



## Impulsivity and test meal intake among women with bulimia nervosa



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### ABSTRACT

Many patients with bulimia nervosa (BN) also meet criteria for a lifetime alcohol use disorder (AUD). In order to understand possible mechanisms contributing to the co-occurrence and perpetuation of these disorders, this study investigated the importance of impulsivity and test meal intake among patients with BN by comparing women with BN only ( $n = 18$ ), BN and current/past AUDs ( $n = 13$ ), and healthy controls ( $n = 12$ ). All participants completed assessments of eating disorder symptoms, frequency of alcohol use, binge eating, and purging via questionnaires and semi-structured interviews over two sessions. Measures of impulsivity consisted of computerized and self-report measures, and laboratory test meals. Significant differences between individuals with BN with/without comorbid AUDs were not found for test meal intake, impulsivity measures, or self-reported psychological symptoms. As hypothesized, compared to healthy controls, individuals with BN had significantly higher scores on two subscales and the total score of the Barratt Impulsiveness Scale, a trait measure of impulsivity, and consumed significantly more calories in the binge instruction meal. Total Barratt Impulsiveness Scale scores were also significantly related to kcal consumed during the laboratory test meal when individuals were instructed to binge eat (BN groups). Data from this study add to the existing literature implicating impulsivity in the psychopathology of disorders of binge eating, including BN, and also support the use of laboratory meals as a symptom-specific measure of this trait in eating disorder populations.

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### 1. Introduction

A substantial percentage of individuals with bulimia nervosa (BN) have a co-occurring substance use disorder, including 33.7% reporting a lifetime diagnosis of alcohol abuse or dependence in a nationally representative population-based study (Hudson, Hiripi, Pope, & Kessler, 2007). Despite this significant overlap, few studies examine shared mechanisms for the etiology and maintenance of BN and alcohol use disorders (AUDs). One characteristic feature of patients with BN (Vaz-Leal et al., 2015; Waxman, 2009) or AUDs (Jentsch et al., 2014) is impulsivity, which is hypothesized

to increase risk for the development of both conditions. Impulsivity, or the inability to suppress a dominant or unwanted action, is not one construct, but rather encompasses a range of behavioral dys-control such as response inhibition, delay of gratification, and delay discounting (Stein, Hollander, & Liebowitz, 1993). Prior research links impulsivity and specific behavioral disturbances in eating, the defining features of eating disorders. For example, a relationship between measures of trait impulsivity and features of binge eating (e.g., loss of control over eating, eating alone due to embarrassment) is found in individuals with binge eating disorder (Nasser, Gluck, & Geliebter, 2004), and significantly greater test meal intake and impulsivity scores are observed among individuals who binge eat compared to those who do not (Galanti, Gluck, & Geliebter, 2007), with a significant positive correlation between impulsivity and test meal intake.

An extensive literature has also linked impulsivity to risk for

Abbreviations: BN, bulimia nervosa; AUD, alcohol use disorder.

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developing AUDs. Relationships are identified between behavioral impulsivity, early onset of alcoholism, and other substance use (i.e., number of daily cigarettes smoked), in individuals with AUDs (Stanford et al., 2009). Although studies consistently find that impulsivity predicts the onset of AUDs, including for individuals genetically predisposed to these conditions, it remains unclear whether this relation is unique to AUDs or simply reflects the cumulative effect of trait disinhibition that places individuals at general risk for all externalizing disorders (Dick et al., 2010).

The primary aim of the current study was to examine differential associations of impulsivity and eating behavior among individuals with BN with and without a co-occurring or lifetime AUD, and healthy controls. We hypothesized that compared to patients without a current/past AUD, individuals with BN and an AUD diagnosis would: (1) report elevated levels of eating disorder psychopathology, and (2) evidence greater trait and behavioral impulsivity in comparison to patients with BN alone and healthy controls. Further, we hypothesized that in comparison to controls, patients with BN would have (1) higher scores on measures of impulsivity and psychopathology, and (2) demonstrate increased consumption during a laboratory test meal. Similar to prior research (Galanti et al., 2007; Nasser et al., 2004), we also hypothesized that an eating-specific measure of disinhibition (laboratory binge meal) would be correlated with other trait measures of impulsivity among patients with BN.

