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Contextual factors associated with eating in the absence of hunger among adults with obesity

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ABSTRACT

Eating in the absence of hunger (EAH) is under-explored in adults with obesity. In this study, 50 adults with obesity recorded eating episodes and theoretically-relevant environmental, perceptual, and emotional correlates in the natural environment for 2 weeks via ecological momentary assessment (EMA). Generalized linear models and mixed models were used to characterize correlates and consequences of EAH vs. non-EAH episodes/tendencies (within-subjects and between-subjects effects, respectively), time of day, and time of day × EAH interactions. Approximately 21% of EMA-recorded eating episodes involved EAH, and 70% of participants reported at least 1 EAH episode. At the within-person level, participants' EAH episodes were associated with greater self-labeled overeating than their non-EAH episodes. At the between-person level, participants who tended to engage in more EAH reported less self-labeled overeating than those who engaged in less EAH. Across EAH and non-EAH episodes, eating in the evening was associated with overeating, expecting eating to be more rewarding, greater alcoholic beverage consumption, eating alone, eating because others are eating, and eating while watching television. Significant EAH × time of day interactions were also observed but the pattern of findings was not consistent. Findings suggest that EAH may be a relevant target for reducing food intake in individuals with obesity given its high prevalence and association with perceptions of overeating, although results should be extended using objective measures of food intake. Associations between evening eating episodes and perceptual and environmental factors should be further explored.

1. Introduction

Obesity is associated with significant morbidity and mortality (Stein & Colditz, 2004). While multiple genetic and environmental factors contribute to obesity (Guyenet & Schwartz, 2012), modifiable lifestyle factors such as eating behaviors have been subject to considerable research given their relevance to prevention and treatment (Waters et al., 2011). Disinhibited eating, characterized by a lack of healthy restraint over eating including eating in the absence of hunger (EAH) (Shomaker, Tanofsky-Kraff, & Yanovski, 2011), may promote excess energy intake (Rutters, Nieuwenhuizen, Lemmens, Born, & Westerterp-Plantenga, 2009), unhealthy weight gain (Hays & Roberts, 2008; Savage, Hoffman, & Birch, 2009; Sun et al., 2015), and obesity (Lindroos et al., 1997; Hainer et al., 2006; Williamson et al., 1995). Contrary to pediatric samples (Lansigan, Emond, & Gilbert-Diamond, 2015), EAH in adults is underexplored (Rutters et al., 2009; Born et al., 2009;

Abbreviations: EAH, eating in the absence of hunger; EMA, ecological momentary assessment; SCID-I/P, Structured Clinical Interview for DSM-IV Axis I Disorders/Patient Edition; PANAS, Positive and Negative Affect Schedule.

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Lemmens, Rutters, Born, & Westerterp-Plantenga, 2011; Nolan-Poupart, Veldhuizen, Geha, & Small, 2013; Fay, White, Finlayson, & King, 2015; Gill, Chen, D'Angelo, & Chung, 2014), particularly in the natural environment (Boggiano et al., 2015).

Historically, obesity has been alternately attributed to an inability to discriminate between physiological hunger and emotional states (Bruch, 1973), and to hyper-reactivity to external food-related cues (e.g., taste of food) accompanied by hypo-reactivity to internal cues related to eating (e.g., hunger, satiety) (Schachter, 1968). Evolving hypotheses of obesity now generally recognize that obesity is a highly complex, multi-factorial condition which originates from a dynamic interplay of environmental and individual factors (Qi & Cho, 2008). Increasing rates of obesity have been largely attributed to the “toxic” food environment, in which highly palatable, energy dense food is omnipresent and easily accessible (French, Story, & Jeffery, 2001; Schwartz & Brownell, 2007). Mere exposure to food cues triggers a series of physiological processes in preparation for digestion (e.g., salivation) (Harrold, Dovey, Blundell, & Halford, 2012), even when sated (Christensen & Navazesh, 1984), and these responses may be enhanced among individuals who are overweight (Ferriday & Brunstrom, 2011). The presence of palatable foods has been linked to overeating in both experimental (Appelhans et al., 2011) and naturalistic studies (Thomas, Doshi, Crosby, & Lowe, 2011). Simply expecting that food will be pleasurable or rewarding has been related to overeating in several studies (Hennegan, Loxton, & Mattar, 2013; Combs, Smith, & Simmons, 2011), and these effects may be pronounced in individuals with obesity, who tend to experience greater reward while anticipating and consuming palatable foods (Stice, Spoor, Ng, & Zald, 2009). Distractions that impair one's focus on eating and ability to self-monitor intake (e.g., television viewing, conversing with dining companions) can also lead to increased palatable food consumption (Robinson et al., 2013; Tal, Zuckerman, & Wansink, 2014), perhaps via inhibiting taste perceptions (van der Wal & van Dillen, 2013). Indeed, social facilitation effects on energy intake (i.e., eating more in the presence of others) are well-documented in the literature (Herman, 2015) and appear to be independent of pre-prandial hunger (de Castro & de Castro, 1989). Finally, alcohol consumption may elicit disinhibited eating, perhaps via reducing self-regulation or enhancing the reward salience of food cues (Traversy & Chaput, 2015).

