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Men who engage in both subjective and objective binge eating have the highest psychological and medical comorbidities

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ABSTRACT

Data suggest that assessing for the presence of loss of control (LOC) while eating is more useful in identifying risk for excess weight gain and psychosocial comorbidities than focusing on the amount of food consumed during episodes of perceived overeating. Yet, most of this research has included children and women. The current study examined whether perceived overeating patterns with and without LOC were uniquely associated with eating- and weight-related comorbidities in a community sample of young men. Participants ($N = 1114$; 18–30 y) completed a brief online survey assessing body mass index (BMI); perceived overeating habits, including overeating without LOC (OEs), and subjective (SBEs) and objective binge eating episodes (OBEs); weight-related medical comorbidities; and disordered eating pathology. After adjusting for BMI and race/ethnicity, men who reported engaging in both OBE(s) and SBE(s) were the most likely to have a weight-related medical comorbidity, and reported the highest levels of dietary restraint, concerns about body fat, and excessive exercise pathology. Group differences remained even after adjusting for frequency of disordered eating episodes, a common indicator of severity of comorbid pathology. The current study's findings suggest that young men who engage in both OBE(s) and SBE(s) may be at the highest risk for chronic disease and psychological concerns, although additional studies with prospective data are necessary to confirm this hypothesis.

1.1. Introduction

When referring to *binge eating*, two unique patterns of discrete eating episodes are generally recognized: 1) objective binge episodes (OBEs), or eating an unambiguously large amount of food while experiencing loss of control (LOC); and 2) subjective binge episodes (SBEs), or eating what is perceived as an excess amount of food, but is not objectively large, while experiencing LOC (Fairburn & Cooper, 1993). Research in women and children highlights the central role that LOC, relative to amount of food consumed, plays in psychopathology and weight. When comparing women who endorsed either OBEs or SBEs, there were no significant differences in eating disorder or depressive symptoms (Fitzsimmons-Craft et al., 2014; Latner, Hildebrandt, Rosewall, Chisholm, & Hayashi, 2007; Palavras, Morgan, Borges, Claudino, & Hay, 2013), or changes in comorbid psychopathology over time (Palavras, Hay, Lujic, & Claudino, 2015). LOC is also a better predictor of distress experienced before and after an overeating episode than the amount of food consumed (Goldschmidt et al., 2012). Pediatric studies also suggest that, even when comparable amounts of food are consumed, the presence of perceived LOC is associated with greater psychosocial symptoms (Allen, Byrne, La Puma, McLean, & Davis, 2008; Shomaker et al., 2010; Tanofsky-Kraff et al., 2004). Likewise, in adults, OBEs predict depressive symptoms and odds of being overweight, while objective overeating episodes without LOC (or OEs) do not (Sonneville et al., 2013).

Extant studies challenge the validity of requiring OBEs in eating disorder diagnoses (Latner & Clyne, 2008; Watson, Fursland, Bulik, & Nathan, 2013) and suggest targeting LOC eating in prevention efforts (Tanofsky-Kraff et al., 2011). However, it remains unclear whether the observed patterns among LOC, episode size, excess weight, and psychopathology are consistent among men. According to some data (Hudson, Hiripi, Pope, & Kessler, 2007; Striegel-Moore et al., 2009; Udo et al., 2013), but not all (Bentley, Mond, & Rodgers, 2014), rates of LOC eating and degree of associated impairments are comparable among men and women. One study did not find gender variations in the association between weekly OBEs (vs OEs), overweight/obesity and elevated depressive symptoms (Sonneville et al., 2013). In a sample of primarily Caucasian men, both weekly OBEs and SBEs were associated with reduced quality of life (Mitchison, Mond, Slewa-Younan, & Hay, 2013). While these preliminary data support the idea that the presence

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Table 1
Eating disorder examination questionnaire (Fairburn & Cooper, 1993) items to assess overeating episodes.

OE presence	Over the past four weeks (28 days), have there been any times when you have felt that you have eaten what other people would regard as an unusually large amount of food given the circumstances?
OE frequency	How many such episodes have you had over the past four weeks?
OBE frequency	During how many of these episodes of overeating did you have a sense of having lost control over your eating?
SBE presence	Have you had other episodes of eating in which you have had a sense of having lost control and eaten too much, but have not eaten an unusually large amount of food given the circumstances?
SBE frequency	How many such episodes have you had over the past four weeks?

