



## Negative affect and past month binge eating may drive perceptions of loss of control

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### ABSTRACT

**Objective:** To evaluate how subjective control over intake is influenced by objective aspects of consumption, negative affect, and recent binge eating.

**Method:** 105 participants with or without current binge eating (BE) consumed a meal replacement shake following a 12-hour overnight fast in a  $2 \times 2$  design: participants were instructed to either consume the entire shake (no control) or decide on their own how much to consume (affirmative control). They were allotted either 5 (fast) or 15 (slow) minutes to complete the task. Participants reported on subjective control and negative affect following consumption.

**Results:** Compared to the slow condition, participants in the fast condition reported higher negative affect after eating. Individuals without a history of BE reported lower subjective control in the no control compared to the affirmative control condition; however, this pattern was reversed among those with BE, such that individuals reported higher subjective control following consumption in the no control condition. In addition, subjective control was positively associated with negative affect in the no control condition whereas it was negatively associated with negative affect in the affirmative control condition.

**Discussion:** Eating rate influences affect, and subjective control over eating may be the result of an interaction of objective control with affect. Thus, distress may drive perceptions of control. This should be directly tested in future studies and has implications for how we understand BE.

Loss of control (LOC) eating is an indicator of eating psychopathology and characterizes binge-eating (BE) episodes (e.g., Latner, Hildebrandt, Rosewall, Chisholm, & Hayashi, 2007; Vannucci et al., 2013). Individuals with LOC eating are over four times more likely to report clinical levels of impairment and are more likely to have mood disorders, anxiety disorders, and other comorbid presentations than those without LOC. Furthermore, LOC is associated with poor emotion regulation (e.g. Goldschmidt, Lavender, Hipwell, Stepp, & Keenan, 2017; Schlüter, Schmidt, Kittel, Tetzlaff, & Hilbert, 2016) and heightened momentary negative affect (Haedt-Matt & Keel, 2015) in individuals endorsing BE. Together, these findings indicate the clinical relevance of LOC and suggest that it may be partially responsible for elevated distress (Vannucci et al., 2013).

Though LOC is clearly associated with clinical impairment, poor emotion regulation, and negative affect, the roles that aspects of consumption and emotions play in *perceptions* of control is not entirely clear. Some research suggests that the experience of LOC drives distress (e.g., Schlüter et al., 2016), while other studies indicate that distress before eating influences perceptions of eating behavior (e.g., Adriaanse,

Prinsen, de Witt Huberts, de Ridder, & Evers, 2016). Thus, there remains some ambiguity regarding how distress and LOC relate.

Rapid consumption of food is a commonly endorsed feature of BE among individuals with eating disorders and is considered to be an aspect of LOC (Vannucci et al., 2013; White & Grilo, 2011). Faster eating rates predict higher post-consumption hunger ratings and increases in food intake in individuals with and without eating disorders (Andrade, Kresge, Teixeira, Baptista, & Melanson, 2012; Ioakimidis, Zandian, Bergh, & Södersten, 2009), indicating that consumption rate is related to amount consumed as well as LOC. Indeed, slower consumption results in reductions of food intake and increases in post-prandial fullness (Angelopoulos et al., 2014; Robinson et al., 2014). While LOC is a purely subjective construct, consumption rate can be assessed objectively, although this is not commonly done in the context of LOC. Therefore, it is generally unknown how consumption rate relates to perceptions of control and distress. It is possible that feeling out of control leads to faster consumption, both of which contribute to distress. Alternatively, distress while eating may encourage faster eating and be experienced as eating that is out of control. Evidence to date

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provides little guidance as to which is the most likely scenario. Clarifying the relationship between eating rate, LOC, and distress may enhance the current understanding of BE, identifying causal agents of LOC for treatments to target when aiming to reduce the distress associated with BE.

The purpose of the present study was to determine how consumption rate and control over amount consumed influence perceptions of control and distress to improve our understanding of the phenomenology of BE. We hypothesized that emphasizing participants' lack of control over the amount of food they were to consume would lead to lower subjective control. We thought this would be especially the case when eating rate was fast compared to slow, contributing to the individual's momentary distress. In other words, we hypothesized a main effect of emphasized lack of control on subjective control that is moderated by consumption rate. We were further interested in exploring how distress (i.e., negative affect) was related to consumption rate and perceptions of control over eating to clarify the nature of this relationship, but due to the mixed literature in this area, we made no a priori hypotheses. These relationships were tested in individuals with and without BE to evaluate whether the results are particular to individuals who experience BE.

## 1. Method

### 1.1. Participants

One hundred and five participants (70.6% female) with past-month BE (38.6%), defined as at least one objective binge episode occurring in the past month, or no history of BE were recruited from the greater Grand Forks, ND community using paper flyers. A computer malfunction resulted in missing survey data for one participant, making the total sample size used for analyses 104. Eligibility criteria included being at least 18 years of age with a body mass index (BMI) greater than or equal to 18 kg/m<sup>2</sup>. Individuals were excluded if they were pregnant, nursing, or had diabetes or any medical condition preventing them from completing an overnight fast followed by a rapidly consumed, calorically dense meal. Mean (*SD*) BMI from measured height and weight was 23.82 (4.65) kg/m<sup>2</sup>. Participants' ages ranged from 18 to 42 years, with a mean (*SD*) of 20.91 (4.04). A total of 90.4% were White, non-Hispanic, 3.8% were Asian, and 5.8% reported another race.

