Negative Emotional Eating among Obese Individuals with and without Binge Eating Behavior and Night Eating Syndrome

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ABSTRACT

Objective: To assess and compare negative emotional eating among individuals with and without Night Eating Syndrome (NES) and Binge Eating behavior (BE).

Method: The sample consisted of 76 obese participants, who were divided into four groups: the NES Only group; the BE Only group; the BE & NES group; and the overweight control group with neither BE or NES.

Results: Results showed significantly higher negative emotional eating among the BE Only group, whereas those with NES Only did not report eating in direct response to negative emotions and situations.

Discussion: Results suggest that individuals with BE may be using food as a maladaptive coping mechanism, while individuals with NES eat in the evening hours as a way to avoid the experience of negative emotions.

INTRODUCTION

Binge eating disorder (BED) and night eating syndrome (NES) are two eating disorders commonly associated with obesity (1). The American Psychiatric Association's (APA)(1994) Diagnostic Statistical Manual of Mental Disorders, 4th Edition (DSM-IV, Appendix) suggests that the key features which define and characterize BED are: 1) the consumption of an objectively large amount of food in a discrete time period; 2) the experience of a lack of control during the eating episode; and 3) a lack of compensatory behaviors following the binge. The updated and recently published Diagnostic Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (2) recognizes BED as a diagnosable Axis I eating disorder. Compared to the previous appendix definition, the new criteria define binge eating episodes as occurring once a week for a period of at least three months, versus twice a week for six months.

Although most prevalent among overweight individuals, BED has also been diagnosed in non-overweight individuals. Studies of weight loss programs have found that among obese individuals, one in three report engaging in some type of binge eating behavior, and one in five meet criteria for BED (3). Other research studies indicate that among obese individuals, 30% have BED, with a male to female ratio of 2:3 (3-5). In comparison to their obese non-BED counterparts, overweight BED individuals present with an earlier onset of weight gain, an overall significant increase in daily caloric intake, more frequent dieting attempts, and increased levels of depression (6, 7).

Night Eating Syndrome was first described in 1955 as a disorder evolving as a response to stress, with its symptoms including morning anorexia, evening hyperphagia, and insomnia (5, 6, 8). Research in NES was originally conducted mainly with obese individuals who were refractory to standard weight loss treatments. A core feature identified among NES individuals was the presence of a delayed circadian shift in both eating and mood patterns. Specifically, an inverse relationship was identified, featuring a progressive increase in eating and a decrease in mood during the evening hours (8).

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The diagnostic criteria of NES have evolved over the years, and various criteria have been used since the original description in 1955 (9-11). Among the significant modifications to the criteria were the inclusion of nocturnal ingestions (i.e., waking during the sleep period to eat) (12) and the degree of awareness of one's eating behaviors and ingestions. The First International Night Eating Symposium convened in 2008 to propose new diagnostic criteria for individuals presenting with an eating pattern marked by increased intake in the evening and/or nighttime. As a result a set of new criteria were proposed for NES (13), and used for the DSM-5 (2) in the Other Specified Feeding or Eating Disorders (OS-FED) subcategory under eating disorders. The proposed criteria include: A) evening hyperphagia, defined as the consumption of 25% or more of total daily caloric intake after the evening meal, and/or two nocturnal ingestions on average per week; B) awareness of one's eating behaviors and ingestions; C) three of the following: 1) morning anorexia, 2) the desire to eat between dinner and sleep, 3) sleep onset insomnia, 4) the belief that one needs to eat in order to fall asleep, 5) depressed or lowering of mood in the evening and nighttime; D) distress or impaired functioning; E) a period of three months or more under these conditions; and F) these conditions not secondary to any medical condition (13).

While NES may occur among normal weight individuals, it is more prevalent among obese individuals (14). Within the obese and overweight population, individuals with NES are reported to have an earlier age of obesity onset, higher rates of depression, lower self-esteem, and a poorer prognosis for long-term weight loss and maintenance (11, 14-21). Research has shown that even individuals with NES who have lost weight through a dieting program or surgical intervention, still report eating patterns that meet criteria for NES (22).

