



## Behavioral evidence of emotion dysregulation in binge eaters



Dawn M. Eichen<sup>a,\*</sup>, Eunice Chen<sup>a</sup>, Kerri N. Boutelle<sup>b</sup>, Michael S. McCloskey<sup>a</sup>

<sup>a</sup> Temple University, Department of Psychology, 1701 N. 13th St., Philadelphia, PA 19122, United States

<sup>b</sup> University of California, San Diego Department of Pediatrics, 9500 Gilman Drive, MC #0874, La Jolla, CA 92093, United States

### ARTICLE INFO

#### Article history:

Received 30 July 2016

Received in revised form

7 November 2016

Accepted 14 December 2016

Available online 15 December 2016

#### Keywords:

Binge eating

Emotion regulation

Distress tolerance

PASAT

Affect regulation

Frustration tolerance

### ABSTRACT

Binge eating is the most common disordered eating symptom and can lead to the development of obesity. Previous self-report research has supported the hypothesis that individuals who binge eat report greater levels of general emotion dysregulation, which may facilitate binge-eating behavior. However, to date, no study has experimentally tested the relation between binge eating history and in-vivo emotion dysregulation. To do this, a sample of female college students who either endorsed binge eating ( $n = 40$ ) or denied the presence of any eating pathology ( $n = 47$ ) completed the Difficulties with Emotion Regulation Scale (DERS) and a behavioral distress tolerance task (the Paced Auditory Serial Addition Task-Computer: PASAT-C) known to induce negative affect and distress. The binge eating group was 2.96 times more likely to quit the PASAT-C early ( $\chi^2 = 5.04$ ,  $p = 0.025$ ) and reported greater irritability ( $F(1,84) = 7.09$ ,  $p = 0.009$ ) and frustration ( $F(1,84) = 5.00$ ,  $p = 0.028$ ) after completing the PASAT-C than controls, controlling for initial levels of these emotions. Furthermore, across the entire sample, quitting early was associated with greater emotion dysregulation on the DERS ( $r_{pb} = 0.342$ ,  $p < 0.01$ ). This study is the first to demonstrate that individuals who binge eat show in-vivo emotional dysregulation on a laboratory task. Future studies should examine the PASAT-C to determine its potential clinical utility for individuals with or at risk of developing binge eating.

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### 1. Introduction

Binge eating is characterized by eating an objectively large amount of food in a short period of time with a perceived loss of control over eating (American Psychiatric Association [APA], 2013). Binge eating is the most prevalent disordered eating symptom (Hudson, Hiripi, Pope, & Kessler, 2007) and can be present across eating disorder diagnoses (APA, 2013), in people with other psychiatric diagnoses (e.g., borderline personality disorder), as well as individuals with no clinical diagnosis (Bruce & Agras, 1992). Further, binge eating is strongly associated with obesity (Spitzer et al., 1993; Stunkard & Allison, 2003). Of note, binge eating is related to significant clinical impairment and distress (Vannucci et al., 2013). Given the prevalence of binge eating and its relation to eating disorders and obesity (Stice, Cameron, Killen, Hayward, & Taylor, 1999), it is important to understand the behavioral characteristics associated with binge eating in attempts to gain a better understanding of the development and maintenance of eating

disorders and obesity and to identify potential targets of prevention and intervention.

One of the most prominent theories of binge eating is the affect regulation model (Polivy & Herman, 1993). Following the principles of negative reinforcement, this model posits that binge eating becomes a learned behavior to cope with this increased negative affect, albeit in a maladaptive way (Arnow, Kenardy, & Agras, 1992; Cooper, Wells, & Todd, 2004; Rieger et al., 2010). In support of this model, research has suggested that negative affect typically precedes binge eating behaviors (Grilo, Shiffman, & Carter-Campbell, 1994; Haedt-Matt & Keel, 2011). Furthermore, though some studies suggested that negative affect decreases during (Deaver, Miltenberger, Smyth, Meidinger, & Crosby, 2003) and following binge eating (Engel et al., 2013; Smyth et al., 2007), a recent meta-analysis showed that negative affect ultimately increases after the binge episode (Haedt-Matt & Keel, 2011). Taken together, it is possible that binge eating may temporarily relieve negative affect; however, distress may ultimately be exacerbated due to feelings of guilt and embarrassment from losing control over eating (Corstorphine, 2006). Alternatively, results may differ due to the operationalization of negative affect or individual differences in response to binge eating (De Young et al., 2013).

\* Corresponding author. Present address: University of California, San Diego Department of Pediatrics, 9500 Gilman Drive, MC #0874, La Jolla, CA 92093, United States.

Given that binge eating is believed to be a reaction to negative affect, it is important to assess emotion regulation in individuals with eating disorders. Emotion regulation difficulties have been identified across eating disorder diagnoses; especially among individuals who binge eat (Brockmeyer et al., 2014; Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012). Difficulties in emotion regulation accounted for a significant portion of the variance in prediction of eating disorder pathology among individuals with binge eating disorder (Gianini, White, & Masheb, 2013) and in a non-clinical college sample (Lavender & Anderson, 2010). Emotion dysregulation also accounted for unique variance of binge eating behaviors in non-clinical children and college students (Czaja, Rief, & Hilbert, 2009; Whiteside et al., 2007). Specifically, difficulties identifying emotions and a lack of appropriate emotion regulation strategies may drive the link between emotion regulation difficulties and binge eating (Whiteside et al., 2007). Lastly, high comorbidity rates of affective disorders, namely anxiety and depression, have been reported among individuals who binge eat (Hudson et al., 2007). Taken together, it appears that difficulties with emotion regulation are often present among individuals who binge eat.