### 1.2. Measures

The Eating Disorder Examination-Questionnaire (EDE-Q version 6.0; Fairburn & Beglin, 2008) is a 28-item self-report measure assessing eating attitudes and behaviors over the past 28 days, with higher global scores indicating greater eating disorder psychopathology. The EDE-Q was used to characterize eating disorder psychopathology. A score of 2.3 or higher for the global score indicates clinical eating disorder symptoms (Mond, Hay, Rodgers, Owen, & Beumont, 2004). The global score demonstrated excellent internal consistency with a Cronbach's alpha of .96.

A 100 mm visual analogue scale (VAS) was created for this study to assess momentary variables including hunger, urge to binge, and subjective control following the consumption task (e.g., "How much did you feel in control of how much you were eating?" or "How much of an urge do you have to eat more?"). The VAS items were rated with a horizontal line drawn to indicate responses anywhere from *not at all* to *extremely*.

The Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson & Clark, 1999) is a self-report measure of affect. Portions of this scale, including general negative affect, were rated before and after the consumption task for how participants felt "right now" on a 5-point scale from *very slightly* or *not at all* to *extremely*. Negative affect demonstrated excellent internal consistency with a Cronbach's alpha of .93 before and 0.89 after the consumption task.

### 1.3. Procedures

Participants were screened for eligibility over the phone by trained research assistants using the Eating Disorder Diagnostic Scale (Stice, Telch, & Rizvi, 2000), which assessed for the past month presence of BE and was modified to assess for lifetime BE in individuals who denied the recent presence of BE. Interested and eligible participants fasted (i.e., nothing except water) overnight for the 12 h before their morning appointments at either 8, 9, or 10am. Fasting compliance was confirmed by a research assistant via verbal report prior to informed consent. After providing informed consent and having their heights and weights measured, participants completed self-report measures including the PANAS-X and EDE-Q. Participants were then instructed to drink using a straw from a 40 oz. opaque cup with a translucent lid containing 16 oz. (480 kcal) of Boost meal replacement shake. Participants were not told the caloric content of the shake nor its brand name or other contents, but they were given a choice of flavor between chocolate, vanilla, and strawberry. In a 2 × 2 design, both rate of consumption and objective control were manipulated. For the rate manipulation, individuals were limited to either 5 (i.e., fast) or 15 (i.e., slow) minutes to complete the consumption task. For the control manipulation, participants were either instructed to drink as much of the meal-replacement shake as they wanted (i.e., affirmative control) or to consume all 16 oz. of the meal-replacement shake (i.e., no control). Participants were randomized to one of the four conditions: 1) no-control/fast, 2) no control/slow, 3) affirmative control/fast, and 4) affirmative control/slow. Following instructions, research assistants left the room and observed participants through a one-way mirror while participants drank their shakes. Participants did not complete any additional activities while drinking their shakes. Following the task, the PANAS-X and the 100 mm VAS were completed. These procedures were approved by the University of North Dakota institutional review board.

### 1.4. Statistical analyses

Univariate general linear models with objective control (affirmative/no) and consumption rate (fast/slow) as independent variables were used to test hypotheses. All analyses included sex and BE status as covariates or as an independent variable interacting with condition (i.e., the BE by condition interactions). Subjective perception of control over eating was the primary dependent variable. Other dependent variables included ratings of hunger, fullness, urge to binge eat, and negative affect, which were used to validate that the manipulations had their intended effects. Results were judged as statistically significant when  $p < .05$ . Effect sizes, indicated by partial eta squared, were judged as either small (0.01), medium (0.06), or large (0.14), and are interpreted as the proportion of residual variance accounted for by the predictor in each model (Tabachnick & Fidell, 2001).

## 2. Results

With regard to characterizing the sample, individuals reporting past-month BE on the EDE-Q had a mean (*SD*) of 6.05 (5.33) BE episodes over the past 28 days. Mean (*SD*) EDE-Q Global scores for those with BE was 2.38 (1.42) and was 0.82 (0.71) for those without BE, which was statistically significant ( $t(51.65) = -6.44$ ;  $p < .001$ ;  $d = 1.39$ ), indicating an average above the clinical cut-off for eating disorder psychopathology among BE participants (Mond et al., 2004). There were no significant differences in age, EDE-Q Global scores, BE status, or ratings of pre-consumption negative affect across the four conditions ( $p$ 's = 0.182 - 0.792). All participants completed the consumption task according to their condition instructions (e.g., finished entire shake in allotted time). Across conditions, individuals with BE reported lower subjective control over eating than those without following the task ( $F(1, 92) = 8.79$ ;  $p = .004$ ;  $\eta_p^2 = 0.087$ ). However, this

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