Stress (Rutters et al., 2009; Lemmens et al., 2011; Groesz et al., 2012) and negative affect (Sheppard-Sawyer, McNally, & Fischer, 2000) also have been linked to disinhibited eating. It has been suggested that the naturally rewarding effects of food alleviate low mood via opioidergic, dopaminergic, and serotonergic mechanisms (Macht, 2008), although some data suggest that acute stress mitigates the brain's reward response to food cues (Born et al., 2009). While acute stress tends to down-regulate appetite (Gibson, 2006), overweight individuals show increased EAH following a stress induction (Lemmens et al., 2011), which may partially explain the relationship between stress and weight gain among those with higher initial body mass indices (Block, He, Zaslavsky, Ding, & Ayanian, 2009). Similarly, negative mood may be associated with increased energy intake in individuals with obesity (Leehr et al., 2015; Patel & Schlundt, 2001), but the role of hunger in this relationship is unclear.

Most studies of disinhibited eating have been conducted using retrospective self-report or laboratory-based methodologies (French, Epstein, Jeffery, Blundell, & Wardle, 2012). Thus, there is a need to better understand proximal correlates and consequences of these behaviors using more ecologically valid approaches. Ecological momentary assessment (EMA) has been utilized extensively in studies of binge eating (Forbush & Hunt, 2014), but less so in research on other problematic eating patterns that may contribute to excess weight (Thomas et al., 2011). EMA is ideal for exploring EAH in the natural environment, as it can be used to assess intrapersonal and environmental factors that precede and follow these episodes in real time.

The purpose of the current study was to utilize EMA to examine contextual correlates and consequences associated with EAH among adults with obesity. We hypothesized that, relative to non-EAH episodes, EAH episodes would be associated with increases in negative affect, stress, eating-related expectancies, and disinhibiting environmental cues, and would result in perceptions of having eaten excessively. This exploratory study was designed to contribute to the small body of literature on EAH in adults by assessing momentary factors associated with such eating episodes, which could inform the development and refinement of behavioral weight control interventions.

2. Material and methods

2.1. Participants

Participants were 50 adults, aged 18–65, with a body mass index (BMI; kg/m^2) > 30, who were recruited from the community. Five participants (10%) met criteria for binge eating disorder (BED). Because individuals with BED comprise a significant subset of individuals with obesity (Hudson, Hiripi, Pope, & Kessler, 2007), these individuals were included in all analyses to enhance the representativeness of the sample and generalizability of the findings. Moreover, previous research suggests that individuals with obesity who deny binge eating during an initial interview commonly report binge episodes during EMA protocols (Le Grange, Gorin, Catley, & Stone, 2001), and there appear to be many shared momentary binge antecedents across BED and non-BED samples with obesity (Greeno, Wing, & Shiffman, 2000). Therefore, we did not expect the inclusion of individuals with BED to bias the findings. Exclusion criteria included previous gastrointestinal surgery; being currently pregnant or breastfeeding; participating in concurrent treatment for obesity; inability to read/understand English; and current or past diagnosis of anorexia nervosa or bulimia nervosa. The presence of other psychiatric disorders was not an exclusion criterion.

2.2. Procedures

This study was approved by the University of Minnesota Institutional Review Board. Although we have previously published several studies from this dataset on contextual factors associated with eating behavior in individuals with obesity (Goldschmidt, Crosby, Cao, et al., 2014; Berg et al., 2015; Berg et al., 2014; Goldschmidt, Crosby, Engel, et al., 2014), the current study was the first to specifically report on factors associated with EAH. A phone screen was conducted to assess initial eligibility criteria. Participants then attended a baseline assessment at the research facility during which they provided written informed consent, completed in-person assessments to confirm eligibility, and were trained to use the handheld computer for the EMA protocol.

EMA data were collected using Handspring Visors and Satellite Forms software (Alberta, Canada). Participants completed a 2-day trial period to ensure compliance with EMA procedures; all 50 participants completed the trial period, although trial data were not included in the analyses. After training, participants completed a 2-week EMA protocol during which they were instructed to complete recordings before and after eating; before bedtime; and after 6 semi-random prompts, which occurred every 2–3 h between 8:00 am and 10:00 pm. Semi-random prompts were utilized to capture variables of interest to the study that were non-discrete and likely to vary continuously over time (e.g., mood) (Shiffman, Stone, & Hufford, 2008). Participants attended 2 in-person visits over the 2 weeks, during which data from the handheld computer were uploaded and monitored for compliance, and research coordinators provided feedback to participants about the quality of the data. Participants received $150 for completing the 2-week protocol and an additional $50 for completing at least 90% of signaled assessments within 45 min of semi-random prompts.