Legend. OE = objective overeating; OBE = objective binge eating; SBE = subjective binge eating.

of LOC is most indicative of comorbid concerns in men, it is difficult to draw firm conclusions. Extant studies only included men who reported weekly binge eating, consistent with the requirements for binge eating disorder (American Psychiatric Association, 2013). Data from these men would not generalize to those who endorse less frequent LOC eating. Moreover, few studies have integrated assessments of disordered eating symptoms which may be particularly relevant to men's LOC eating, such as muscularity concerns and excessive exercise (Kelly, Cotter, Tanofsky-Kraff, & Mazzeo, 2015).

The goal of the current study is to examine how specific features of perceived overeating, including LOC and amount consumed, relate to weight concerns and eating disorder pathology in young men. We hypothesized that men with recent OBE(s) and/or SBE(s) would report higher BMI, weight-related medical diagnoses, dietary restraint, body image concerns, and excessive exercise than those with recent OE(s) or no instances of disordered eating. We further hypothesized that men with recent OBE(s) or SBE(s) would not significantly differ from one another in these variables. These eating groups were created to allow for comparisons of comorbid concerns by both presence of LOC and amount of food consumed.

1.2. Methods

1.2.1. Participants and procedures

Participants were recruited via Qualtrics Panels, who partners with market research panels and utilizes social media outlets to recruit a diverse pool of survey respondents nationwide. Men were invited to participate if they were 18–30 years old; lived in the U.S.; understood English; and identified as White/Caucasian, African American, Hispanic/Latino, or Asian/Asian American. This age range was selected because LOC behavior is particularly prevalent among men under the age of 30 (Forrester-Knauss & Zemp Stutz, 2012; Nicdao, Hong, & Takeuchi, 2007). Interested men were sent an email invitation with the link to the survey. Participants were presented with details of the study and asked to provide their consent by clicking a radial button. This study was approved by the Institutional Review Board at the University of Oregon. Data for the current study were collected as part of a larger study for which young men from diverse racial/ethnic identities were oversampled to facilitate well-powered investigations of sociocultural factors associated with LOC eating within these groups.

1.2.2. Measures

Participants self-reported their demographic characteristics, including height and weight (to calculate body mass index [BMI kg/m^2]), and their history of weight-related medical diagnoses (e.g., type 2 diabetes). They also completed several surveys, including the 5-item dietary restraint subscale (α = 0.81 current study) and the OE, SBE and OBE items (Table 1) from the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994). Responses on this survey coincide with reports obtained from daily food records (Berg, Peterson, Frazier, & Crow, 2012). Participants also completed the Revised Male Body Image Attitudes Scale, a 15-item measure of concerns about height, muscularity (α = 0.84) and body fat (α = 0.88) (Ryan, Morrison, Roddy, & McCutcheon, 2011; Tylka, Bergeron, & Schwartz, 2005); only the latter two subscales were used in the current study. This survey has yielded reliable scores in prior research with men and demonstrated construct validity when correlated with measures of drive for leaness and social comparison of physical appearance (Ryan et al., 2011). Finally, participants completed the Exercise Dependence Scale, a 21-item measure of compulsive exercise beliefs and behavior; this survey has demonstrated acceptable test-retest reliability and internal consistency, as well as content and concurrent validity in a large sample of men and women (α = 0.96 current study) (Hausenblas & Symons Downs, 2002).

1.2.3. Analytic approach

For the primary hypotheses, participants were placed into one of five groups: 1) no-disordered eating (no OEs, OBEs or SBEs); 2) OE(s) only; 3) SBE(s) only; 4) OBE(s) only; or 5) both OBE(s) and SBE(s).[1] All analyses adjusted for BMI and race/ethnicity (when not the dependent variable). An analysis of covariance (ANCOVA) with Sidak adjustments was used to compare groups by BMI, dietary restraint, body image concerns, and excessive exercise. Logistic regression models were used to determine whether groups differed in their likelihood of having weight-related medical diagnoses. Spearman's correlations were used to examine the associations between frequency of OEs, OBEs, SBEs and all other measures given the non-normal distribution of frequency of eating episodes and medical diagnoses. All other variables met assumptions for parametric analyses.