Despite their similarities, NES and BED have distinct features that differentiate them from each other. Two of the most important differences between them are the amount and time of food consumption (23).

Individuals with NES typically consume food, while still maintaining a sense of control; choosing snack-like portions during their eating episodes. However, individuals with BED consume abnormally large meals, accompanied by a loss of control (6). Moreover, individuals with NES consume a minimum of 25% of their daily caloric intake in the evening hours and most experience morning anorexia, likely as a result of the evening intake. In comparison, individuals with BED do not necessarily have a preferred eating time and often binge eat throughout the day.

Despite their differences, there are shared characteristics between individuals with NES and BED, most notably the propensity towards obesity, increased rates of depression, and binge-like eating behaviors. These similarities have led researchers to analyze the psychopathological communalities of these two disorders in an attempt to better understand their placement along the obesity and eating disorder continuum. Adding to the complexity of the shared relationship, research has also identified a history of neglect and emotional abuse among both NES and BED individuals, which may be an important correlate for better understanding of the psychopathological communalities (24).

A final shared communality of BED and NES is the role played by emotional eating. Emotional eating is a form of reactionary eating behavior, either overeating or under eating in response to emotionally charged feelings or situations (25). While individuals may eat in response to either positive or negative emotions, research studies have shown that overweight individuals, compared to underweight and normal weight individuals, eat primarily in response to negative affective emotions, including, but not limited to, anger, depression and anxiety (25, 26). Among overweight individuals, eating in response to emotions has been characterized as a maladaptive learned coping behavior, aimed at reducing stress and other negative feelings (25). Binge eating episodes, reported by individuals with BED, have been directly associated with emotional overeating (25). As such, binge-eating episodes can be viewed as a maladaptive coping mechanism employed in situations of emotional distress in order to suppress the experience and awareness of the uncomfortable emotions (26, 27). Studies have suggested that emotional eating, even among non-clinical populations, is indicative of unhealthy eating behaviors and attitudes (18, 23, 26).

To the best of our knowledge, no studies have been conducted on the relationship between NES and BED in relation to emotional eating. Thus, the aim of this study was to assess and compare emotional eating, both negative and positive, of overweight individuals with and without NES to those with and without BED.

It was hypothesized that significant differences would be found between BED and NES on both negative and positive emotional eating patterns.

METHODS

PARTICIPANTS

Participants were recruited through local advertisements as part of a clinical outpatient weight loss program at St.

Luke's Roosevelt Hospital Center in New York. Exclusion criteria for the weight loss program were diabetes, cancer (in active treatment or remission of less than five years), heart disease, and pregnancy or lactation. Additionally, those individuals reporting active psychotic and suicidal thoughts and/or episodes were excluded. A physical examination was conducted to ensure good health prior to beginning the weight loss program. The physical examination included a full medical history report as well as an electrocardiogram and blood tests.

A total of 81 individuals who enrolled in the weight loss program participated in the current research study. Among the 81 participants, 76 had complete data, and 5 were excluded for missing data. The statistical analyses were conducted on the 76 participants with complete data. The final sample included 15 males and 61 females, ranging in age from 19 to 63 years (mean age: 45.6 ± 11.0 years). Participants in the study had BMIs ranging from 25.4 to 63.8 (mean BMI: 38.0 ± 8.5).

INSTRUMENTS

Following the initial intake and physical examination and prior to the beginning of the research study and clinical weight loss program, the participants were asked to complete three questionnaires: 1) the Emotional Appetite Questionnaire (EMAQ) (25, 28). 2) the Questionnaire on Eating and Weight Patterns (QEWP-R) (29); and 3) the Night Eating Diagnostic Questionnaire (NEDQ) (15, 29, 30) Completion of these questionnaires took about 30 minutes.

