

Non-normative eating behavior and psychopathology in prebariatric patients with binge-eating disorder and night eating syndrome

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Conflicts of interest statement

The authors declare no conflicts of interest with respect to the content of this manuscript.

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Abstract

Background: Binge-eating disorder (BED) as a distinct eating disorder category and night eating syndrome (NES) as a form of Other Specified Feeding or Eating Disorders were recently included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).

Objectives: This study sought to investigate the prevalence of BED and NES and associations with various forms of non-normative eating behavior and psychopathology in prebariatric patients.

Setting: Within a consecutive multicenter registry study, patients in six bariatric surgery centers in Germany were recruited.

Methods: Overall, 233 prebariatric patients were assessed using the Eating Disorder Examination and self-report questionnaires. Assessment was unrelated to clinical procedures.

Results: Diagnostic criteria for full-syndrome BED and NES were currently met by 4.3% and 8.2% of prebariatric patients, respectively. In addition, 8.6% and 6.9% of patients met subsyndromal BED and NES criteria, respectively. Comorbid BED and NES diagnoses were present in 3.9% of patients. In comparison to patients without any eating disorder symptoms, patients with BED and NES reported greater emotional eating, eating in the absence of hunger, and more symptoms of food addiction. Moreover, differences between patients with BED and NES emerged with more objective binge eating episodes and higher levels of eating concern, weight concern, and global eating disorder psychopathology in patients with BED.

Conclusions: BED and NES were shown to be prevalent among prebariatric patients, with some degree of overlap between diagnoses. Associations with non-normative eating behavior and psychopathology point to their clinical significance and discriminant validity.

Key words: eating disorders; binge-eating disorder; night eating syndrome; non-normative eating behavior.

INTRODUCTION

Previous research on binge-eating disorder (BED) and night eating syndrome (NES) in prebariatric patients reported a wide range of prevalences. Moreover, the relationship of BED and NES to non-normative eating behavior (e.g., subjective binge eating episodes [SBEs]) and associated psychopathology (e.g., food addiction) in prebariatric patients is widely unclear.

There is increasing evidence that eating disorders ⁽¹⁾, including BED and NES ⁽²⁾, are common among prebariatric patients. BED was recently included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) ⁽³⁾ and is characterized by recurrent episodes of binge eating (BE; at least once per week over three months) defined as eating an objectively large amount of food accompanied by a sense of lack of control during the episode in the absence of recurrent compensatory behaviors. In the DSM-5, NES constitutes a new diagnostic category within the spectrum of Other Specified Feeding or Eating Disorders including recurrent episodes of night eating that are defined as eating after awakening from sleep and/or excessive food consumption after the evening meal while the person is aware of and able to recall the episode ⁽³⁾.

As the DSM-5 was only recently published, most previous preoperative studies reported BED prevalences based on the DSM-IV-TR criteria ⁽⁴⁾ with at least two binge eating episodes per week over six months. Findings ranged from 2% to 49%, whereas BE of any kind occurred in 6% to 64% of the prebariatric patients ⁽⁵⁾. Only few studies examined prevalence of BED according to the DSM-5 in prebariatric patients. Recently, a prevalence of 15.7% as assessed by self-report questionnaire was reported in the LABS-2 study ⁽⁶⁾. Three other studies, although based on the DSM-IV-TR criteria, also reported prevalences based on the frequency of at least one episode of binge eating per week as required in the DSM-5.

These studies yielded prevalences of 24% using self-report questionnaire⁽⁷⁾ and 5.6%⁽⁸⁾ and 39%⁽⁹⁾, respectively, using clinical interview. The prevalence of NES according to the DSM-5 has not yet been examined in prebariatric patients. Previous studies reported prevalences of NES from 8.9% to 55%^(8,10), using varying diagnostic criteria.

30 In previous studies on BED and NES in prebariatric patients, variations in prevalences could have been influenced by heterogeneity in study design and methods of assessment. Diagnoses for both BED and NES were commonly based on self-report questionnaires or routine clinical interviews rather than structured diagnostic interviews, thus limiting the validity and reliability of the results. Further, information was usually obtained in the context
35 of clinical procedures. Thus, patients were aware that the information would be shared with the surgical team and, hence, might influence their candidacy for surgery as any form of disordered eating could decrease their chance of receiving the procedure.

