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Original article

Prevalence and Clinical Significance of Night Eating Syndrome in University Students

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A B S T R A C T

Purpose: Most studies of night eating syndrome (NES) fail to control for binge eating, despite moderate overlap between the two conditions. Establishing the independent clinical significance of NES is imperative for it to be considered worthy of clinical attention. We compared students with and without NES on eating disorder symptomatology, quality of life, and mental health, while exploring the role of binge eating in associations.

Methods: Students (N = 1,636) ages 18–26 years (M = 20.9) recruited from 10 U.S. universities completed an online survey including the Night Eating Questionnaire (NEQ), Eating Disorder Examination-Questionnaire (EDE-Q), Project Eating Among Teens, and the Health-Related Quality of Life-4. NES was diagnosed according to endorsement of proposed diagnostic criteria on the NEQ. Groups (NES vs. non-NES) were compared on all dependent variables and stratified by binge eating status in secondary analyses.

Results: The prevalence of NES in our sample was 4.2%; it decreased to 2.9% after excluding those with binge eating. Body mass index did not differ between groups, but students with NES were significantly more likely to have histories of underweight and anorexia nervosa. In students with NES, EDE-Q scores were significantly higher; purging, laxative use, and compulsive exercise were more frequent; quality of life was reduced; and histories of depression, attention-deficit/hyperactivity disorder, and self-injury were more common. Binge eating did not account for all of these differences; the presence of it and NES was associated with additive risk for psychopathology on some items.

Conclusions: NES may be a distinct clinical entity from other DSM-5 eating disorders.

IMPLICATIONS AND CONTRIBUTION

Most studies of night eating syndrome (NES) fail to control for binge eating (BE). Thus, the independent clinical significance of NES has been unclear. We found that NES is associated with clinical impairment independent of BE, and that the presence of it and BE may be associated with additive risk for psychopathology.

Night eating syndrome (NES) is a disorder characterized by evening hyperphagia and nocturnal ingestions (Figure 1), in addition to sleep and mood disturbances. Associations between NES, eating disorder (ED) behaviors and attitudes, poor physical and psychosocial functioning, and maladaptive coping have been found [1–9]. In one study [10], young adults had a higher prevalence of evening hyperphagia than any other age group. University students who report high stress [11], inconsistent sleep

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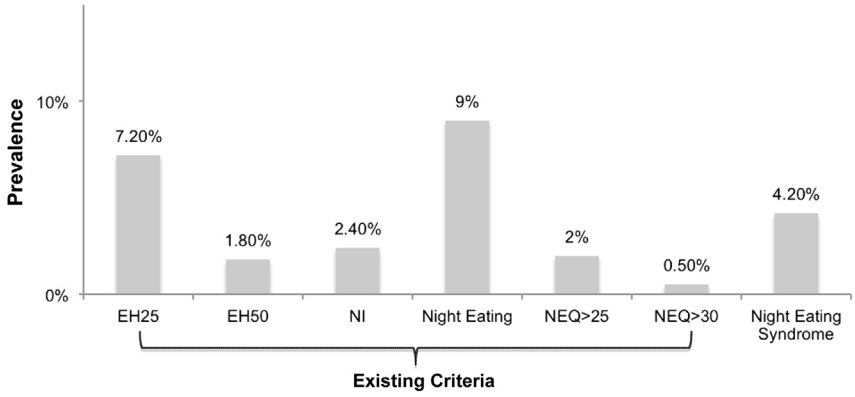

Figure 1. Prevalence of night eating and night eating syndrome (NES) diagnosed with existing or proposed criteria.
Abbreviations/definitions not defined elsewhere: EH25 = Evening hyperphagia, defined as eating >25% of daily caloric intake after suppertime; EH50 = Evening hyperphagia, defined as eating >50% of daily caloric intake after suppertime; NI = Nocturnal ingestions, defined as waking up from sleep and eating "about half the time"; Night Eating, defined as either evening hyperphagia (25% cutoff) or nocturnal ingestions; NEQ >25 = score >25 on the NEQ; NEQ >30 = score >30 on the NEQ. Night eating syndrome was diagnosed using proposed criteria [14], which can be viewed in Table 1.

patterns [12], and disordered eating [13], may be at particular risk for developing NES symptoms. The prevalence of NES using proposed diagnostic criteria [14] was reported as 5.7% in one university sample [4], yet few studies have comprehensively explored the significance of night eating in this group.