1. The Emotional Appetite Questionnaire (EMAQ) (25, 28) was used to assess the negative and positive dimensions of emotional eating. The EMAQ is a two-page questionnaire, with the first page including items on negative and positive emotions and the second page including negative and positive situations.

The items are rated on a nine-point Likert scale, indicating whether the subjects eat much less, the same, or much more relative to their usual eating behavior in response to various negative and positive emotional states and situations. Two additional responses are NA (not applicable) or DK (don't know).

The negative and positive emotions include 14 items: sad, bored, confident, angry, anxious, happy, frustrated, tired, depressed, frightened, relaxed, playful, lonely, and enthusiastic. The negative and positive situations include eight items: when under pressure, after a heated argument, after a tragedy of someone close to you, when falling in love, after ending a relationship, when engaged in an enjoyable hobby, after losing money or property, and after receiving good news.

Scoring for the EMAQ averaged the responses for each category of positive emotions, negative emotions, positive situations, and negative situations. Positive emotions and situations, were then averaged as were negative emotions and situations to obtain a total positive emotional eating score and a total negative emotional eating score.

The EMAQ has been shown to have construct validity, with a convergent validity of $r=.54$, $p<.001$ and a discriminate validity of $r=.63$, $p<.001$ (28). The four dimensions (negative emotions, negative situations, positive emotions, and positive situations) on the EMAQ were also found to have good reliability (r =.89, .95, .90, and .71, respectively) and acceptable internal consistency (Cronbach alpha = .78, .75, .65, and .57, respectively) (25, 28).

2. The Questionnaire on Eating and Weight Patterns Revised (QEWP-R) (30) was used to assess BED. The QEWP is a 28-item self-report questionnaire that was used in the DSM-IV field trials for the assessment of BED and in two multi-site field trials assessing BED prevalence (29-31). The QEWP-R includes items on demographics, frequency and duration of binge eating, engagement in compensatory behavior for weight control, degree of associated distress with binge episodes and eating, loss of control and any associated behavioral indicators of loss of control (30).

The QEWP-R diagnostic criteria were subdivided along a hierarchy of four categories: non-binge eating disorder (non-BED); objective overeating (B); binge eating (BE); and binge eating disorder (BED). Those individuals who reported eating large amounts of food within a two-hour period of time, but did not experience loss of control, were classified as B. Those individuals who reported eating large amounts of food with a loss of control, but did not report symptoms for more than six months, were classified as sub-threshold BED or BE. Those who met the full diagnostic criteria according to the DSM-IV were given a diagnosis of BED (31).

The QEWP has been shown to be reliable and valid in the assessment of BED, with an internal consistency of .75 in a weight control sample and .79 in a community sample (27).

3. The Night Eating Diagnostic Questionnaire (NEDQ) (15, 29) was used to assess night eating syndrome. The questionnaire was based on the criteria of morning anorexia, evening hyperphagia, and insomnia (15). The NEDQ is a 23-item self-report questionnaire assessing the occurrence and frequency of nighttime awakening,

night eating during awakenings, nighttime eating patterns, and percentage of food intake after 7:00pm and after the dinner meal. It also assesses distress associated with nighttime eating, overall daytime and evening mood, and general sleep disturbances. Those individuals who work during the nighttime, evening, or on nighttime rotating work shifts were excluded from a diagnosis of night eating syndrome (and included in the normal group). The diagnoses were subdivided into a hierarchy of severe, moderate, mild, and non-NES.

Scoring for the NEDQ was based on the responses to various questions directly related to the criteria for NES. Those questions included: "Do you generally experience loss of appetite in the morning?" (Question 3); "How often do you eat breakfast after your final morning awakening?" (Question 4); "Do you generally consume 50% or more of your daily food intake after 7:00pm?" (Question 6); "Do you generally consume 50% or more of your daily food intake after the dinner meal?" (Question 8); "Do you generally have trouble falling asleep at night?" (Question 9); and "Do you generally have trouble staying asleep at night?" (Question 10). Specific cut-off scoring was as follows:

1. Normal: no night eating (q6 and q8 = no).
2. N: mild night eater (q6 or q8 = yes).
3. NE: moderate night eater ([q6 or q8 = yes] and [q3=yes or q4 ≤ 3 days/week]).
4. NES: severe night eater ([q6 or q8 = yes] and [q3=yes or q4 ≥ 3 days/week]) and [q9 or q10 ≥ 3 days/week], and meets each of the above criteria for ≥ 3 months duration). If all of the above criteria are met, but for less than three months, then the subject was coded as NE.

