



An experimental analysis of the affect regulation model of binge eating



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ABSTRACT

There is research suggesting that binge eating may serve an affect regulation function. However, experimental evidence supporting this model in adults is sparse and studies have been mixed regarding whether negative affect impacts objective energy intake. This study examined the impact of a real-time interpersonal stressor on laboratory test meal intake between individuals endorsing recent objective binge eating ($\geq 1 \times/\text{week}$) and those denying disordered eating. Generalized linear modeling was used to compare individuals with recent binge eating (BE group; $n = 52$) to those denying recent eating pathology (HC group; $n = 51$) on test meal intake following a stressor (stressful condition) or neutral stimulus (non-stressful condition). Moderated mediation analyses were used to examine whether negative affect mediated the impact of condition on intake differently between BE and HC groups. The BE group did not have significantly higher energy intake than the HC group in the stressful versus non-stressful condition. However, the BE group was more likely to engage in extreme intake (i.e., over- or under-consumption) than the HC group in the stressful versus non-stressful condition ($p = 0.02$). Changes in negative affect did not significantly mediate the relationship between condition and intake extremes for the BE group. The results indicate that both over- and under-consumption are triggered by stress among individuals with recent binge eating. Continued research investigating both binge eating and restriction as a means of affect regulation in binge-eating samples is encouraged.

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Binge eating is characterized by eating an objectively large amount of food in a short period of time while experiencing a sense of loss of control over food consumption (American Psychiatric Association, 2013). Individuals who engage in binge eating episodes often experience a range of negative health effects, significant psychiatric co-morbidity, and decreased quality of life (American Psychiatric Association, 2013; Bulik, Sullivan, & Kendler, 2002; Winkler et al., 2014). While existing treatments can produce significant decreases in binge eating (Brownley, Berkman, Sedway, Lohr, & Bulik, 2007; Shapiro et al., 2007), approximately half of patients with binge eating remain symptomatic after receiving evidenced-based treatment. Development of more effective treatments may be restricted by limited knowledge of the mechanisms

driving binge-eating behaviors. While multiple theoretical models pertaining to the risk for and maintenance of binge eating have been proposed (Pearson, Wonderlich, & Smith, 2015), there have been relatively few direct tests of such models (Stice, 2002).

The role of affect regulation has been increasingly acknowledged in risk and maintenance models of disorders characterized by binge eating, such as bulimia nervosa (BN) and binge eating disorder (BED) (Pearson et al., 2015; Wonderlich et al., 2008), based on research indicating that binge episodes are frequently precipitated by affective difficulties (Greeno, Wing, & Shiffman, 2000; Heatherton & Baumeister, 1991). Additionally, studies using ecological momentary assessment to examine the relationship between affect and binge eating in real-time have found negative affect to significantly increase before and decrease after binge eating (Berg et al., 2015; Smyth et al., 2007) and to mediate the relationship between stressful events and binge eating (Goldschmidt, Wonderlich, et al., 2014). Although these prior studies implicate an affect regulation function of binge eating, they

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have primarily relied on self-report methods (Lavender et al., 2015), which may be problematic, as individuals with disordered eating are often inaccurate in their report of eating habits (Mitchell, Crow, Peterson, Wonderlich, & Crosby, 1998; Tanofsky-Kraff, Haynos, Kotler, Yanovski, & Yanovski, 2007).

Test meal studies examining eating behavior in a controlled, laboratory can be used to effectively assess objective binge eating (Anderson, Williamson, Johnson, & Grieve, 2001), while reducing the potential for self-report bias (Mitchell et al., 1998; Tanofsky-Kraff et al., 2007). A recent meta-analysis of laboratory meal studies concluded that negative affect significantly predicts over-consumption across clinical and non-clinical samples (Cardi, Leppanen, & Treasure, 2015). However, this review only included two publications involving binge-eating samples. Indeed, few studies have experimentally examined the relationship between stress, affect, and test meal eating behavior among binge-eating adult samples (Lavender et al., 2015) and those that have report conflicting findings (Aubie & Jarry, 2009; Laessle & Schulz, 2009; Telch & Agras, 1996). Of the extant experimental studies, two have found that negative mood manipulations increased the experience of loss of control and eating rate, but not objective energy consumption among individuals meeting DSM-IV criteria for BED (Laessle & Schulz, 2009; Telch & Agras, 1996). Another found that mood manipulation through weight-related teasing vignettes was associated with increased test snack consumption among individuals with binge eating; however, vignettes portraying other teasing-related scenarios did not trigger increased consumption (Aubie & Jarry, 2009). Thus, the evidence suggests that manipulation of negative affect among binge-eating samples impacts the feeling of loss of control, which is one key facet of binge eating, as well as other aspects of the eating experience; however, the findings are mixed regarding whether negative affect promotes objectively greater consumption in a laboratory setting.