 As the relationship of NES and BED remains widely unclear⁽¹¹⁾, it seems necessary to further characterize and differentiate both eating disorders with regard to non-normative
40 eating behavior and associated psychopathology. While BED was related to more objective binge eating episodes (OBEs) and objective overeating episodes (OOEs) when compared to NES in overweight and obese participants⁽¹²⁾, studies in prebariatric patients are lacking. Eating disorder psychopathology as well as emotional eating and food addiction, which does not constitute an accepted diagnosis at this time, have been related to BED and BE in only a
45 small number of studies in prebariatric patients^(13,14,15). However, these aspects have not been investigated in patients with NES. Eating in the absence of hunger⁽¹⁶⁾ as another aspect of associated psychopathology has not been studied in bariatric patients thus far.

 This study sought to determine the prevalence of BED and NES according to the DSM-5 as well as the prevalence of non-normative eating behavior using diagnostic
50 interviews and to examine the association of BED and NES with non-normative eating

behavior and psychopathology in prebariatric patients. Based on previous research, we hypothesized a substantial proportion of prebariatric patients to report BED, NES, and non-normative eating behavior as assessed by diagnostic interviews. In addition, patients with BED and NES were expected to display higher levels of non-normative eating behavior and associated psychopathology than patients without any eating disorder symptoms.

METHODS

60 *Participants and Study Design*

The present study was part of a German multicenter registry for the longitudinal assessment of psychosocial parameters in a consecutive bariatric sample (PRAC: Psychosocial Registry for Bariatric Surgery). Eligible patients were at least 18 years of age and seeking bariatric surgery in six participating bariatric surgery centers. Exclusion criteria were insufficient language skills and the inability to comply with the follow-up protocol. Written informed consent was obtained prior to study participation, and the study was approved by all responsible Ethics Committees.

Patients completed paper-and-pencil- or web-based questionnaires and a clinical telephone interview was conducted by trained Masters-level psychologists. This study included all preoperative data of patients recruited from March 2012 to June 2014. Overall, $n = 233$ individuals were included.

Definitions of Diagnoses and Non-normative Eating Behavior

Eating disorder diagnoses were based on the DSM-5 criteria for BED and NES⁽³⁾. In addition to full-syndrome BED, BED of low frequency and/or limited duration was defined

according to DSM-5 if BE occurred less than once per week and/or for less than three months. Further, subsyndromal BED included modified criteria of two instead of three or more behavioral indicators or lack of distress⁽¹⁷⁾. The DSM-5 criteria for NES do not specify frequency and duration of night eating episodes (NEEs), however, based on previous
80 recommendations, full-syndrome NES comprised at least two NEEs per week within the last three months⁽¹⁸⁾. According to BED, subsyndromal NES included NEEs that occurred only once per week or were not associated with significant distress⁽¹⁷⁾.

Non-normative eating behaviors comprised OBEs and SBEs, which are defined as eating an objectively or subjectively large amount of food accompanied by a sense of loss of
85 control. The definition of loss of control (LOC) eating allowed the presence of OBEs and/or SBEs. OBEs were characterized by eating an objectively large amount of food without a sense of LOC over eating. According to the DSM-5, NEEs included eating after awakening from sleep and/or excessive eating after the evening meal, which was defined as eating an amount of food larger than the usual amount eaten under similar circumstances. NEEs were
90 accompanied by awareness and recall of the episode and were not affected by external influences.

Measures

Eating Disorder Examination (EDE). The semistructured EDE interview⁽¹⁹⁾ is
95 considered the gold standard in the diagnosis of eating disorders and eating disorder psychopathology. In this study, a shortened German version including diagnostic items only was used. Based on the structure of EDE items, additional items for NES according to the DSM-5 were developed by the first author (SB). These included a detailed description of typical episodes of eating after awakening from sleep and of eating after the evening meal.
100 Regarding these episodes, possible influences of external factors and the presence of

awareness and recall were assessed. Patients' descriptions classified as NEEs were assessed regarding their frequency within the last three months and the presence of distress.

