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An Examination of Eating Patterns in Community Women with Bulimia Nervosa and Binge Eating Disorder

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Abstract

Objective—To better understand the eating patterns of persons with eating disorders.

Method—This study investigated typical eating behavior (meal frequency and snacking) and atypical eating behavior among 311 community women with online questionnaires. Participants were classified with bulimia nervosa (BN; $n = 39$), binge eating disorder (BED; $n = 69$), or controls (CON; $n = 203$).

Results—In terms of typical eating behaviors, the BN group ate significantly fewer meals, particularly lunches, than the other two groups. Atypical eating, such as nibbling, eating double meals and nocturnal eating, was significantly more common in the eating disorder groups. More frequent breakfast consumption was associated with lower BMI in the BED and CON groups, and more frequent meal consumption was associated with less binge eating in the BED group only.

Discussion—Our study revealed differences in typical and atypical eating patterns, and associations with weight and eating disorder behaviors among eating disorder and control groups.

Keywords

obesity; binge eating; bulimia; eating disorders; eating behavior

Introduction

Except for overeating and binge eating behaviors, relatively little is known regarding the eating patterns of persons with bulimia nervosa (BN) and binge eating disorder (BED). Laboratory studies have confirmed clinical studies that persons with BN and BED exhibit objectively abnormal overeating and binge eating behaviors¹ and that there are, for example, significant differences in macronutrient intakes in addition to overall intakes between obese women with and without BED.² More recently, a study employing ecological momentary assessment in combination with standardized computer-based dietary recall program has also shown differences in overeating and binge eating between obese participants with and without BED.³ In one study of eating patterns, Masheb and Grilo⁴ found that overweight

patients with BED who ate three meals per day weighed significantly less, and had significantly fewer binge eating episodes, than those who did not regularly eat three meals per day.

Characterizations of eating behavior beyond overeating and binge eating among individuals with and without BN and BED may lead to an improved understanding of how atypical eating behavior may contribute to, and typical eating behavior may protect against, weight gain and eating disorder behaviors.⁵ Thus, this study examined eating behaviors and patterns reported by female community volunteers classified as having either BN or BED, and utilized a control group defined as women not having either binge eating or purging behaviors. For our purposes, typical eating patterns were defined as meals and snacks eaten on a regular basis each day, and atypical eating included behaviors such as nibbling, eating double meals or eating during the night. Eating disorder behaviors were defined as binge eating, purging, and restraint. It was hypothesized that eating disorder (ED) groups would differ from controls on both typical and atypical eating behaviors, and that these behaviors would be associated with both weight and ED behaviors albeit differently for BN and BED.

Method and Procedure

Participants

Participants were 311 community women who completed a battery of questionnaires online in response to advertisements requesting participation in a research study on eating and dieting. Participants were identified from a larger sample of 1,143 volunteers based on the criteria described below. Three study groups were created based upon responses to binge eating and purging frequency items: BN (modified criteria requiring binge eating and purging at least once per week for the past 28 days, $n = 39$), BED (modified criteria requiring binge eating at least once per week on average for the past 28 days, $n = 69$), or controls (CON; no binge eating and no purging in the past 28 days, $n = 203$). The approach of defining BN and BED with a once-weekly frequency criterion was used because research has consistently supported a broadening of the required frequency criterion from twice-weekly to once-weekly.^{6,7}

The overall study group was female. The racial/ethnic distribution was: 79.3% ($n = 246$) Caucasian, 4.8% ($n = 15$) Hispanic, 5.5% ($n = 17$) African American, 7.1% ($n = 22$) Asian, and 3.2% ($n = 10$) reporting “other.” The mean age was 36.3 years ($SD = 12.4$) and the mean body mass index (BMI) was 29.5 kg/m² (range, 16.0–60.1, $SD = 8.6$).

Procedure

Advertisements were placed on Craigslist internet classified ads and on Google banners when users entered search strings including: “weight gain; body image; binge eating; obesity; eating questionnaire.” Ads contained a link to the online data gathering website SurveyMonkey (www.surveymonkey.com). Volunteers were offered a 1 in 20 chance to receive a \$50 gift card in exchange for participation. Participants were required to affirm willingness to participate and to provide informed consent prior to accessing the

questionnaires. Procedures for obtaining consent received approval from the Yale School of Medicine Institutional Review Board. No personal identifying information was collected.

Assessments and Measures

Participants provided basic demographic information, including self-reported height and current weight, and completed a battery of self-report measures.