1.3. Results

1.3.1. Participants

A total of 1114 men completed the current study (M_{age} = 24.1 ± 3.6 y; M_{BMI} = 25.4 ± 6.2 kg/m^2; 33.7% ≥ 4-year college degree; 62.6% not in college; 63.4% single; 25% annual income less than $19,999; 28.4% White/Caucasian, 23.4% African American, 23.9% Asian/Asian American, 24.3% Hispanic/Latino); 40% of participants reported no disordered eating in the prior 28 days; 9.2% reported only OE(s) ($M_{episodes}$ = 3.9 ± 5.1); 11.9% SBE(s) only ($M_{SBEepisodes}$ = 3.1 ± 2.6; $M_{OEepisodes}$ = 0.7 ± 2.0); 16% OBE(s) only ($M_{OBEepisodes}$ = 2.4 ± 2.4; $M_{OEepisodes}$ = 4.1 ± 3.6); and 22.9% reported both OBE(s) and SBE(s) ($M_{OBEepisodes}$ = 2.9 ± 2.6; $M_{SBEepisodes}$ = 4.3 ± 4.6; $M_{OEepisodes}$ = 5.2 ± 4.2). The proportion of men in each eating group differed significantly by race/ethnicity, $X^2(12) = 27.95$, $p < .01$, with more White/Caucasian men reporting OE(s) only, and African American men reporting OBE(s) only. OE(s), SBE(s) and OBE(s) were significantly and positively correlated with one another (rs = 0.28–0.45); BMI (rs = 0.09–0.13); weight-related medical diagnoses (rs = 0.20–0.25); dietary restraint (rs = 0.24–0.40); body image concerns (rs = 0.12–0.34); and excessive exercise (rs = 0.20–0.31; $ps < 0.01$).

[1] Men in the SBE(s) only, OBE(s) only, or OBE(s)/SBE(s) groups could have endorsed OE(s).

Table 2
Differences in disordered eating pathology by eating group adjusting for race/ethnicity, body mass, and total disordered eating episodes.