Eating Disorder Examination-Questionnaire (EDE-Q). A subset of 22 items assigned to four subscales (restraint, eating concern, weight concern, and shape concern) of the German version of the EDE-Q⁽²⁰⁾ was administered to assess eating disorder psychopathology within the past 28 days. Mean scores for the subscales and a global score were computed.

Dutch Eating Behavior Questionnaire – Emotional Eating (DEBQ-EE). The 10-item emotional eating subscale of the revised German version of the Dutch Eating Behavior Questionnaire (DEBQ)⁽²¹⁾ was used to assess emotional eating defined as eating in reaction to negative feelings (mean score).

Eating in the Absence of Hunger Questionnaire (EAH). An adapted 7-item version (German translation by AH – unpublished manuscript) of the EAH⁽¹⁶⁾ was administered, including a combined assessment of the frequency of keeping *or* starting eating due to emotional, sensory or social cues while not being hungry (sum score).

Yale Food Addiction Scale (YFAS). The 25-item German version of the YFAS⁽²²⁾ was used to examine addictive eating behavior within the past 12 months. A symptom count score indicating the number of food addiction symptoms (e.g., withdrawal) was computed.

All measures demonstrated good reliability and validity^(16,19,20,21,22).

Body mass index (BMI). BMI (kg/m²) was calculated from measured weight and height for $n = 200$ (85.8%). If measured BMI was not available, patients were contacted to provide self-reported weight and height.

Data Analytic Plan

For the analyses of group differences, patients with comorbid BED and NES diagnoses were excluded. Differences between patients with BED, NES, and without non-

normative eating behavior regarding demographic (age, sex) and anthropometric characteristics (BMI) were examined using univariate General Linear Model Analysis for continuous and χ^2 tests for categorical variables. Due to the non-normal distribution of self-report scores, groups were compared on all variables using Kruskal-Wallis H tests and post-hoc Mann-Whitney U tests including Bonferroni-Holm corrections. Effect sizes were interpreted according to Cohen⁽²³⁾ (small > .10, medium > .30, large > .50). A two-tailed $\alpha < .05$ was applied for all statistical tests. Statistical analyses were performed using IBM SPSS Statistics version 20.0.

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RESULTS

Sample Characteristics

The sample comprised $n = 233$ patients (68.0% women) with a mean age of $M = 45.35$ years ($SD = 10.37$; range 23–66 years) and a mean BMI of $M = 48.72$ kg/m² ($SD = 7.64$; range 36.00–77.75 kg/m²).

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Prevalence of Eating Disorder Diagnoses and Non-Normative Eating Behavior

A total of 10 (4.3%) patients received a full-syndrome BED diagnosis. In addition, criteria for BED of low frequency and/or limited duration and subsyndromal BED were met by 12 (5.2%) and 8 (3.4%) patients, respectively. Full-syndrome NES was diagnosed in 19 (8.2%) patients, and another 16 (6.9%) patients met criteria for subsyndromal NES. Comorbid diagnoses of BED and NES were present in 9 (3.9%) patients who were excluded from the subsequent analyses.

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150 Over the last three months, 40 (17.2%) and 22 (9.4%) patients reported having at least one OBE or SBE, respectively, and 54 (23.2%) patients reported LOC eating. At least one NEE was reported by 39 (16.7%) patients.

Group Differences in Non-Normative Eating Behavior and Psychopathology

155 *Sample.* To analyze group differences, 21 patients with BED only and 26 patients with NES only were compared to a total of 155 patients without any non-normative eating behavior (i.e., no OBEs, SBEs, nor NEEs; non-ED group). The remaining 22 patients reported non-normative eating behavior (i.e., at least one OBE, SBE or NEE), but did not meet BED or NES criteria and were thus excluded from the analyses. The three groups did not differ
160 regarding sex, age, and BMI (all $p > .05$).