The Eating Disorder Examination Questionnaire (EDE-Q),⁸ the self-report version of the EDE interview (EDE),^{9,10} was used to create the three study groups and assess three prominent clinical features of eating disorders: binge eating episodes, purging episodes, and restraint. The EDE-Q focuses on the previous 28 days and assesses the frequency of binge eating episodes (objective bulimic episodes, i.e., eating unusually large amounts of food while experiencing a subjective sense of loss of control), as well as the frequency of purging episodes (vomiting, laxative and diuretic use). The EDE-Q has received empirical support for identifying binge eating in obese clinical samples,¹¹ and binge eating and purging in community studies.¹² The Restraint subscale was used in this study to assess unhealthy dieting related behaviors and cognitions. Psychometric support for the EDE-Q subscales includes adequate test-retest reliability¹³ and convergence with the EDE in studies with diverse disordered-eating groups.^{11,12,14,15} In the present study, the Restraint subscale showed good internal consistency ($\alpha = 0.84$).

Typical and Atypical Eating Patterns were evaluated using items added to the EDE-Q obtained from the newest version of the EDE Interview –16.0D (EDE).⁹ Studies of the EDE have reported good internal consistency and test-retest reliability for the subscales measuring the features of eating disorders.^{16,17} At least one study has reported on the reliability of the eating pattern items from the EDE among obese individuals with BED (intraclass correlation coefficients ranging from 0.46 to 0.90, $p < .02$, and Pearson product moment correlation coefficients ranging from 0.99 to 1.00, $p < 0.0001$) for the seven eating pattern items corresponding to the frequency of breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, evening snack, and nocturnal eating in the past 28 days.⁴

In this study, the seven eating pattern items were adapted for the EDE-Q using items and language similar to that used in the EDE. Each item began with, “On how many days out of the past 28 days have you eaten ...” and ended with breakfast (meal eaten shortly after waking), mid-morning snack, lunch (mid-day meal), mid-afternoon snack, evening meal, evening snack, and nocturnal eating (have you gotten up during the night to eat). Two additional eating pattern items, nibbling and double-meals, were added to ensure all episodes of eating throughout the day were captured. These items were phrased as follows: “On how many days of the past 28 days have you PICKED or NIBBLED (eaten food between meals and snacks that is unplanned and repetitious)?” and “On how many days of the past 28 days have you eaten DOUBLE MEALS (e.g., two breakfasts, two lunches, or two dinners)?” Double meals were defined as eating two of the same meal, and not based on calorie intake. Unlike the EDE that uses a 7-point frequency response set corresponding to the number of days in the past 28 days, the actual number of days from 0-28 was used in the present study. Two additional summary items were created: meals per day (the average number of meals per day calculated by adding the number of breakfasts, lunches and

dinners, and dividing by 28) and snacks per day (the average number of snacks per day calculated by adding the number of mid-morning, mid-afternoon and evening snacks, and dividing by 28).

For the purposes of this study, typical eating behaviors included meals per day, breakfast, lunch, dinner, snacks per day, mid-morning snack, mid-afternoon snack and evening snack, and atypical eating behaviors included nibbling, double-meals, and nocturnal eating.

Results

Validation of Study Groups

The three study groups did not differ significantly in ethnicity and age. Chi-square test of independence performed on the three study groups showed no significant differences for ethnicity (White versus non-White) (χ^2 (df = 2, N = 310) = 2.44, p = 0.30) and analysis of variance (ANOVA) showed no significant differences for age (F (2, 279) = 0.65, p = 0.53). A greater proportion of participants in the eating disorder groups were “currently dieting to lose weight” than in the CON group (71.8%, 66.6%, and 44.3% for BN, BED, and CON, respectively; (χ^2 (df = 2, N = 311) = 16.8, p < 0.001).

Table 1 summarizes the findings regarding weight and eating disorder variables relevant for the three study groups. Analysis of variance (ANOVA) revealed significant differences on BMI indicating that the BED group was heavier than both controls and BN, and these two groups did not differ from each other. All three groups were significantly different from one another on binge eating frequency. The BN group had significantly greater binge eating and purging frequency than BED and controls. In terms of the EDE-Q restraint scale, posthoc tests revealed that the BN group had significantly higher scores than the BED and CON groups, which in turn did not differ significantly from each other.

Do Eating Pattern Behaviors Differ by Diagnostic Status?