Despite a large body of research that suggests a link between impaired emotion regulation and binge eating, previous studies have relied on self-report data through surveys or ecological momentary assessment, both which may be subject to recall bias. Of note, depressive symptoms can further influence self-reported data due to a common tendency for individuals with depression to report greater pathology due to a biased negative perspective of their current situation (Gupta & Kar, 2008). However, at times individuals with depression may minimize their symptoms (Hunt, Auriemma, & Cashaw, 2003). Given the high comorbidity of binge eating with depressive symptoms (Hudson et al., 2007), this population may be subject to greater bias. Laboratory tasks that elicit frustration and measure time spent pursuing a goal may serve as a proxy for distress tolerance, and thus would be particularly useful tools to examine in vivo emotion regulation in this population. These tasks represent the ability to regulate emotions and continue with goal-directed action despite induced distress, which cannot be measured through self-report. However, as with all assessments, these tasks are not without limitations. Many behaviors (such as quitting a task early) are interpreted as a proxy for distress tolerance. Without knowing that the reason behind the behavior was tied to distress tolerance, it is not possible to know for certain whether it reflects the construct proposed to be evaluated or something else (e.g., fatigue, boredom). Thus, it is important to try to evaluate the relation between the behavior and construct being measured via additional self-report, observational or behavioral measures whenever possible and show that the task did indeed induce distress. Despite this limitation, in vivo experimental testing is still important as it is less susceptible to social desirability responding and can be complementary to self-report measures. Further, by observing participants while completing the tasks, experimenters can ensure participants remain focused on the tasks. Lastly, objective in-vivo measures may be more sensitive and might be able to detect at-risk individuals prior to their becoming aware of their reactions in response to distressing emotions.

### 1.1. The current study

The current study aimed to evaluate whether individuals who binge eat demonstrate more dysregulated emotion in response to a non-food, non-eating related, behavioral distress tolerance task. Specifically, in the current study we used the Paced Auditory Serial Addition Task-Computer (PASAT-C), a well-validated paradigm known to insight negative affect (Lejuez, Kahler, & Brown, 2003).

The PASAT-C assesses the ability to persist in a distressing task. Scores on this measure were used to compare the in-vivo, objectively measured emotion regulation abilities of undergraduate females who binge eat and those who do not. We hypothesized that the binge eating group would be more likely to choose to quit the task early (i.e., less likely to complete the task), spend less time on the task, and show a greater increase in negative emotions in response to the task in comparison to the non-binge eating control group. If confirmed, this would suggest that individuals who binge eat are quicker to engage in behaviors to escape or avoid negative emotions and demonstrate an increased emotional response to distressing stimuli.

## 2. Method

### 2.1. Participants and procedures

Undergraduate females (ages 18–25 years) from Temple University were recruited for the current study from a pool of participants who completed self-report measures on a secure online portal to earn class credit. Inclusion criteria included a) endorsing four or more binge episodes (on the Eating Disorder Examination-Questionnaire;  $n = 50$ ) in the past 28 days OR b) denial of any binge eating, purging, or fasting (healthy controls,  $n = 51$ ). Exclusion criteria for all participants included: endorsing currently (past month) taking any psychotropic medication for the presence of any psychological disorders, current depression and any history of a) psychosis, b) any bipolar disorder, or c) alcohol and/or substance dependence. In addition to denying any binge eating in the past 28 days, eligible controls denied any current or past eating disorder or eating disorder symptomatology (e.g. purging, abuse of diet pills/laxatives and fasting occurring 2 or more times in any given year). Individuals in the binge eating group remained eligible if they endorsed  $\geq 2$  binge eating episodes in the past month, which was confirmed by assessing an example of a binge episode. This amount was chosen as it represents a subclinical amount of binge eating (APA, 2013).

Fourteen individuals (binge eating = 10, control = 4) were excluded from all analyses for not endorsing at least two binge episodes ( $n = 7$ ) or endorsing substance or alcohol dependence ( $n = 7$ ) during the interview. All individuals who participated in the laboratory portion were provided research course credits as compensation for their participation to be used towards the fulfillment of course requirements or provided with \$15 remuneration. This study was approved by the Institutional Review Board at Temple University and all participants provided written informed consent.

### 2.2. Measures

#### 2.2.1. Disordered eating behaviors

The *Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008)* is a self-report questionnaire that examines eating disorder attitudes and behaviors. Responses to items regarding binge eating, purging, laxative use, and fasting were used as a pre-screening measure for inclusion to help identify potential participants for the current study as healthy controls or binge eaters. Height and weight reported on this questionnaire were used to calculate BMI. The global EDE score (current study  $\alpha = 0.96$ ) which represents overall eating disorder attitudes was used to explore differences in eating disorder attitudes between individuals in the binge eating and control groups as a cross-validation that the samples differ not only on binge eating behavior but also on eating disorder attitudes. The global EDE ranges from 0 to 6, with higher scores representative of greater eating disorder pathology. Scores

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