STUDY GROUPS

The final sample of 76 participants was divided into four subgroups: 1) binge eating only (BE Only); 2) night eating only (NES Only); 3) night eating and binge eating (NES & BE); and 4) the overweight control group. The NES only group contains both moderate and severe night eating categories. Participants were divided into the subgroups according to the following criteria:

The *BE Only* study group included 20 overweight subjects who were diagnosed with BE only and did not have a diagnosis of NES. Individuals defined in this study as BE were those who met the criteria for a full BED diagnosis and/or BE, but did not report symptoms occurring two times a week for at least six months.

The *NES Only* study group included nine overweight subjects who were diagnosed with NES only and did not report having BED or BE. Individuals defined in this study as NES were those who met the criteria for severe and moderate NES, while those who met the criteria for mild NES were excluded from the study group for NES and included in the overweight control group.

The *BE & NES* study group included 12 overweight subjects who were diagnosed with both NES and BE.

The *Overweight Control* group included 35 overweight subjects who did not meet the criteria for either BE or for severe or moderate NES.

Our research was conducted prior to the publication of the DSM-5 (2) and used the DSM-IV criteria for BED and NES.

DATA ANALYSIS

Means and SDs were calculated. A one-way ANOVA was used to compare the groups on the EMAQ average scores of negative emotions and situations, and the EMAQ average scores of positive emotions and situations. Separate one-way ANOVAs were used to assess between group comparisons on the EMAQ scores of negative emotions and the EMAQ scores of negative situations. Post hoc tests were conducted when the overall F value was significant to determine specific pair-wise differences. . Data were analyzed using the Statistical Package for the Social Sciences (Version 13.0, SPSS, Chicago, IL).

RESULTS

DESCRIPTIVE RESULTS

Statistical analyses did not control for participant characteristics, as the initial results indicated that age, gender, BMI, and race were not significant covariates and did not differ by group. Means, SDs and significance levels are in Table 1.

COMBINED MEAN NEGATIVE EMOTIONS AND SITUATIONS BY GROUP

As described above, a one-way analysis of variance was conducted comparing the four groups with respect to their levels of eating in response to combined negative emotions and situations.

The overall F test from this analysis was found to be statistically significant ($F_{3,76}=4.95$, $p<0.01$). These results indicated that at least one pair of these groups, differed significantly from one another. In order to determine which pair or pairs of these groups were implicated in the overall differences, a series of multiple comparison tests was conducted. These tests showed that the BE

Only group reported significantly greater mean levels of overall combined negative emotional eating as compared to the Overweight Controls (6.36±0.88 vs. 5.47±1.22, p = .009). Similarly, the BE Only group reported significantly greater mean levels of overall combined negative emotional eating as compared to the NES Only group (6.36±0.88 vs. 4.63±0.98, p = .001). Finally, the BE & NES group reported significantly greater mean levels of overall combined negative emotional eating as compared to the NES Only group (5.83±1.61 vs. 4.63±0.98, p = .001).

Table 1. *Means and SD of the EMAQ scores among groups*

	N	Calculated negative situations and emotions	Negative situation	Negative emotions
Overweight Controls	35	5.47 (1.22)	5.37 (1.54)	5.56 (1.02)
Binge Eaters Only	20	6.36 (0.88)	6.1 (1.06)	6.62 (0.86)
Night Eaters Only	9	4.63 (0.98)	3.62 (1.47)	5.69 (1.33)
Binge & Night Eaters	12	5.83 (1.61)	5.36 (20.7)	6.27 (1.39)
F values Sig.		F(3,76)=4.95, p<0.01	F(3,76)=5.56, p<0.01	F(3,76)=3.92, p<0.01

MEAN NEGATIVE EMOTIONAL EATING SITUATIONS BY GROUP

A one-way analysis of variance was conducted in which the four groups – BE Only, NES Only, BE & NES, and Overweight Controls – were compared with respect to their levels of eating in response to negative emotional situations. The overall F test was found to be statistically significant as presented in Table 1.

