample included those at low-risk for, high-risk for, and with EDs (who comprised only 5% of the sample, not classified by ED diagnosis), more research is needed to examine whether overweight and obesity exacerbate ED pathology and clinical impairment in a large sample of university students who all have EDs. Thus, among university women with sub-clinical or clinical EDs, we examined whether weight status was related to differences in: 1) ED pathology and correlates (i.e., weight/shape concerns, perceived benefit of thinness, global ED pathology), 2) ED-related clinical impairment, 3) general psychopathology (i.e., depression and anxiety), and 4) ED diagnoses. This evaluation is critical because if individuals with EDs and overweight or obesity experience more ED-related impairment and have greater general psychopathology, then ED treatments may need to be tailored to better suit their needs. Based on previous work (Kass et al., 2017), we hypothesized that students with overweight

or obesity would report greater ED correlates, pathology, ED-related clinical impairment, and general psychopathology compared to those with healthy weight. Moreover, given the strong association between overweight and obesity and binge eating (Dingemans & van Furth, 2012), we hypothesized that ED diagnoses would vary by weight status, with those with overweight or obesity more likely to report a diagnosis of clinical or sub-clinical binge eating disorder (BED) than other EDs.

## 2. Material and methods

### 2.1. Participants and procedure

This study utilized baseline data from 690 female students participating in the Healthy Body Image Program study (HBI), which evaluated a digital cognitive behavioral therapy guided self-help intervention for EDs (see Fitzsimmons-Craft et al., 2020 for additional details). Trial eligibility included being ≥18 years, identifying as female, being enrolled at one of 28 participating U.S. universities, and screening positive for a probable DSM-5 clinical or sub-clinical ED other than anorexia nervosa (AN; which received a medical referral to in-person evaluation). All participating universities received their own Institutional Review Board (IRB) approval or deferred to the main IRB of record for the study, which reviewed and approved all study procedures. All participants provided informed consent.

### 2.2. Measures

**2.2.1. Height and Weight.—**Self-reported height and weight were used to calculate body mass index (BMI; $kg/m^2$). BMI was used to classify weight status as underweight (BMI < 18.5), healthy weight (18.5 ≤ BMI < 25.0), overweight (25.0 ≤ BMI < 30.0), or obese (BMI ≥ 30.0).

**2.2.2. ED Pathology and Correlates.—**Weight/shape concerns (range: 0-100) were assessed using the Weight Concerns Scale (Killen et al., 1994). The Perceived Benefit of Thinness Scale (range: 1-6) was created for the trial (Flatt et al., in preparation; Fitzsimmons-Craft et al., 2019a). ED pathology (range: 0-6) was assessed using the Eating Disorder Examination-Questionnaire global score (Fairburn, 2008). Cronbach's alphas were .70, .93, and .91, respectively. Higher scores on all measures indicate greater ED pathology.

**2.2.3. Clinical Impairment.—**ED-related clinical impairment (range: 0-48) was examined using the Clinical Impairment Assessment (Bohn et al., 2008)(Cronbach's alpha = .94). Scores ≥16 indicate clinically significant impairment.

**2.2.4. General Psychopathology.—**Depressive symptoms (range: 0-27) were assessed using the Patient Health Questionnaire-9 (Kroenke & Spitzer, 2002). The clinical cutoff for moderate depressive symptoms is 10. Anxiety (range: 4-20) was assessed using the Patient-Reported Outcomes Measurement Information System Short Form v1.0-Anxiety4a questionnaire (Pilkonis et al., 2011). The cutoff for clinical anxiety is 8. Cronbach's alphas were .88 and .90, respectively.

**2.2.5. Probable DSM-5 ED Diagnoses.—**The Stanford-Washington University ED Screen (SWED; Graham et al., 2019) indicated probable ED diagnoses. The SWED was validated in college-age women, with specificities ranging from 0.79 (sub-BED) to 0.99 (AN) and sensitivities ranging from 0.68 (sub-BN) to 0.90 (AN) compared to diagnostic interview. Participants were categorized as likely meeting criteria for clinical or sub-clinical bulimia nervosa (BN), clinical or sub-clinical BED, purging disorder, or unspecified feeding or eating disorder.

### 2.3. Statistical analyses

Analyses were performed using SPSS version 26. Analyses excluded participants classified as underweight, due to small sample size ($n = 8$), or were missing height or weight ($n = 5$). Analyses of variance examined whether weight status was related to differences in ED pathology and correlates, ED-related clinical impairment, and general psychopathology. Significant results were followed with Tukey post-hoc tests. Chi-square analyses examined differences in ED diagnoses by weight status. Statistical significance was defined as $p < .05$ for primary analyses, and $p < .017$ (i.e., .05/3) for post-hoc tests to account for multiple comparisons.