Eating behavior. As expected, the number of OBEs was significantly higher in the BED group compared to both the NES and the non-ED groups (see Table 1). In addition, the NES group reported significantly more OBEs than the non-ED group. The number of SBEs did not differ between the BED and NES groups. Both groups showed significantly higher
165 scores than the non-ED group. Regarding OOE, the NES group reported significantly more episodes than the non-ED group, whereas the BED group did not differ from the other groups. As expected, patients of the NES group engaged in significantly more NEEs than the BED and non-ED groups, while these two groups did not differ.

Psychopathology. The BED group reported significantly higher eating concern, weight
170 concern, and global eating disorder psychopathology (EDE-Q) compared to both other groups. NES and non-ED groups did not differ. Shape concern scores were significantly higher in the BED group compared to the non-ED group, whereas the NES group did not differ from the other groups. The levels of emotional eating (DEBQ-EE), eating in the absence of hunger (EAH), and the number of food addiction symptoms (YFAS) did not differ

175 between the BED and NES groups. Both groups showed significantly higher scores than the
non-ED group.

DISCUSSION

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This study was the first to examine prevalence of BED and NES according to the DSM-5 criteria using diagnostic interviews in prebariatric patients. Full-syndrome BED was present in 4.3% of the patients. Additionally, 8.6% of the patients reported BED of low frequency and/or limited duration or subsyndromal BED. Full-syndrome NES was present in 185 8.2% of the patients. In addition, 6.9% met subsyndromal NES criteria. Previous prospective interview-based studies in prebariatric patients resulted in widely ranging prevalences of NES from 8.9% to 19.4%^(8,24). A lack of specified diagnostic criteria could have influenced these variations⁽¹¹⁾. In addition, both BED and NES diagnoses were present in 3.9% of the patients. These findings are consistent with comorbidity rates of BED and NES in previous studies 190 ranging from 2.4% to 7.9% in prebariatric patients^(8,25), suggesting some degree of overlap between both eating disorders⁽²⁾.

Compared to prebariatric patients without non-normative eating behavior, both BED and NES were associated with greater emotional eating, eating in the absence of hunger, and more symptoms of food addiction. Regarding emotional eating in relation with BED, previous 195 studies across various samples also supported negative emotions as antecedents for binge eating⁽¹⁴⁾. The construct of food addiction has gained recent attention in the scientific literature, but has been controversially discussed. Our findings suggest that both BED and NES are associated with aspects of addictive eating. For BED, these results are in line with

previous studies suggesting a substantial association of BED and addictive eating behavior
200 (26).

Differential effects for BED and NES emerged for non-normative eating behavior and
eating disorder psychopathology. The number of objective binge eating episodes was higher
in patients with BED than in both other groups. Yet patients with NES reported more
objective binge eating episodes than patients without non-normative eating behavior. The
205 presence of objective binge eating episodes in NES provides further evidence of an overlap
between BED and NES. In addition, both BED and NES were associated with subjective
binge eating episodes.

In contrast to NES, BED was associated with higher levels of eating disorder
psychopathology regarding greater eating concern, weight concern, and global eating disorder
210 psychopathology. For BED, associations with eating disorder psychopathology have been
demonstrated in various samples^(13,19). Regarding NES, the finding of comparable levels of
eating disorder psychopathology between patients with NES and without non-normative
eating behavior is consistent with that of a study in prebariatric patients with nocturnal eating
(27).

215 Strengths of this study include the data collection in several clinical sites from all parts
of Germany. Further, the diagnostic interview to assess BED, NES, and non-normative eating
behavior prohibits the overestimation of eating disorder symptoms inherent in self-report
assessments. In addition, data collection was unrelated to clinical procedures. Thus, potential
selective underreporting of certain behaviors (e.g., LOC eating) for fear of being denied the
220 surgery was limited. Study limitations include the conduct of telephone interviews due to
organizational constraints and reliance on self-reported weight and height for 14.2% of the
patients, which might have resulted in an underestimation of BMI⁽²⁸⁾.

CONCLUSIONS

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Full-syndrome BED and NES were present in a small proportion of prebariatric patients, whereas episodes of binge eating or night eating were found to be common in this population. Associations of BED and NES with non-normative eating behavior and psychopathology point to the clinical significance and discriminant validity of BED and NES.

