Night eating syndrome in young adult women: Prevalence and correlates.

Ruth Striegel Weissman
Night Eating Syndrome in Young Adult Women: Prevalence and Correlates

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ABSTRACT
Objective: The current study examined the prevalence and clinical significance of night eating syndrome (NES) in a community cohort of Black and White women.

Method: We assessed 682 Black and 659 White women for NES, eating disorders, and psychiatric symptomatology.

Results: The prevalence was 1.6% (22 of 1,341; Blacks [n = 20]; Whites [n = 2]). Comparisons between identified Black women and the remaining Black participants revealed no significant differences in obesity, psychiatric comorbidity, or self-reported psychiatric distress. Comorbidity with eating disorders as outlined in the 4th ed. of the Diagnostic and Statistical Manual of Mental Disorders (Washington, DC: American Psychiatric Association) was low (n = 1 [4.5%]). Black NES women were significantly less likely than Black non-NES women to be overweight and significantly more likely to have two or more children.

Discussion: NES was rare in this sample of young women. Low comorbidity of NES with other eating disorders suggests that NES may be distinct from the DSM-IV recognized eating disorders. Longitudinal data are needed to determine the long-term health implications of this behavioral pattern.

Keywords: night eating syndrome; eating disorders; psychiatric symptomatology; health implications

Accepted 17 October 2004

Supported by Grant R01-MH-57897-01 from the National Institute of Mental Health and the National Institute of Diabetes, Digestive and Kidney Diseases and by Grant HL/DK71122 from the National Heart, Lung, and Blood Institute.

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Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/eat.20128

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Introduction
Night eating syndrome (NES) was introduced into the medical literature in 1955 by Stunkard, Grace, and Wolff, based on their clinical observations of eating disturbances in a group of morbidly obese patients seeking treatment for weight control at a specialty clinic. Stunkard et al. (1955) distinguished two distinct eating patterns, night eating and binge eating, which they believed could contribute to an understanding of the etiology of obesity. Although binge eating, the core feature of bulimia nervosa (BN) and binge eating disorder (BED), has been studied extensively, little research has focused on night eating. Research is now beginning to examine the possibility that, like binge eating, night eating may contribute to obesity.

Stunkard et al. (1955) defined NES as involving morning anorexia, evening hyperphagia, and insomnia or sleeplessness. Morning anorexia was defined as negligible (i.e., coffee or juice) or no intake at the traditional breakfast time. Evening hyperphagia was defined as consuming at least 25% of the total daily calories after the evening meal. Insomnia or sleeplessness was required to occur three or more times a week. In recent work, Stunkard (2002) has emphasized that NES may represent a unique combination of eating disorder, mood disorder, and sleep disorder. This relationship between NES and mood disorder has been supported by Gluck, Geliebter, and Satov (2001), who found that night eating participants reported higher levels of depression and lower self-esteem than were reported by non-NES participants. Also, Birketvedt et al. (1999) found that, in contrast to non-NES participants, NES participants were more likely to report that their mood was lowest in the morning.

Estimates of the prevalence of NES are quite preliminary because few studies have examined NES in a population sample or have recruited (often fairly small) patient samples at obesity or bariatric surgery clinics (Adami, Meneghelli, & Scopinaro, 1999; Hsu, Betancourt, & Sullivan, 1996; Powers, Perez, Boyd, &
Rosemurgy, 1999; Rand & Kuldau, 1986; Rand, Macgregor, & Stunkard, 1997). Estimates of NES among obese patients vary widely and range from approximately 8% (Adami et al., 1999; Greeno, Wing, & Marcus, 1995) to a high of greater than 40% among patients requesting bariatric surgery for severe obesity (Hsu et al., 1996). Estimates of the disorder in the community range from less than 0.5% to approximately 1.5% (Stunkard, 2002). An early study by Rand and Kuldau (1986) found that only 1 person (0.4%) in a sample of 232 normal weight individuals (91% White, 62% female, mean age = 35) met criteria for NES. A later study by Rand et al. (1997) found that 1.5% (31 of 2,097) of participants in a community sample of Black and White men and women (mean age = 52.8 years) met criteria for NES. In this relatively older sample, NES was not associated significantly with gender, ethnicity, or body mass index (BMI). These studies suggest that NES is uncommon in the general population and that, in contrast with patient populations, its symptoms are not correlated with obesity. Discrepancies in prevalence rates between patient and nonpatient populations may be attributable to self-selection by obese individuals who are distressed by their weight and subsequently seek treatment (Stunkard, 2002). Overall, discrepancies in NES prevalence rates also may be attributable to the varying diagnostic criteria sets used in studies of NES (de Zwaan, Burgard, Schenck, & Mitchell, 2003; Striegel-Moore et al., 2004).