## 3. Results

### 3.1. Sample characteristics

Participants' ($n = 677$) mean age was 22.13 ± 4.86 years. Participants self-identified as White (85.4%), Asian/South Asian (17.5%), Multi-Racial (7.7%), other (6.9%), Black/African American (5.6%), and American Indian or Alaska Native (0.5%). Roughly one-fifth (17.5%) identified as Hispanic. Approximately three-quarters (74.2%) identified as an undergraduate. Mean BMI was 25.8 ± 6.0; 60.9% met criteria for healthy weight, 21.7% for overweight, and 17.4% for obesity.

### 3.2. ED pathology and correlates

As shown in Table 1, weight/shape concerns were high (mean = 67.8 ± 17.5) and differed by weight status ($p = .002$); participants with obesity had higher weight/shape concerns than participants with healthy weight ($p = .001$). Perceived benefit of thinness differed by weight status ($p < .001$); participants with overweight and obesity reported higher perceived benefit of thinness than participants with healthy weight ($p = .005$ and $p < .001$, respectively). No differences emerged between weight statuses by global ED pathology ($p = .218$).

### 3.3. ED-related clinical impairment

The sample endorsed a clinically significant level of ED-related clinical impairment (mean = 25.14 ± 11.24; Table 1), which differed across weight status ($p = .033$). No between-group post-hoc comparisons reached statistical significance ($ps \geq .017$).

### 3.4. General Psychopathology

Means for the total sample and each weight status group exceeded clinical cutoffs for depressive symptoms and anxiety, however both differed by weight status ($ps < .001$; Table

1). Participants with overweight and obesity reported higher depressive symptoms (*p*s = .003 and .002, respectively) and anxiety (*p*s = .016 and .001, respectively) than participants with healthy weight.

### 3.5. DSM-5 ED diagnoses

DSM-5 ED diagnoses differed by weight status ($\chi 2(10, 677) = 46.62$; $p < .001$; Cramer's V = .186; Table 2). BN rates were higher in those with healthy weight than in those with obesity. BED rates were higher in those with obesity than healthy weight. Sub-clinical BED rates were higher among those with obesity than healthy weight or overweight. No other significant differences emerged in ED diagnosis rates by weight status.

## 4. Discussion

In university women who screened positive for EDs, overweight and obesity were associated with greater weight/shape concerns, perceived benefit of thinness, general psychopathology, and higher rates of sub-clinical and clinical BED. This is the first study to investigate concurrent overweight or obesity and EDs among university students with EDs, a critical population given their heightened risk for development and persistence of EDs and overweight/obesity (Lanoye et al., 2017; Nelson et al., 2008). Findings support the wealth of research on the co-occurrence of EDs and overweight/obesity (Goldschmidt et al., 2015; Sysko, Hildebrandt, Wilson, Wilfley, & Agras, 2010). Evidence in college samples indicates that a greater percentage of students with overweight and obesity met criteria for high ED risk or a clinical ED (58%) compared to students with healthy weight (34%) or underweight (25%) (Kass et al., 2017), though this sample was not restricted to only those with EDs like the current sample. Further, elevated weight status was the strongest predictor of ED risk in a sample of undergraduate and graduate students (Lipson & Sonneville, 2017). Extant literature shows both overweight/obesity and EDs are associated with increased co-morbid psychopathology. Among adolescents and young adults, overweight/obesity is positively associated with both elevated weight/shape concerns (Goldschmidt et al., 2015) and elevated anxiety and depressive symptoms (Chao, Wadden, & Berkowitz, 2019). Similarly, EDs are associated with increased general psychopathology (Aspen et al., 2014), clinical impairment (Bohn et al., 2008), and elevated weight/shape concerns (Killen et al., 1994). This study highlights that the concurrent presence of EDs and overweight or obesity may compound risk for these symptoms. Consequently, in addition to ED pathology, it may be important to address weight-related ED pathology among individuals with EDs and overweight/obesity who are interested in doing so, or to tailor ED treatments to address ED-related psychopathology that occurs in the context of or is perpetuated by stigma/bias associated with higher weight status. These implications are important because weight status, aside from underweight, is typically not addressed in ED treatments.

Additionally, ED diagnoses varied by weight status; those with obesity had higher rates of BED than those with healthy weight and higher rates of sub-clinical BED than those with overweight or healthy weight. This finding supports research showing a greater likelihood of obesity among individuals with BED compared to those with no ED (Hudson, Hiripi, Pope, & Kessler, 2007). Since binge eating and compensatory behaviors are robust risk factors for

weight gain (Neumark-Sztainer et al., 2006), university women with healthy weight and BN may be at risk for overweight and obesity further into adulthood. This is supported by findings from Udo & Grilo (2018) in which the average BMI of those with BN among adults was in the overweight range. Collectively, findings indicate that those with co-occurring elevated weight status and EDs may be an especially high-risk group for whom specialized treatment is warranted. However, prospective data are needed to examine the directionality of the associations between EDs, overweight/obesity, and psychopathology.