Results in Table 2 depict ANOVA and analysis of covariance (ANCOVA) controlling for BMI comparing the three study groups on eating pattern behaviors. With regard to typical eating behavior, BN participants reported significantly fewer average meals per day and lunches in the past 28 days than both BED and controls. BED participants reported a significantly higher average frequency of snacks per day and evening snacks in the past 28 days than controls but not BN. Controls reported significantly less atypical eating behavior (nibbling, double-meals, and nocturnal eating) than both eating disorder groups, and BN participants reported significantly more nocturnal eating than BED as well as controls. Of the atypical eating behaviors, nibbling was most frequent and occurred 56.8%, 50.4%, and 31.8% of the days in the past 28 days for BN, BED, and controls, respectively.

Are Eating Disorder and Eating Pattern Behaviors Related to BMI?

A correlation analysis was performed between the ED and eating pattern variables, and BMI, separately by study group. After controlling for multiple comparisons using a Bonferroni corrected alpha level of 0.017 for each grouping (ED behaviors, meals, snacks, and atypical eating behaviors), only breakfast frequency was significantly related to BMI

such that more frequent breakfast consumption was related to lower weight among the BED ($r = -0.33, p = 0.007$) and CON ($r = -0.22, p = 0.002$) groups, but not the BN group. No other eating behaviors were related to weight.

Are Eating Patterns Related to Eating Disorder Behaviors?

Table 3 summarizes correlations between eating pattern variables and ED behaviors (binge eating and restraint, and purging episodes for BN). Within the BN group, both binge eating and purging were unrelated to eating patterns, however, binge eating and purging were significantly correlated ($r = 0.36, p = 0.030$). Restraint was negatively related to snacking in general ($r = -0.55, p = 0.001$) and more specifically to mid-afternoon snacking ($r = -0.49, p = 0.002$) suggesting that greater restraint was related to less snacking.

Within the BED group, binge eating episodes were related to average meals per day ($r = -0.30, p = 0.015$) and dinner frequency ($r = -0.30, p = 0.015$) indicating that greater frequency of regular meals was associated with fewer binge eating episodes. Also among BED were weak correlations between eating disorder behaviors (binge eating and restraint) and atypical eating patterns (double meals and nocturnal eating). These correlations were no longer significant when using Bonferroni correction.

To confirm that the different pattern of relations found for the BN and BED groups was not accounted for by BMI, a second set of partial correlation analyses were performed controlling for BMI. The results were consistent with the initial analysis.

Discussion

This study investigated typical and atypical eating patterns, and their relationships to weight and ED behaviors, among community women classified as BN, BED, or controls. Consistent with the existing literature,¹⁸ we found that the BN group reported significantly greater dietary restraint than the BED and CON groups, which in turn differed little from each other. Our study produced new and more specific information about both typical and atypical eating patterns between groups and their specific associations with BMI and core ED psychopathology (binge eating, restraint, and purging) within diagnostic groups.

Among typical eating behaviors, individuals with BN ate fewer meals particularly lunches per day than the other groups, whereas individuals with BED ate more snacks per day than controls. Both eating disorder groups reported significantly more atypical eating behavior (i.e., nibbling, double meals, and nocturnal eating) than controls. These atypical eating episodes were not infrequent, and nibbling was especially common (56.8%, 50.4%, and 31.8%, of the days in the past 28 days for BN, BED, and controls, respectively). Not only were eating patterns found to differ between the groups, different eating pattern behaviors were significantly associated with BMI within diagnostic groups. Within the BED and control groups, more frequent breakfast consumption was related to lower weight. This significant association between breakfast consumption and BMI has been previously reported in clinical samples with BED⁴ and in epidemiological studies.¹⁹ While these findings support recommendations to encourage breakfast consumption, results of a randomized trial to compare breakfast consumption to no breakfast consumption suggest

there is little difference in weight loss if overall daily food intake is matched.²⁰ More recent studies suggest that interventions to simply encourage break-fast eating may not be enough as the association between breakfast quality and intake is associated with subsequent daily intake as well.^{19,21,22}

One curious finding was the absence of a significant relationship between meal frequency and binge eating in the BN group. Restraint theory models of BN suggest that dietary restriction leads to binge eating, which leads to purging, and this in turn leads to a vicious cycle of increased efforts to restrict eating again. Cognitive-behavioral therapy (CBT) for BN is thought to break this cycle of restraint through regular meal and snack patterning (i.e., initiation of regularly eating three meals and two to three snacks per day). Consistent with this view is that CBT has been shown to significantly reduce dietary restraint (as measured by the EDE-Q) along with substantially reducing binge eating.²³ However, in the present study, not only was meal frequency not related to binge eating, but restraint was not related to binge eating in the BN group ($r = 0.05$, $p = 0.757$). Restraint was negatively associated with BMI in the BN group.