Consistent with his early formulation of night eating and binge eating as distinct clinical phenomena, Stunkard’s group specified that the presence of BED is an exclusion criterion for NES (Birketvedt et al., 1999). Some studies examined specifically whether night eating is correlated with a history of an eating disorder (Adami et al., 1999; Greeno et al., 1995; Hsu et al., 1996; Winkelman, 1998; Winkelman, Herzog, & Fava, 1999). For example, in a sample of 21 patients who engaged in night eating, Winkelman (1998) found that 8 (38%) had a diagnosis of a lifetime eating disorder (3 had anorexia nervosa [AN], 3 had BN, and 2 had BED). In addition, Winkelman et al. (1999) examined 150 women in treatment for an eating disorder and found that 15 (10%) met criteria for sleep-related eating disorders (5 for AN and 10 for BN). Hsu et al. (1996) reported that in a sample of 10 individuals with NES, 8 also met criteria for BED or BN. Also, Stunkard et al. (1996) found that 18% of BED patients also met criteria for NES, and 44% of NES patients also met criteria for BED.

The current study sought to expand the empirical knowledge base in NES by taking advantage of data collected as part of the National Growth and Health Study-Wave II (NGHS-Wave II), a community based study of eating problems in a large community sample of young adult Black and White women (Striegel-Moore et al., 2003). Data collected as part of that study permitted us to determine the prevalence of NES and to examine demographic characteristics and several possible clinical correlates of NES, including obesity, history of an eating disorder, psychiatric comorbidity, and self-reported psychiatric distress.

### Methods

#### Participants and Recruitment

NGHS-Wave II recruited women who previously had participated in the NGHS, a multicenter, 10-year study of risk factors for cardiovascular disease (a full description of the recruitment process is available in Striegel-Moore et al., 2003). All participants in the NGHS (1,209 Black girls and 1,166 White girls, ages 9 or 10 at study entry) were contacted by mail, and given an explanation of the new study. The NGHS centers then contacted the participants by telephone, describing the study in more detail to obtain informed consent. A total of 2,051 women (89%) consented to participate in the NGHS-Wave II protocol, only women (n = 1,683) who had not yet been assessed were asked to provide data regarding night eating and 1,344 women (79.9%) completed the night eating questionnaire. In addition, 3 individuals were excluded from the analysis due to missing demographic information, resulting in a total of 1,341 women for the current report.

#### Instruments and Procedure

NES was assessed using the Daily Eating and Mood Questionnaire (DEMQ; Birketvedt et al., 1999). The DEMQ includes nine items concerning mood disturbance, nightly awakenings, and food consumption. Consistent with Birketvedt et al. (1999) and Stunkard et al. (1996), a diagnosis of NES was given if the participant reported that she (1) got up in the middle of the night at least once a week, (2) at least sometimes during these awakenings had a snack, (3) consumed nearly one half or more of her daily food intake after the evening meal, and (4) in the morning did not eat until after 9 a.m.

