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The Night Eating Questionnaire (NEQ): Psychometric properties of a measure of severity of the Night Eating Syndrome

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Abstract

The purpose of this study was to evaluate the Night Eating Questionnaire (NEQ) as a measure of severity of the Night Eating Syndrome (NES). The 14-item NEQ assesses the behavioral and psychological symptoms of NES. The NEQ was evaluated in three samples: 1980 persons who completed the NEQ on the Internet; 81 persons diagnosed with NES; and 194 bariatric surgery candidates. Study 1, using principal components analysis, generated four factors (nocturnal ingestions, evening hyperphagia, morning anorexia, and mood/sleep) and an acceptable alpha (.70). Confirmatory factor analysis suggested that 99% of covariation among factors is accounted for by a higher-order construct. Study 2 found convergent validity of the NEQ with additional measures of night eating, disordered eating, sleep, mood, and stress. Study 3 compared scores from obese bariatric surgery candidates with and without NES and found appropriate discriminant validity of the NEQ. The NEQ appears to be an efficient, valid measure of severity for NES.
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The Night Eating Syndrome (NES) was first described in 1955 as a stress-related eating disorder consisting of morning anorexia, evening hyperphagia, and insomnia (Stunkard, Grace, & Wolf, 1955). The presence of nocturnal ingestions (awakening to eat) was added to these criteria later (Birketvedt et al., 1999). NES has also been associated with depressed mood; it is generally lower in persons with NES, compared to controls and often worsens in the evening and nighttime (Birketvedt et al., 1999).

Studies regarding the relationship between NES and weight status are mixed. As NES research has advanced, non-obese night eaters have been identified (Birketvedt et al., 1999; Marshall, Allison, O'Reardon, Birketvedt, & Stunkard, 2004). Epidemiological studies suggest that there is no relationship between NES and obesity (Rand, Macgregor, & Stunkard, 1997; Striegel-Moore, Franko, Thompson, Affenito, & Kraemer, 2006), but studies of clinical populations

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suggest that the prevalence is higher among overweight and obese patients (Aranoff, Geliebter, & Zammit, 2001; Lundgren et al., 2006; Stunkard et al., 1955). The relationship between night eating and weight requires more attention.

Estimates of the prevalence of NES have ranged from 6% (Cerú-Björk, Andersson, & Rössner, 1983) to 64% (Stunkard et al., 1955) among patients seeking weight loss, and from 8% (Adami, Meneghelli, & Scopinaro, 1999; Allison et al., 2006) to 42% (Hsu, Betancourt, & Sullivan, 1996) for persons seeking bariatric surgery. Prevalence estimates of NES have also been reported in the following groups: 1.5% among the general population (Rand et al., 1997), 12.3% among an outpatient psychiatric population (Lundgren et al., 2006), and 3.8% among a type 2 diabetic population (Allison et al., 2007). Data from clinical samples have not established a relationship between NES and gender or NES and ethnicity. Similarly, in an epidemiological sample, night eating behavior was not consistently associated with gender or ethnicity (Striegel-Moore et al., 2006). The wide range of prevalence rates can be attributed to differing diagnostic criteria and different assessment techniques (Allison & Stunkard, 2005; Striegel-Moore et al., 2006).

Night Eating Questionnaire (NEQ) development and description.

Differing diagnostic criteria have been used to identify NES, including the requirements for the amount of evening hyperphagia (ranging from 25 to 50% of daily caloric intake after dinner) and the presence of nocturnal ingestions (for review see Allison & Stunkard, 2005). Striegel-Moore and colleagues (2006) have evaluated different definitions of night eating behavior in a community sample and found that increasingly rigorous definitions (50% of food intake after 7 pm vs. 25% of food intake after 7 pm) led to decreasing prevalence rates. Thus, these differences likely influenced the widely varying reports of prevalence. Reliable and valid criteria, for prevalence estimates and clinical purposes, would be improved with a validated NES assessment measure.

The original, unpublished, version of the Night Eating Questionnaire (NEQ) was a nine item measure with a 4-point Likert scale. Its items assessed: morning anorexia (2 items), evening hyperphagia (1 item), initial insomnia (1 item), mid-phase insomnia (1 item), nocturnal ingestions (1 item), and mood (3 items). As research continued to expand our understanding of NES (Cerú-Björk et al., 1983; Gluck, Geliebter, & Satov, 2001; Marshall et al., 2004; Napolitano, Head, Babyak, & Blumenthal, 2001; O'Reardon et al., 2004), the NEQ was revised, including six new items added over time, and the conversion of items to a 5-point scale. One of these intermediate versions was included in the weight and lifestyles inventory (WALI; Wadden & Foster, 2001) and contained visual analog scales to assess levels of morning hunger and percentage of caloric intake consumed after dinner. Another version was published by Marshall et al. (2004) as the NEQ continued to be refined.

Our research and clinical experiences with NES led to the 14-item questionnaire that we sought to test in the current studies (Appendix). Five of the new items were added to assess psychological aspects of NES, such as cravings and feelings of control over late evening and nocturnal eating and whether there is a compulsion to eat to fall back to sleep. The sixth new item was added to assess the level of awareness of nocturnal eating episodes to differentiate between NES and Sleep Related Eating Disorder (Schenck & Mahowald, 1994), in which nocturnal ingestions occur with little to no awareness or later recollection. Finally, one of the original three mood questions that assessed when mood was best during the day was excluded to diminish the weight that mood questions contributed to the total score.

This current version of the NEQ assesses morning hunger and timing of first food consumption (2 items), food cravings and control over eating behavior both before bedtime (2 items) and during nighttime awakenings (2 items), percentage of food consumed after dinner (1 item), initial insomnia (1 item), frequency of nocturnal awakenings and ingestion of food (3 items), and mood disturbance (2 items), and awareness of nocturnal eating episodes (1 item). The NEQ and its scoring instructions are included in the Appendix.

The current items appeared in a monograph (Allison, Stunkard, & Thier, 2004) and the most recent version of the WALI (Wadden & Foster, 2006). Nine items of the NEQ presented in the WALI (excluding the mood and awareness of nighttime eating items) were recently evaluated by Van der Wal, Waller, Klurfeld, McBurney, and Dhurandhar (2005). They found that including more NES symptoms at each step of an interview was positively correlated with the NEQ score. Vander Wal and colleagues concluded that questions assessing the full range of behaviors associated with NES were needed in order to identify a psychological disorder, not just poor eating habits in the evening.

The psychometric properties of the NEQ were evaluated in three studies. The first study examined the factor structure and internal consistency of the NEQ, as administered via the Internet to 1980 persons who inquired about NES. The second study examined convergent validity for the NEQ among a sample of 81 participants in a study designed to characterize the behavioral and psychological features of NES. The third study examined discriminant validity among a sample of 194 bariatric surgery candidates. The website used in the first study was approved by the University of Pennsylvania's Institutional Review Board (IRB), and participants were informed that their responses

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