We observed that the BN group reported high levels of restraint despite reporting many different typical and atypical eating behaviors on most days. For the most part, negative relationships were found between these eating behaviors and restraint for the BN group, but not the BED group. Recent studies have suggested that restraint scales are not valid indicators of actual eating behaviors.^{24,25} This issue has been a source of controversy and confusion in the literature although it can perhaps be understood by Lowe's distinctions between the perception of dieting versus actually being in an objective energy deficit state.²⁶⁻²⁸ Findings from this study, however, suggest that restraint could be a marker for self-reported eating patterns among persons with BN, but not BED.

Within the BED group, binge eating was negatively related to average meals eaten per day and frequencies of dinners in the past 28 days. Thus, this study converges with the previous study by Masheb and Grilo,⁴ conducted with a clinic sample, in suggesting the potential importance of more frequent meal consumption for binge eating in individuals with BED. However, findings from the present study also suggest that individuals with BED eat a similar frequency of meals, and a greater frequency of snacks and atypical eating episodes, compared with individuals without BED. Such findings about broader eating behaviors in persons with BED offer a potential explanation for the consistent findings in controlled treatment studies with CBT that despite substantial reductions in binge eating, only minimal weight loss occurs (e.g.,^{29,30}). CBT interventions may need to be augmented by greater attention to reducing overeating and atypical eating behaviors in addition to reducing binge eating, restraint and associated cognitions. Thus, it is critical for future research to examine both changes in the frequency of meals as well as their composition during the course of treatment. Our findings highlight the need for studies that focus on whether changes in eating patterns are associated with changes in caloric and/or macronutrient intake as well as with subsequent weight changes.

One limitation of this study was our reliance on self-report, such that the study group assignment was made based upon responses to binge eating and purging items from the

EDE-Q. Community volunteers meeting self-reported, modified criteria for BN and BED may be somewhat different than individuals known to meet full criteria. While participants meeting definitive diagnostic categories (based on diagnostic interviews) may have been preferable, the use of a community sample and the method of anonymous data collection may have improved participants' candor, especially as it pertains to disordered eating.³¹ This study was also potentially limited by the absence of reliability data for eating pattern variables that we added to the EDE-Q. Furthermore, information about current treatments, diets and medications, factors known to affect eating behavior, was not obtained. Future studies should examine the eating pattern variables from the EDE interview across healthy and eating disordered samples. We also note the high mean BMI in our BN group relative to what is typically reported for clinical samples. We note that this might reflect the overall increasing rise of overweight and obesity in the general population. A recent study³² reported that increases for comorbid eating disorders with obesity have been greater than for either eating disorders or obesity alone and recent epidemiologic research³³ has documented an increased risk of BN in overweight and obese groups.

Many unanswered questions remain about typical and atypical eating patterns, including what other eating behaviors are important with regard to their relationship to weight and eating disorders. For example, this study highlighted a considerable amount of atypical eating in the form of nibbling, double-meals, and nocturnal eating that occurred outside of meals and snacks. Epidemiological research is needed to measure and validate typical and atypical eating behaviors in community and clinical populations such as BN and BED as well as medical populations such as persons with diabetes. Findings from the present study suggest that mechanisms of treatment models need to be elucidated for eating disorder behaviors such as binge eating and purging, and more work is to be done in understanding the relationships between restraint and eating behaviors. While examining relationships between eating patterns and weight variables such as current BMI and weight loss have implications for public health messages and weight loss interventions, data from this study were cross-sectional. Thus, our findings suggest that eating breakfast may protect against weight gain, but longitudinal or randomized studies are needed to determine this more definitively. Research is needed to build on work that has shown that other factors, such as energy and nutrient intake and physical activity, are related to breakfast consumption and eating patterns as well.^{19,21,22,34,35}

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TABLE 1
Comparisons of BN, BED, and control groups on weight and eating disorder variables

Weight and Eating Disorder Variables	BN (<i>n</i> = 39)		BED (<i>n</i> = 69)		Control (<i>n</i> = 203)		ANOVAs		
	M	SD	M	SD	M	SD	df	F	<i>p</i>
BMI ^{*b,c}	28.7	7.8	34.8	9.3	27.9	7.8	2,305	18.4	0.000
EDE-Q Binge eating episodes ^{*a,b,c}	14.1	16.6	9.0	6.1	0.0	0.0	2,307	104.5	0.000
EDE-Q Purging episodes ^{*a,c}	14.3	12.0	0.0	0.0	0.0	0.0	2,304	199.2	0.000
EDE-Q Restraint ^{*a,c}	3.7	1.5	2.3	1.6	1.8	1.5	2,308	26.5	0.000

* Significant main effect.