		F	*p*	Partial eta^2	Group differences	Model 1 group M ± SE of dependent variable	Model 2 group M ± SE of dependent variable
Dietary restraint							
Model 1	Race/ethnicity	3.56	0.01	0.01	None < SBE(s) only, OBE(s) only, SBE(s)/OBE(s); None = OE(s) only; SBE(s) only = OBE(s) only; SBE(s)/OBE(s) > all groups	None (0.9 ± 0.1)	None (1.1 ± 0.1)
	BMI	42.87	< 0.001	0.04		OE(s) only (0.8 ± 0.1)	OE(s) only (0.8 ± 0.1)
	Eating group	48.65	< 0.001	0.15		SBE(s) only (1.5 ± 0.1)	SBE(s) only (1.5 ± 0.1)
						OBE(s) only (1.7 ± 0.1)	OBE(s) only (1.7 ± 0.1)
Model 2	Total eating episodes	49.38	< 0.001	0.04	None and OE(s) < SBE(s) only, OBE(s) only, SBE(s)/OBE(s); None = OE(s) only; SBE(s) only = OBE(s) only = SBE(s)/OBE(s)	SBE(s)/OBE(s) (2.2 ± 0.1)	SBE(s)/OBE(s) (1.8 ± 0.1)
	Eating group	16.54	< 0.001	0.06			
Muscularity concerns							
Model 1	Race/ethnicity	2.34	0.07	0.00	None < OE(s) only, OBE(s) only, SBE(s)/OBE(s); None and OE(s) only = SBE(s) only; OE(s) only = OBE(s) only, SBE(s)/OBE(s); SBE(s) only and OBE(s) only = SBE(s)/OBE(s)	None (19.3 ± 0.3)	None (19.9 ± 0.3)
	BMI	0.44	0.51	0.00		OE(s) only (21.4 ± 0.6)	OE(s) only (21.4 ± 0.6)
	Eating group	10.26	< 0.001	0.04		SBE(s) only (20.7 ± 0.6)	SBE(s) only (20.8 ± 0.6)
						OBE(s) only (21.9 ± 0.5)	OBE(s) only (21.8 ± 0.5)
						SBE(s)/OBE(s) (22.2 ± 0.4)	SBE(s)/OBE(s) (21.3 ± 0.5)
Model 2	Total eating episodes	13.45	< 0.001	0.01	None < OBE(s) only; SBE(s) only = OBE(s) only = SBE(s)/OBE(s)		
	Eating group	3.17	0.01	0.01			
Fat concerns							
Model 1	Race/ethnicity	6.95	< 0.001	0.02	None < SBE(s) only, OBE(s) only, SBE(s)/OBE(s); None = OE(s) only; OE(s) only < OBE(s) only, SBE(s)/OBE(s); OE(s) only = SBE(s) only; SBE(s) only < SBE(s)/OBE(s); SBE(s) only = OBE(s) only; OBE(s) only = SBE(s)/OBE(s)	None (11.7 ± 0.2)	None (12.0 ± 0.3)
	BMI	140.50	< 0.001	0.12		OE(s) only (12.8 ± 0.5)	OE(s) only (12.7 ± 0.5)
	Eating group	43.56	< 0.001	0.14		SBE(s) only (14.3 ± 0.4)	SBE(s) only (14.3 ± 0.4)
						OBE(s) only (15.8 ± 0.4)	OBE(s) only (15.2 ± 0.4)
Model 2	Total eating episodes	6.87	< 0.01	0.01	None < SBE(s) only, OBE(s) only, SBE(s)/OBE(s); None = OE(s) only; OE(s) only < OBE(s) only, SBE(s)/OBE(s); SBE(s) only < SBE(s)/OBE(s); OBE(s) only = SBE(s)/OBE(s)	SBE(s)/OBE(s) (16.5 ± 0.3)	SBE(s)/OBE(s) (16.0 ± 0.4)
	Eating group	21.41	< 0.001	0.07			
Excessive exercise							
Model 1	Race/ethnicity	2.76	< 0.05	0.01	None and OE(s) only < SBE(s) only, OBE(s) only, SBE(s)/OBE(s); None = OE(s) only; SBE(s) only = OBE(s) only; SBE(s)/OBE(s) > all groups	None (48.0 ± 1.1)	None (49.9 ± 1.2)
	BMI	2.06	0.15	0.00		OE(s) only (46.9 ± 2.3)	OE(s) only (46.9 ± 2.3)
	Eating group	33.84	< 0.001	0.11		SBE(s) only (57.5 ± 2.0)	SBE(s) only (57.5 ± 2.0)
						OBE(s) only (57.9 ± 1.7)	OBE(s) only (57.7 ± 1.7)
Model 2	Total eating episodes	11.78	0.001	0.01	None and OE(s) only < SBE(s) only, OBE(s) only, SBE(s)/OBE(s); None = OE(s) only; SBE(s) only = OBE(s) only; SBE(s)/OBE(s) > all groups	SBE(s)/OBE(s) (68.0 ± 1.5)	SBE(s)/OBE(s) (64.9 ± 1.7)
	Eating group	14.51	< 0.001	0.05			

Legend: Model 1 adjusted for race/ethnicity and body mass index (BMI); Model 2 adjusted for race/ethnicity, BMI and total number of disordered eating episodes; None = No-disordered eating group.

1.3.2. Body mass and medical diagnoses differences

Groups significantly differed in BMI in a non-adjusted model, $F(4, 1094) = 7.74$, $p < .001$, partial eta$^2 = 0.03$; these differences became non-significant after adjusting for race/ethnicity. After adjusting for BMI and race/ethnicity, all groups were significantly more likely to have a weight-related medical diagnosis than the no-disordered eating group ($ps < 0.05$). The SBE(s)/OBE(s) group was more likely to have a medical diagnosis than all other groups ($ps < 0.01$). The likelihood of having a weight-related medical diagnosis did not significantly differ for the OE(s) only, SBE(s) only, or OBE(s) only groups.

1.3.3. Dietary restraint

Groups significantly differed in dietary restraint (Table 2). The SBE(s)/OBE(s) group reported more restraint than all other groups. Men in the SBE(s) only and OBE(s) only groups reported more restraint than those in the OE(s) only and no-disordered eating group, but did not significantly differ from one another.