#### Diagnostic Information

As described in detail elsewhere (Striegel-Moore et al., 2003), a telephone screening interview was developed for Wave II that included screening questions from two well-established diagnostic interviews, the Structured Clinical Interview for DSM-IV diagnoses (SCID; First, Spitzer, Gibbon, & Williams, 1996).
and the Eating Disorder Examination (EDE; Fairburn & Cooper, 1993). Women who screened positively for a nonsubstance Axis I disorder on the SCID screening questions (i.e., women who screened positively only for a substance disorder were not interviewed further) were asked the complete corresponding SCID module. Moreover, all participants were asked all questions pertaining to the assessment of posttraumatic stress disorder (PTSD). Women with a possible eating disorder were recruited to participate in a subsequent full-length EDE interview to confirm an eating disorder diagnosis and assess any other psychiatric disorder. Hence, a history of past and current eating disorders was determined by a two-stage diagnostic assessment.

**Demographic Information and Height and Weight Information.** As a proxy for participants’ socioeconomic status (SES), parental education was extracted from the NGHS baseline files, using data for the parent with the most education. Educational attainment was coded as follows: high school or less, some college, and 4 or more years of college. The telephone screen elicited basic demographic information and current height and weight. BMI was calculated using the ratio of self-reported weight in kilograms to self-reported height in squared meters, obesity was operationally defined as a BMI ≥ 30, and overweight was operationally defined as a BMI > 25.

**Self-Reported Psychiatric Symptoms.** To measure self-reported current symptoms of depression, the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was administered. This 20-item scale elicits information on how a person may have felt or behaved during the past week. Research demonstrates high internal consistency and adequate test-retest repeatability as well as high validity, established by correlations with other measures of depression among diverse ages and ethnic backgrounds (Prescott et al., 1998; Radloff, 1977, 1991).

Psychiatric symptomatology was also assessed using the Brief Symptom Inventory (BSI; Derogatis, 1975). The BSI is a 53-item, symptom index designed to assess severity of current psychopathology. This measure assesses nine primary symptoms including depression and anxiety. For each item, subjects indicate how much a specific problem has bothered or distressed them in the previous 7 days. Research indicates high reliability and validity among diverse populations (Boulet & Boss, 1991; Derogatis & Melisaratos, 1983; Hemnings, Reimmann, Madrigal, & Velasquez, 1998).

Birketvedt et al. (1999) found that NES patients tended to report that their mood was lowest in the morning. A dichotomous variable indicated whether mood was lowest in the morning.

**Data Analysis**

Group comparisons were examined on the variables of obesity, overweight, the presence of at least one nonsubstance Axis I disorder, and self-reported psychiatric distress. Chi-square analyses were used (or when the frequency in a given cell was less than 5, Fisher’s exact test) to describe group rates for NES and other eating disorders and to examine group frequencies on categorical variables including parental education, obesity, overweight, time of lowest mood, and the presence of at least one nonsubstance Axis I disorder. Effect size for significant chi-square analyses was reported using odds ratios (OR) with 95% confidence intervals (CIs). A multivariate analysis of variance (MANOVA) was performed to examine group differences on the continuous variables of self-reported psychiatric distress. The dependent variables for this analysis were the total score on the BSI and the total score on the CES-D.

**Results**

**Sample Description**

The sample included 682 (50.9%) Black women (mean age = 21.46, SD = 0.73) and 659 (49.1%) White women (mean age = 21.24, SD = 0.73). Consistent with the demographic characteristics of the complete NGHS cohort, on average, the Black women had parents with lower education levels in comparison to the White women (National Heart, Lung, & Blood Institute Growth and Health Study Research Group, 1992). Specifically, more Black than White women had parents with high school or less (33% vs. 19.3%) and fewer Black women than White women had a parent with 4 or more years of college (21.4% vs. 53.7%).

**Prevalence of NES and Eating Disorder Comorbidity**

In all, 22 of 1,341 women (1.6%) met criteria for NES. Of these, 20 were Black (2.9% of Black women) and only 2 were White (0.3% of White women). The average age of the White NES women was 21.50 years (SD = 2.12) and the average age of the Black NES women was 21.35 years (SD = 0.49). Of the 22 identified NES patients, only 1 (4.5%) had
met lifetime criteria for another eating disorder, BED, and was not currently symptomatic for BED. Table 1 presents descriptive data regarding eating disorder comorbidity for the NES and non-NES women.