^a Significant difference between BN and Controls at *p* < 0.05 level.

^b Significant difference between BED and Controls at *p* < 0.05 level.

^c Significant difference between BN and BED at *p* < 0.05 level.

TABLE 2

Comparisons of BN, BED, and control groups on eating pattern behaviors

Eating Pattern Variables	BN (<i>n</i> = 39)			BED (<i>n</i> = 69)			Control (<i>n</i> = 203)			ANOVAs			ANCOVAs		
	M	SD	M	SD	M	SD	M	SD	M	df	F	P	df	F	P
Typical															
Meals per day ^{*,†,a,c}	2.0	0.8	2.5	0.5	2.4	0.6	2.4	0.6	2.288	5.77	0.003	.039	2, 285	6.85	0.001
Breakfast	14.6	11.7	19.9	9.1	18.6	10.4	2.293	3.23	0.041	.022	2, 290	5.07	0.007	.034	
Lunch ^{*,†,a,c}	17.6	10.8	23.4	7.3	22.8	8.0	2.288	6.89	0.001	.046	2, 285	7.13	0.001	.048	
Dinner	25.4	5.3	25.7	5.0	25.6	5.9	2.291	0.03	0.968	.000	2, 288	0.06	0.943	.000	
Snacks per day ^{*,†,b}	1.5	0.8	1.6	0.9	1.2	0.8	2.285	6.81	0.001	.046	2, 282	6.29	0.002	.043	
Mid-morning	11.7	11.2	11.9	10.4	8.6	9.8	2.291	3.50	0.031	.024	2, 288	3.48	0.032	.024	
Mid-afternoon snack	13.5	10.7	14.7	10.4	12.1	10.2	2.287	1.64	0.196	.011	2, 284	1.92	0.148	.013	
Evening snack ^{*,†,b}	16.6	10.7	18.1	10.0	12.6	9.7	2.289	8.78	0.000	.057	2, 286	6.62	0.002	.044	
Atypical															
Nibbling ^{*,†,a,b}	15.9	9.2	14.1	9.4	8.9	8.7	2.289	15.11	0.000	.095	2, 286	12.52	0.000	.081	
Double meals ^{*,†,a,b}	4.6	7.4	3.9	6.4	0.7	2.7	2.289	19.40	0.000	.118	2, 286	15.36	0.000	.097	
Nocturnal ^{*,†,a,b,c}	6.3	9.7	3.1	6.4	1.1	3.8	2.287	14.78	0.000	.093	2, 284	13.17	0.000	.085	

* Significant main effect based on Bonferroni corrected alpha level of 0.017.

† Significant main effect after controlling for BMI based on Bonferroni corrected alpha level of 0.017.

^a Significant difference between BN and Controls at *p* < 0.05 level.^b Significant difference between BED and Controls at *p* < 0.05 level.^c Significant difference between BN and BED at *p* < 0.05 level.

TABLE 3

Correlations of eating disorder and eating pattern behaviors by group

Eating Pattern Variables	BN		BED	
	Binge Eating Episodes	Purging Episodes	Binge Eating Episodes	Restraint
Typical				
Meals per day	0.17	-0.25	-0.30*	-0.02
Breakfast	0.17	-0.28	-0.23	0.00
Lunch	0.13	-0.06	-0.11	-0.02
Dinner	0.11	-0.15	-0.30*	-0.04
Snacks per day	-0.03	-0.55*	0.11	0.10
Mid-morning	0.06	-0.32	0.06	0.04
Mid-afternoon	-0.04	-0.49*	0.12	0.12
Evening snack	-0.06	-0.29	0.10	0.06
Atypical				
Nibbling	0.15	-0.28	0.16	0.06
Double meals	0.25	-0.27	0.25	0.27
Nocturnal	0.03	-0.25	0.28	0.29

* Significant main effect based on Bonferroni corrected alpha level of 0.017.