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As eating pathology may persist or re-emerge after surgery, prebariatric patients should be screened for BED and NES and should be considered for pre- or postoperative counseling for the regulation of their eating behavior. To this end, an adaptation of psychological interventions for BED and LOC eating, respectively, for bariatric patients seems necessary. In addition, research on the implementation of targeted interventions for bariatric patients with

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NES is required.

Previous research suggests that preoperative BED and LOC eating and, to a smaller extent, NES do not predict postoperative outcomes^(29,30). However, postoperative LOC eating was identified as a predictor of poor weight loss outcome, greater eating disorder psychopathology, and lower quality of life after bariatric procedures⁽²⁹⁾. This study's sample

240 of prebariatric patients will be extended and monitored longitudinally after surgery, thus, enabling analyses of associations of pre- and postoperative BED, LOC eating, and NES to postoperative weight loss.

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Table 1. Group differences for patients with binge-eating disorder (BED) and patients with night eating syndrome (NES) in non-normative eating behavior and psychopathology.

		BED	NES	non-ED	Test	Effect size	Effect size	Effect size
		(<i>n</i> = 21)	(<i>n</i> = 26)	(<i>n</i> = 155)		BED vs. non-	NES vs. non-	BED vs.
						ED	ED	NES
		<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>H</i> (2)	<i>r</i>	<i>r</i>	<i>r</i>
EDE	Objective binge eating episodes	1.75 (3.12) ^a	0.23 (0.58) ^b	0.00 (0.00) ^c	162.94***	.99	.41	.69
	Subjective binge eating episodes	0.25 (1.12) ^a	0.11 (0.49) ^a	0.00 (0.00) ^b	13.99**	.30	.26	.04
	Objective overeating episodes	0.55 (1.10) ^{a, b}	1.54 (3.89) ^a	0.33 (1.12) ^b	6.34*	.02	.19	.20
	Night eating episodes	0.00 (0.00) ^a	4.97 (5.37) ^b	0.00 (0.00) ^a	199.74***	.00	.99	.89
EDE-Q	Restraint	2.14 (1.20)	2.14 (1.27)	2.63 (1.38)	3.79	.11	.11	.01
	Eating concern	3.08 (1.17) ^a	1.82 (1.10) ^b	1.35 (1.18) ^b	30.15***	.39	.16	.48
	Weight concern	4.47 (0.92) ^a	3.62 (1.13) ^b	3.36 (0.99) ^b	20.02***	.33	.10	.39
	Shape concern	4.72 (1.04) ^a	4.28 (0.72) ^{a, b}	4.01 (1.23) ^{b, c}	8.24*	.21	.05	.35
	Global score	3.60 (0.85) ^a	2.98 (0.73) ^b	2.84 (0.94) ^b	12.79**	.26	.08	.38

DEBQ Emotional eating	3.37 (0.69) ^a	2.90 (0.85) ^a	2.06 (0.89) ^b	43.56***	.41	.32	.25
EAH	20.65 (4.61) ^a	16.92 (4.67) ^a	12.13 (4.55) ^b	48.76***	.44	.33	.35
YFAS Symptom count	4.62 (1.60) ^a	3.69 (1.69) ^a	2.16 (1.18) ^b	47.99***	.44	.33	.26

Notes. BED, binge-eating disorder; NES, night eating syndrome; non-ED, without non-normative eating behavior (i.e., no objective or subjective
325 binge eating episodes, no night eating episodes); *M*, mean; *SD*, standard deviation; EDE, Eating Disorder Examination; EDE-Q, Eating Disorder
Examination-Questionnaire; DEBQ, Dutch Eating Behavior Questionnaire; EAH, Eating in the Absence of Hunger; YFAS, Yale Food Addiction
Scale. For all measures, higher scores indicate higher levels of psychopathology. Objective binge eating episodes, subjective binge eating
episodes, and night eating episodes include mean episodes per week over the last three months. Objective overeating episodes include mean
episodes per week over the last month. Night eating episodes were defined as eating after awakening from sleep and/or excessive eating after the
330 evening meal. ^{a,b,c} Different superscripts indicate significant group differences. * $p < .05$; ** $p < .01$; *** $p < .001$.