**Correlates of NES**

Because the sample of White NES women was so small (n = 2), comparisons based on ethnicity were not feasible. Given the ethnic group differences in parental education in our sample, the well-established ethnic differences in obesity, and the possible moderating effect of ethnicity on the relationships between SES and obesity (Jeffrey & French, 1996; Sobal & Stunkard, 1989) or self-reported psychiatric symptoms (Miech & Shanahan, 2000; Williams, Takeuchi, & Adair, 1992), the examination of the clinical correlates of NES was limited to the comparisons between the identified Black women (NES; n = 20) and the remaining Black participants in the sample (non-NES; n = 662).

**Demographics.** The Black women with NES did not differ significantly from the non-NES Black women on mean age (mean age = 21.35 years, SD = 0.49 vs. mean age = 21.46 years, SD = 0.74), F(1, 680) = .24, p = .61. Nor did they differ on BMI (M = 24.61, SD = 4.90 vs. M = 27.55, SD = 7.17), F(1, 680) = 3.32, p = .07. In addition, no significant group differences were found for highest parental education between a high school diploma or less (NES: n = 8 [40%]; non-NES: n = 217 [32.8%]) and some college (NES: n = 9 [45%]; non-NES: n = 301 [45.5%]), χ²(1) = .18, p = .67; and between some college and 4 or more years of college (NES: n = 3 [15%]; non-NES: n = 143 [21.6%]; Fisher’s exact test = .76).

To explore the finding that almost 91% of the NES women in this sample were Black women, post-hoc analyses examining group differences on 2 potentially relevant social variables, social assistance status and number of children, were conducted. These variables were considered relevant because of their implications for increased daily stress, which has been implicated as a correlate of NES (Stunkard & Allison, 2003; Stunkard et al., 1955). Black women with NES (n = 9 [45%]) were not significantly more likely than non-NES Black women (n = 259 [39.1%]) to receive social assistance, χ²(1) = .28, p = .60. However, Black women with NES (n = 8 [40%]) were significantly more likely than non-NES Black women (n = 115 [17.4%]) to have more than 1 child, χ²(1) = 6.73, p = .01, OR = 3.2, 95% CI = 1.3–7.9. It also is notable that Black women overall (n = 123 [18%]) were significantly more likely than White women (n = 36 [5.5%]) to have 2 or more children, χ²(1) = 50.69, p = .0001, OR = 3.8, 95% CI = 2.6–5.6.

**Obesity and Overweight.** Black women with NES were not significantly more or less likely to be obese (n = 3 [15%]) than non-NES Black women (n = 181 [27.3%]), Fisher’s exact test = .31. However, Black women with NES were significantly less likely to be overweight (n = 6 [30%]) than non-NES Black women (n = 370 [55.9%]), χ²(1) = 5.25, p = .03, OR = 3.0, 95% CI = 1.1–7.8.

**Psychiatric Comorbidity and Current Symptomatology.** As shown in Table 2, no significant differences were found in the rates of Axis I psychiatric disorders in Black women with or without NES. Seven Black women with NES (35%) met criteria for a comorbid Axis I disorder. Of these, 4 met criteria for major depression only, 1 met criteria for major depression, panic disorder, and generalized anxiety disorder, 1 met criteria for major depression and PTSD, and 1 met criteria for PTSD only.