1.3.4. Body image concerns

Groups significantly differed in their body image concerns (Table 2). The no-disordered eating group was significantly less concerned with their muscularity than the OE(s) only, OBE(s) only, and SBE(s)/OBE(s) groups, but did not differ from the SBE(s) only group. The no-disordered eating group was significantly less concerned with their body fat than the SBE(s) only, OBE(s) only, and SBE(s)/OBE(s) groups, but did not differ from the OE(s) only group. The OBE(s) only group was significantly more concerned about their body fat than the OE(s) only group, and the SBE(s)/OBE(s) group was significantly more concerned than the SBE(s) only and OE(s) only groups.

1.3.5. Excessive exercise differences

Groups differed in excessive exercise symptoms (Table 2). The no-disordered eating group reported significantly less excessive exercise than most other groups but did not differ from the OE(s) only group. The OBE(s) only and SBE(s) only groups reported more excessive exercise than the OE(s) only group, but did not differ from one another. The SBE(s)/OBE(s) group reported significantly more excessive exercise than all others.

1.3.6. Exploratory analyses adjusting for number of disordered eating episodes

Given the significant, positive correlations between the frequency of all eating episodes and comorbid pathology, an additional set of all analyses were conducted in which total number of disordered eating episodes was added as a covariate. Generally, the pattern of findings was similar (see Model 2, Table 2). Average dietary restraint no longer significantly differed for the SBE(s)/OBE(s) group when compared to the SBE(s) only or OBE(s) only group. Concerns with muscularity only differed significantly between the no-disordered eating and OBE(s) only group.

1.4. Discussion

Consistent with some data from women (Mond et al., 2006), men who reported both SBE(s) and OBE(s) presented with the greatest likelihood of having a weight-related medical comorbidities and the highest dietary restraint, concerns about body fat, and excessive exercise. Those with no disordered eating habits had the lowest medical and psychosocial concerns. Group differences generally remained present after controlling for frequency of disordered eating, which has been postulated to function as an indicator of symptom severity (Colles, Dixon, & O'Brien, 2008; Glasofer et al., 2006). These findings highlight the need for prospective investigations of the clinical implications of various perceived overeating patterns in young men.

Dietary restraint and excessive exercise were the only variables that demonstrated clear associations with LOC eating; mean scores on these variables were higher for men who reported any pattern of LOC eating compared to those with reported OEs or no disordered eating. These findings may be due to the association between restrictive weight-loss practices and LOC eating (Allen, Byrne, & McLean, 2012; Kelly et al., 2015). Individuals are theorized to LOC eat in response to caloric deprivation and/or negative affect secondary to failures in maintaining an overly restrictive diet (Herman & Mack, 1975). These findings may represent a specific disordered eating phenotype in men.

Data from the current study support the association between perceived overeating, with or without LOC, and concerns with weight. Unlike prior research (Sonneville et al., 2013), there were no significant differences in BMI or presence of weight-related medical diagnoses for those who exclusively reported SBE(s), OBE(s), or OE(s). Frequency of these eating episodes was positively correlated with BMI and weight-related medical diagnoses. These unexpected findings may be due to gendered variations in comfort with endorsing LOC, which counters societal expectations for men to consistently maintain control (Carey, Saules, & Carr, 2017; Reslan & Saules, 2011). Appetite-increasing medications commonly used to treat weight-related medical diagnoses may also promote patterns of overeating, and should be measured in future investigations.

There are a number of study limitations which should be considered. BMI, medical diagnoses, and eating episode size were self-reported and thus likely to suffer from social desirability and recall biases. The current study only included men between the ages of 18 and 30 who self-selected into an online study (the response rate for which is unknown), which limits the generalizability of the findings. While the current study suggests that men who endorse both SBE(s) and OBE(s) represent a high-risk disordered eating phenotype, prospective studies are needed to determine whether these men experience particularly poor health outcomes. Such research should incorporate objective assessments of energy intake, adiposity and health, as well as more extensive measures of psychological functioning, like depression and anxiety. These data are necessary for diagnostic- and intervention-related recommendations.

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