A series of multiple comparison tests indicated that the Overweight Controls reported significantly greater mean levels of eating in response to negative emotional situations as compared to the NES Only group (5.37 vs. 3.62, p = .003). Similarly, the BE Only group reported significantly greater mean levels of eating in response to negative emotional situations relative to the NES Only group (6.11 vs. 3.62, p < .001). Finally, the combined BE & NES group reported significantly greater mean levels of eating in response to negative emotional situations when compared with the NES Only group (5.35 vs. 3.62, p = .012).

MEAN NEGATIVE EMOTIONAL EATING BY GROUP

A one-way analysis of variance was conducted in which the four groups – BE Only, NES Only, BE & NES, and Overweight Controls –were compared with respect to their levels of eating in response to negative emotions. The overall F test from this analysis was found to be statistically significant as presented in Table 1.

A series of multiple comparison tests indicated that the BE Only group reported significantly greater mean levels of eating in response to negative emotions as compared to the Overweight Controls (6.62 vs. 5.56, p = .002). Similarly, the BE Only group reported significantly greater mean levels of eating in response to negative emotional situations as compared to the NES Only group (6.62 vs. 5.68, p = .045).

COMBINED MEAN POSITIVE EMOTIONS AND SITUATIONS BY GROUP

A one-way analysis of variance was conducted in which the four groups – BE Only, NES Only, BE & NES, and Overweight Controls – were compared with respect to their levels of combined positive emotional eating. The overall F test was not found to be statistically significant. Two additional one-way analyses of variance were conducted using the components of the combined mean positive emotional eating, that is, emotions and situations, with similar results (Emotions: (F=1.37, df=(3.75),p=.26), Situations: (F=.344, df=(3,72), p=.79).

DISCUSSION

The aim of this study was to assess and compare negative and positive emotional eating among individuals with and without NES, as compared to those with and without BED. The main results, as hypothesized, showed significant differences between individuals with NES and individuals with BED on measures of negative emotional eating, with the Binge Eating behavior (BE) group having significantly higher scores.

The BE Only group had significantly higher scores on all measures of negative emotional eating (combined, situations, and emotions), as compared to either the NES Only group or the Overweight Controls. Results showed that individuals in the NES Only group reported the lowest scores on the combined negative emotional eating measure relative to the other three groups. Interestingly, individuals with a combined diagnosis of BE and NES had significantly higher scores on eating in response to negative emotions in comparison to the NES only group and to the Overweight controls.

These results suggest that emotional eating is related primarily to BE behavior, rather than night eating behavior or overweight as independent factors. One possible explanation for these results is that the increased negative

emotional eating levels found among individuals with BE behavior may be related to the higher psychiatric co-morbidity associated with BE behavior (6, 17, 18, 32). It is suggested that the increased prevalence of psychopathology among individuals with BE behavior may negatively influence eating behavior, further exacerbating their eating in response to psychopathological stressors relative to individuals with a diagnosis of NES only (33).

In order to understand the divergent results between individuals with NES and individuals with BE, it is important to take into account their distinct patterns of eating behavior. Individuals with BE behavior may employ food as a continuous and reactive maladaptive coping mechanism to negotiate stressful experiences and subsequent emotions. In contrast, the particular night eating pattern among individuals with NES may suggest a distinct and unusual pattern of behavior designed to avoid the experience of distressing emotions and situations. As such, this nighttime eating behavior may be a habituated preventive-avoidance response to emotions and situations prior to their occurrence. Thus, it is suggested that individuals with NES may eat in the evening hours in an attempt to help them cope with any future negative emotions and situations that may occur, whereas individuals with BE eat in direct response to emotions and situations that are occurring in real time.