Examination of the MANOVA testing for group differences on the BSI and CES-D revealed no significant group differences, F(2, 653) = .77, p = .46. In terms of current psychiatric symptomatology as measured by the BSI and CES-D, Black women with NES (mean BSI = 88.74, SD = 30.46; mean CES-D = 16.95, SD = 8.50) did not differ significantly from Black women without NES (mean BSI = 81.07, SD = 29.80; mean CES-D = 14.15, SD = 10.15). The frequency of NES women (n = 7 [35%]) and non-NES respondents (n = 202 [30.5%]) who

<table>
<thead>
<tr>
<th>TABLE 1. Lifetime history of eating disorders in a community sample of white and black young adult women with and without NES</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (n = 659)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Any eating disorder ever</td>
</tr>
<tr>
<td>Anorexia nervosa</td>
</tr>
<tr>
<td>Binge eating disorder</td>
</tr>
<tr>
<td>Bulimia nervosa</td>
</tr>
</tbody>
</table>

Note: NES = night eating syndrome.

Individuals may be present in more than one category given lifetime history of more than one eating disorder.
TABLE 2. Lifetime prevalence of major axis I disorders for black women based on NES status

<table>
<thead>
<tr>
<th>Disorder</th>
<th>NES Present (n = 20) f (%)</th>
<th>NES Absent (n = 662) f (%)</th>
<th>Statistical Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any axis I disorder</td>
<td>7 (35.0)</td>
<td>167 (25.2)</td>
<td>x² = .18, p = .67</td>
</tr>
<tr>
<td>Major depressive disorder</td>
<td>6 (30.0)</td>
<td>117 (17.7)</td>
<td>x² = .98, p = .32</td>
</tr>
<tr>
<td>PTSD</td>
<td>2 (10.0)</td>
<td>49 (7.4)</td>
<td>Fisher’s exact test = .66</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>1 (5.0)</td>
<td>23 (3.5)</td>
<td>Fisher’s exact test = .52</td>
</tr>
<tr>
<td>General anxiety disorder</td>
<td>1 (5.0)</td>
<td>15 (2.3)</td>
<td>Fisher’s exact test = .38</td>
</tr>
<tr>
<td>Bipolar disorder</td>
<td>0</td>
<td>3 (0.5)</td>
<td>Fisher’s exact test = 1.00</td>
</tr>
<tr>
<td>Agoraphobia</td>
<td>0</td>
<td>15 (2.3)</td>
<td>Fisher’s exact test = 1.00</td>
</tr>
<tr>
<td>Social phobia</td>
<td>0</td>
<td>17 (2.6)</td>
<td>Fisher’s exact test = 1.00</td>
</tr>
<tr>
<td>OCD</td>
<td>0</td>
<td>11 (1.7)</td>
<td>Fisher’s exact test = 1.00</td>
</tr>
<tr>
<td>Somatoform disorder</td>
<td>0</td>
<td>5 (0.8)</td>
<td>Fisher’s exact test = 1.00</td>
</tr>
</tbody>
</table>

Note: NES = night eating syndrome; PTSD = posttraumatic stress disorder; OCD = obsessive-compulsive disorder.

Discussion

The proposed diagnosis of NES was rare in this sample of young women, especially among White women. Although the overall prevalence of 1.6% that was found is consistent with rates reported for other, smaller community samples (Rand et al., 1997; Stunkard, 2002), the finding that almost 91% of the participants were Black women begs further exploration. Previous studies of NES have neither examined the contribution of ethnicity to NES nor have they reported descriptive information based on ethnicity, making it difficult to understand this finding. Given that Black NES women in this sample were more likely than non-NES Black women who had two or more children and were less likely to be overweight, one hypothesis is that there may be more than one type of NES. That is, there may be one type of NES where the disturbance revolves around and is related directly to eating issues, and there may be a second type of NES where the disturbance manifests in an aberrant pattern of eating but revolves around and is related to life circumstances and stress. This latter view is consistent with the Adami et al. (1999) description of night eating as a behavior that is not related to preoccupation with food and dieting. Also, if NES is related to life circumstances or stress generally, and to the number of children specifically, our finding that so few White women met criteria for NES may be an artifact of the small percentage of White women in the sample who had two or more children.