Absent from most NES research is concurrent attention to the presence of binge eating, despite moderate overlap between the two behaviors [14,15]. It is not yet clear whether night eating alone is associated with eating attitudes and psychosocial health, or whether binge eating explains previously reported findings. NES is now categorized in the DSM-5 [16] and standardized diagnostic criteria have been developed [14]—two developments that may promote further research on this question.

Historically, studies of NES have struggled to achieve large enough samples to interpret results reliably. Here, we take advantage of a large university-based sample to compare ED attitudes and behaviors, quality of life (QOL), and indicators of mental health between students with and without NES, preliminarily exploring the role of binge eating in associations of interest. We hypothesized that students with NES would report more ED pathology, poorer QOL, and would be more likely to have a self-reported psychiatric history compared with students without NES. In secondary analyses, we compared weight and ED history, ED behaviors, and maladaptive behaviors between groups. Finally, we report separate prevalence estimates of NES in this sample determined from proposed and existing criteria in the literature.

Methods

Data were obtained from a cross-sectional online study, The Stanford Athletic Training and Health: Lifestyle and Eating Tendencies in University Students (ATHLETICS) study, which examined eating, exercise, and health among students recruited from 10 U.S. universities in 2008. Inclusion criteria were: (1) age between 18 and 26 years; (2) academic affiliation; and (3) Internet access. All students were recruited via a social networking site (SNS) through targeted advertisements, and (at the home study site, Stanford) via campus electronic mailing lists. Athletes identified on any publicly available team roster were oversampled in the parent study by sending them a personal message through the SNS with study information. After informed consent was obtained, eligible participants were directed to the full 295-item survey. The Stanford University Panel of Medical Research in Human Subjects and the National Collegiate Athletic Association approved all data collection protocols.

Although a traditionally defined response rate cannot be reliably calculated for online surveys, data on "hits" to the Web site showed that the online consent form was viewed 3,339 times and that 1,688 participants completed the survey, resulting in a 50.6% proxy "response rate." Fifty-one participants were excluded from analyses for: (1) failure to meet inclusion criteria (n = 21); (2) nonexistent or very incomplete responses (n = 18); (3) duplicate entries (n = 5); or (4) disclosure of untruthful responses (n = 8). In total, 1,636 students were included in analyses.

Measures

Demographics and weight history were reported. We calculated current body mass index (BMI; kg/m^2). BMI was also calculated at reported highest and lowest weights achieved at their current height to determine a history of underweight (BMI <18.5) or overweight (BMI ≥25) as defined by the Centers for Disease Control and Prevention (CDC) [17].

Several established measures of disordered eating and QOL were included in the survey. NES was assessed with the Night Eating Questionnaire (NEQ) [18], using a clinical cut score of ≥25 for broad assessment and ≥30 for increased specificity. The NEQ was also used to diagnose NES following proposed research criteria [14] as detailed in Table 1. The Eating Disorder Examination-Questionnaire (EDE-Q) [19] measured ED behaviors and attitudes; it contains a global score and four subscales: restraint, eating concern, weight concern, and shape concern. QOL was determined by the CDC Health-Related QOL-4 (HRQOL) [20], which yields an index of unhealthy days in the past month (max = 30) due to poor physical or mental health and a report of the number of days that poor health prevented engagement in usual activities. Selected questions from the Project Eating Among Teens Survey (EAT-II) [21] were included to determine the presence of diet pill use in the last month, self-reported lifetime history of an ED, and frequency of current substance use in the last year. Substance use variables were coded to reflect either "frequent" (>weekly) or "infrequent" (<weekly) use. Presence of binge drinking (≥five drinks per session) in the last