Although prior experimental studies provide important initial information about the role of affect in binge eating, several limitations should be noted. First, these studies have utilized vignettes or films to induce negative mood, which may not closely resemble the real-life stressors associated with binge eating. Research suggests that interpersonal stressors are especially powerful triggers for binge eating in the natural environment (Goldschmidt, Wonderlich, et al., 2014; Ivanova et al., 2015). Therefore, a mood induction involving a real-time interpersonal stressor could provide a more ecologically-valid negative affect manipulation. Second, nearly all of these studies have been conducted with individuals meeting DSM-IV criteria for BED, excluding a large number of individuals who binge eat at a lower severity or who also purge. However, there is growing interest in examining problem behaviors dimensionally in order to identify common mechanisms across a range of severity and presentation (Morris & Cuthbert, 2012), and therefore, a need to examine mechanisms of binge eating across diagnostic groups. Third, the existing studies have not used advanced statistical analyses to conduct modeling (e.g., mediation analyses) of the relationship between stress, affect, and test meal intake among individuals who binge eat.

Another potential limitation is that these studies have utilized energy intake as the outcome measure in order to specifically investigate over-consumption. Although it would be expected that higher energy intake would represent more disordered outcomes (i.e., over-consumption likely due to binge eating) in binge-eating samples, there are data indicating that individuals who binge eat also frequently engage in pronounced under-consumption (i.e., dietary restriction) (Elran-Barak et al., 2015; Polivy & Herman, 1985). Therefore, important findings may be masked by only examining elevated energy consumption if some of the individuals in these studies engage in dietary restriction, in addition to binge

eating, in response to negative affect. In a recent experimental study investigating the impact of a stressor on test meal intake of individuals with anorexia nervosa (Wildes, Marcus, Bright, Dapelo, & Psychol, 2012), researchers examined the variable of extreme intake, or consuming significantly more or less (1 SD above or below) than the group average, as an outcome measure to account for patterns of both over- and under-consumption. This variable has not been examined within binge-eating samples. Examination of extreme intake in addition to overall energy intake could allow for a more thorough investigation of the association between negative affect and disordered eating in binge-eating populations.

Therefore, this study examined the effects of a real-time interpersonal induction of distress (Shenk & Fruzzetti, 2011) (stressful condition) versus a non-stressful stimulus (neutral condition) on laboratory test meal intake, comparing individuals with recent binge eating (BE group) with individuals not reporting recent disordered eating (HC group). The primary aim was to test the role of negative affect in over-consumption among a dimensional sample with recent binge eating. We hypothesized that individuals in the BE group would consume more food in the stressful versus neutral condition compared to the HC group. We also conducted moderated mediation analyses consistent with the model in Fig. 1. We hypothesized that the association between a stressor (i.e., stressful versus neutral condition) (1a) and energy intake (1c) would be mediated by increases in negative affect (i.e., baseline to pre-meal) (1b) for individuals who endorsed recent binge eating (i.e., BE versus HC group) (1d). As an exploratory aim, we investigated the role of negative affect in extreme intake (i.e., over- or under-consumption) by repeating all analyses with extreme intake as the outcome variable.

1. Materials and methods

1.1. Participants

Participants were females ≥ 18 years old who either endorsed binge eating ($n = 52$; BE group) or no significant disordered eating ($n = 52$; HC group) within the prior month. The sample size of 104 participants was identified using G-Power software (Faul, Erdfelder, Lang, & Buchner, 2007), assuming sufficient power (80%) to detect a large effect size ($d = 0.80$) between groups at $\alpha = 0.05$. Inclusion criteria required self-reported BMI ≥ 18.5 kg/m² to avoid any confounding effects of starvation. Exclusion included: 1) pregnancy; 2) use of medications with known effects on appetite (e.g., stimulants) within two weeks of participation; and 3) history of bariatric surgery.

Further, inclusion in the BE sample required endorsement of engaging in objective bulimic episodes (i.e., binge eating) $\geq 1\times$ /week on average within the prior month on the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 1994). Although engaging in binge eating $\geq 1\times$ /week corresponds with DSM-5 criteria (American Psychiatric Association, 2013), we did not require any eating disorder diagnosis for inclusion. Inclusion in the

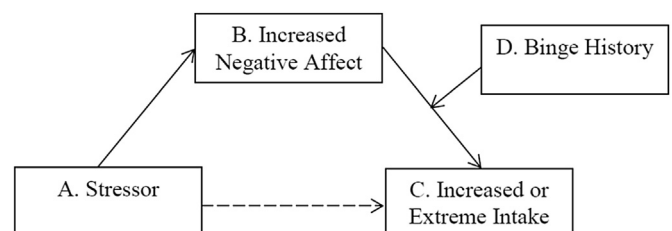


Fig. 1. Proposed study moderated mediation model.

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