The low rate of comorbidity of NES with other eating disorders (only 1 woman met criteria for both NES and BED) suggests that NES may be distinct from the eating disorders outlined in the 4th ed. of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). This rate (5%) is much lower than was found in previous studies. For example, Stunkard et al. (1996) reported that 44% of their NES participants met criteria for BED. Again, one might wonder whether the fact that most of our NES participants were Black women, for whom the prevalence of other eating disorders is known to be low relative to White women, explains this disparate finding. Yet, the finding that the Black women with NES who also had a comorbid Axis I disorder (although not in higher rates than the non-NES Black women) had major depression and/or anxiety disorders is consistent with other research (Gluck et al., 2001) and with Stunkard’s (2002) view that NES includes a mood disorder component or is stress related. Also, although the group comparisons on the presence of Axis I disorders were not statistically significant, this may be the result of low power and should not be interpreted to mean that NES is not associated with higher Axis I comorbidity. The percentage of Black NES participants who met criteria for any Axis I disorder, major depressive disorder, PTSD, panic disorder, or generalized anxiety disorder all are elevated relative to the rates for non-NES black women, with ORs of 1.6, 2.0, 1.4, 1.5, and 2.3, respectively.

The findings related to obesity are consistent with other research that has found no significant relationship between NES and obesity in community samples (Rand & Kuldau, 1986; Rand et al., 1997). The NES participants in the current study were all young adults, so the effects of NES on weight may not yet be observable. Supporting this notion is a study by Marshall, Allison, O’Reardon, Birketvedt, and Stunkard (2004), which found that obese NES participants were significantly older than nonobese NES participants. Marshall et al. suggested that NES may contribute to obesity, but only over time. However, the finding that Black women with NES were significantly less likely than their non-NES counterparts to be overweight is new. Overall, given the dearth of previous research, more research is needed to untangle the complex relationship between NES and comorbid Axis I disorders.
research that has examined ethnicity as a factor in understanding NES, this is a finding that needs replication and further exploration.

Overall, in Black young women, NES was not significantly correlated with negative physical or psychological effects, but it was positively correlated with number of children. Longitudinal data are needed to determine the long-term health implications of this behavioral pattern, and additional studies exploring the relationship between ethnicity and NES in nonpatient samples are needed. To describe the complete clinical picture for NES, large, epidemiologic samples will need to be studied.

Limitations to be noted are related to the self-report nature of the data, small cell sizes for some analyses (a limitation present whenever rare behavior is being studied), and the restricted range of age of the participants. The primary limitation of our study is the self-report nature of the DEMQ data. However, the prevalence of NES as rated by the DEMQ for this sample is consistent with the prevalence of the symptom of night eating per food diaries completed by the entire NGHS cohort from which the subset studied in the current report was drawn (Striegel-Moore et al., 2004). For the NGHS subsample in this study, the syndrome of NES was found to be more prevalent in Black women than in White women. For the entire NGHS cohort, the symptom of night eating was more prevalent in Black women than in White women (Striegel-Moore et al., 2004). The primary strength of the study is the fact that the data were provided by a large and diverse community sample. The information provided by the current study about NES in young Black women is new to the literature.

The authors gratefully acknowledge the work of the NGHS centers in sample recruitment and retention: Children’s Medical Center, Cincinnati, Ohio (Stephen R. Daniels, MD, Principal Investigator; John A. Morrison, PhD, Co-Investigator); Westat, Inc., Rockville, Maryland (George B. Schreiber, ScD, Principal Investigator; Ruth Striegel-Moore, PhD, Co-Investigator); and University of California, Berkeley, California (Zak I. Sabry, PhD, Principal Investigator; Patricia B. Crawford, DrPH, RD, Co-Investigator); Maryland Medical Research Institute, Baltimore, Maryland (Bruce A. Barton, PhD, Principal Investigator), served as the data coordinating center; and the National Heart, Lung, and Blood Institute Program Office (Eva Obarzanek, PhD, RD, Project Office 1992–present; Gerald H. Payne, MD, Project Officer 1985–1991).

References