This study is strengthened by a large, heterogeneous sample of university women from across the United States. However, limitations include that the sample was exclusively female, so results cannot generalize across genders. Data were self-reported, including height and weight. Although self-reported height and weight are mostly reliable proxies for measured height and weight (Rowland, 1990), individuals with obesity tend to underreport weight (Gorber, Tremblay, Moher, & Gorber, 2007). Accordingly, the true percentage of those with elevated weight status in the sample may be higher. Additionally, illness duration was not collected. Given that those with overweight/obesity are less likely to get diagnosed with an ED (Sonneville & Lipson, 2018), this may partially explain their increased co-morbid psychopathy.

Findings reinforce that EDs affect individuals across the weight spectrum (Fitzsimmons-Craft et al., 2019b; Kass et al., 2017) and indicate that overweight and obesity in university women with EDs are associated with heightened ED correlates, ED-related clinical impairment, and co-morbid psychopathology. Although ED treatments largely do not focus on weight status (other than restoring underweight status, which is usually targeted when treating AN), those with overweight/obesity and an ED may require additional treatment support to address elevated psychopathology.

## 5. Conclusions

Findings highlight the need for ED treatments to address shared risk factors between EDs and overweight/obesity. Future work should identify the best ways to optimize ED treatment for those with overweight/obesity. This is critical for reducing stigma and improving treatment outcomes among those with co-morbid EDs and overweight/obesity.

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**Table 1.**

Comparison of eating disorder pathology and correlates, clinical impairment, and general psychopathology across weight statuses.

| | Total (N = 677) | Healthy weight (HW; n = 412 | Overweight (OW; n = 147) | Obese (OB; n = 118) | Significance | Pairwise comparison |
|---|---|---|---|---|---|---|
| **ED pathology and correlates** | | | | | | |
| Weight/shape concerns (range: 0-100) | 67.78 ± 17.46 | 66.10 ± 17.78 | 68.39 ± 17.70 | 72.86 ± 14.98 | F(2, 671)=7.121, p = .001 | OB > HW |
| Perceived benefit of thinness (range: 1-6) | 4.67 ± 0.92 | 4.51 ± 0.91 | 4.84 ± 0.93 | 4.94 ± 0.84 | F(2, 466) = 10.056, p <.001 | OW, OB > HW |
| ED pathology (range: 0-6) | 3.59 ± 1.11 | 3.54 ± 1.13 | 3.63 ± 1.13 | 3.73 ± 0.98 | F(2, 670) = 1.527, p = .218 | - |
| **Clinical impairment** | | | | | | |
| ED-related clinical impairment (range: 0-48) | 25.14 ± 11.26 | 24.29 ± 11.60 | 25.84 ± 10.94 | 27.20 ± 10.13 | F(2, 669) =3.43, p = .033 | |
| **General Psychopathology** | | | | | | |
| Depressive symptoms (range: 0-27) | 11.07 ± 6.19 | 10.26 ± 6.14 | 12.21 ± 6.17 | 12.43 ± 5.93 | F(2, 668) = 9.24, p < .001 | OW, OB > HW |
| Anxiety (range: 4-20) | 11.18 ± 4.22 | 10.66 ± 4.31 | 11.78 ± 3.94 | 12.18 ± 4.03 | F(2, 669) = 8.17, p < .001 | OW, OB > HW |

Note: Pairwise comparisons were significant at p < .017

ED = eating disorder; HW = healthy weight; OW = overweight; OB = obese

**Table 2.**

Comparison of DSM-5 eating disorder diagnoses across weight statuses.

| | Total (N = 677) | Healthy weight (HW; n = 412 | Overweight (OW; n = 147) | Obese (OB; n = 118) | Overall p-value | Pairwise comparisons |
|---|---|---|---|---|---|---|
| Bulimia nervosa | 20.1% | 23.8% | 17.0% | 11.0% | $\chi 2(2, 677) = 10.42$; p = .004; Cramer's V = .124 | HW > OB |
| Binge eating disorder | 9.9% | 7.3% | 10.2% | 18.6% | $\chi 2(2, 677) = 13.30$; p = .001; Cramer's V = .140 | OB > HW |
| Sub-clinical bulimia nervosa | 25.1% | 24.5% | 27.9% | 23.7% | $\chi 2(2, 677) = .802$; p = .670; Cramer's V = .034 | - |
| Sub-clinical binge eating disorder | 9.7% | 6.6% | 9.5% | 21.2% | $\chi 2(2, 677) = 22.33$; p < .001; Cramer's V = .182 | OB > HW, OW |
| Purging disorder | 4.4% | 5.3% | 2.7% | 3.4% | $\chi 2(2, 677) = 2.10$; p = .346; Cramer's V = .056 | - |
| Unspecified feeding or eating disorder | 30.7% | 32.5% | 32.7% | 22.0% | $\chi 2(2, 677) = 5.07$; p = .079; Cramer's V = .087 | - |

Note: Pairwise comparisons were significant at least at $p < .017$

HW = healthy weight; OW = overweight; OB = obese