Alternatively, individuals with NES may possess a stronger set of coping skills relative to individuals with BE. According to their patterns of eating, individuals with BE behavior use food to negotiate stressful life events occurring any time of the day or night, whereas individuals with NES behavior may be able to cope throughout the day, but are unable to cope during the evening hours in their own home environment. The pattern of eating among individuals with BE, which is to engage in binge type episodes throughout the day, may be indicative of an overall significant lack of coping skills. In contrast, individuals with NES seem to demonstrate healthier coping skills while they are busy during the daytime, as their disordered eating episodes occur only in the evening hours or at nighttime. These evening or nighttime eating episodes may be a maladaptive coping mechanism in reaction to any lingering upsetting emotions that the coping mechanisms employed during the daytime were not able to mange. This explanation is supported by Latzer and Tzischinsky's research, in which individuals with NES reported intense feelings of loneliness during the nighttime when they were alone and not as busy (34).

Further analysis of the specific negative situations and emotions, which were subsumed within the averaged negative emotional score, showed that negative situations had a significantly stronger effect on negative emotional eating than did negative emotions. The act of binge eating may be a specific maladaptive coping mechanism that an individual engages in so as to avoid dealing with difficult experiences or events. Often, individuals who use food as a coping mechanism can recall the situation that "triggered" the binge eating episode, but have difficulty identifying the specific emotions they were feeling, as the food is used to "stuff down" the feelings.

One surprising finding in need of further explanations that individuals in the overweight control group reported significantly higher levels of negative emotional eating in response to negative situations than did individuals with NES. A possible explanation for these findings may be the increased low self-esteem and depression reported among overweight individuals, who struggle, some for a lifetime, with the stigma of obesity, as well as the teasing and bullying they experience as a result of their weight (35). Individuals with NES may not necessarily have been overweight their whole lives, but rather only since the onset of their disordered eating behavior, and therefore may have developed a resiliency and positive self-esteem on which they can rely to manage various unpleasant situations. This interpretation is supported by the present research findings that individuals with NES have lower psychopathology relative to individuals with BED or individuals with a combined diagnosis of BED and NES, and that individuals with BED have the highest amount of psychopathology (17, 18, 23, 27, 36).

The results also found a lack of emotional eating in response to positive situations and emotions, suggesting that positive events may be subjectively interpreted as negative life experiences, rather than the expected positive ones. For example, an individual who interprets the process of dating and falling in love as a stressful life experience may not be able to internalize and assess it as a positive experience.

There were a number of limitations in this study. First, once subdivided into four groups, what was initially a moderate sample size left a less than ideal size within each subgroup for analysis. This limitation may inhibit the ability to generalize these results to the larger NES and BED populations. Second, the number of individuals who had a complete BED and NES diagnosis was limited, which compelled us to combine individuals with a full BED diagnosis with those who had a partial diagnosis of BE. Finally, this study utilized an NES questionnaire that was based on

a previous criteria set, rather than on the new proposed criteria by Allison et al. (13). In addition, it should be noted here that the 50% criterion of evening hyperphagia (percent of intake after dinner) was used in the current study rather than nocturnal ingestions. Examining NES and BED using the new criteria (2, 13) would be worthwhile.

These results, which show that individuals with BED eat in response to negative emotions and that individuals with NES do not, may contribute to a better understanding of BED and NES in relation to emotional eating. The results may also help in understanding the continuum of obesity, suggesting that BED is more pathological than NES. Independent of the continuum of obesity is the continuum of psychopathology that this research highlights. Specifically, individuals with NES and BED have increased levels of psychopathology relative to individuals with NES only. Both continuums are key components that are interrelated and important for future research as well as treatment and preventative interventions.

Acknowledgement

We would like to thank Miriam Baldinger and Rachel Rubin for their valuable contribution to this paper.

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