## 2. Method

### 2.1. Procedure

Individuals with DSM-IV BN (American Psychiatric Association, 1994) and healthy controls participated in the study. Patients were treatment-seeking individuals with BN and if eligible, were offered treatment at no charge in exchange for participation (brief inpatient stay or 20 sessions of outpatient cognitive-behavioral therapy). Eligibility was evaluated during an in-person screening, in which all participants completed informed consent, an evaluation of medical stability, and self-report and interview measures (see below). Patients with BN were not eligible if a lifetime diagnosis of bipolar disorder, schizophrenia, or other psychotic disorders, substance abuse or dependence (for patients without a comorbid AUD), history of alcohol withdrawal symptoms (for patients with a current/past AUD), significant medical illness, or pregnancy were reported. Control participants were recruited via advertisements in local media and flyers around a university medical center campus and participated in exchange for monetary compensation. Healthy controls were of normal weight and denied any current psychiatric diagnosis or significant medical illness.

Participation occurred on two non-consecutive days, on average 4.6 days apart (standard deviation = 3.6; range = 1–21). On both testing days, participants consumed a standardized breakfast, consisting of one Thomas' English Muffin, 2 pats of butter, and 4 fluid ounces (118.3 ml) of apple juice (~300 kcal), at home following an overnight fast. Participants were asked not to consume additional food or liquid besides water before the test meal six hours later. Standardized breakfast adherence was evaluated by phone on the morning of the testing sessions and questionnaire prior to laboratory meals. On the first test day, participants completed a battery of computerized behavioral and self-report assessments (Barratt Impulsiveness Scale, GoStop Impulsivity Paradigm, Immediate and Delayed Memory Task, Stroop Word-Color Interference, Delay Discounting Task; see Measures section for additional detail) for approximately 90 min before initiating the meal procedures. Immediately before both test meals, all participants were assessed with a breathalyzer and urine drug screen to rule out

intoxication at time of testing. Any participant with a positive breathalyzer or urine drug screen did not participate in scheduled test meals. This study was reviewed and approved by the New York State Psychiatric Institute's Institutional Review Board.

### 2.2. Measures

As above, impulsivity is dimensional (Stein et al., 1993) including behavioral, cognitive, and biological characteristics (Barratt & Patton, 1983). The heterogeneity of concepts assessed by measures of 'impulsivity,' and the multi-impulsive characteristics previously observed in samples of BN, underscore the importance of examining different aspects of impulse control (Waxman, 2009). Thus for this study, several assessments measured impulsivity, including the test meals, which served as an objective, domain-specific measure of impulsivity relevant to BN. The Wechsler Test of Adult Reading (The Psychological Corporation, 2001) assessed basic reading level to ensure valid assessments.

#### 2.2.1. Test meals

Similar to other research on eating behavior (Goldfein, Walsh, LaChaussée, Kissileff, & Devlin, 1993; Kissileff, Walsh, Kral, & Cassidy, 1986; LaChaussée, Kissileff, Walsh, & Hadigan, 1992; Sysko, Devlin, Walsh, Zimmerli, & Kissileff, 2007), instructions about the meal were given, which on the first day (normal meal) specified: "We would like this meal to resemble a normal meal that you would eat outside of the laboratory. Please eat as much or as little as you'd like. If you have problems with binge eating, we would like this meal to be typical of a meal when you are not binge eating. On the second test day (binge meal), participants were informed: "We would like this meal to resemble a binge meal. If you are someone who has problems with binge eating, we would like this meal to resemble what happens when you have a binge eating episode. If you are not someone who regularly binge eats, we would like this meal to resemble what happens when you overeat." Based on our prior studies of eating behavior (Kissileff et al., 1986; Schebendach, Broft, Foltin, & Walsh, 2013), rather than counterbalancing instructions, the first test meal was designed as an adaptation session to acclimate participants to eating in the laboratory and increase the likelihood of comfort with binge eating or overeating on the second day. Meals consisted of 27 different foods (e.g., bread, chicken, cookies, ice cream) and drinks (e.g., water, Diet Coke<sup>®</sup>) used in previous studies (Mayer, Schebendach, Bodell, Shingleton, & Walsh, 2012) with a few adaptations (e.g., Munchkins<sup>®</sup> instead of donuts). During the meal, participants were observed via closed circuit video monitor and a DVD player showed episodes of either *The Office* or *Modern Family*. The end of the meal was signaled by pushing a button (doorbell). Individuals with BN had access to a private bathroom both during and after the test meals. Food was weighed (in grams) before and after test meals. Nutrient analyses included energy (kcal), macronutrient content (grams of carbohydrate, protein, and fat), and percent of kcal provided by macronutrients. Two dietary scores were calculated: (1) diet energy density score (DEDS), or intake in kcal divided by the total gram weight of food and beverage consumed, and (2) diet variety score (DVS), or the total number of different caloric foods and beverages consumed during the meal divided by the number of caloric foods and beverages served (Mayer et al., 2012).

#### 2.2.2. Other impulsivity assessments

The Barratt Impulsiveness Scale (Patton, Stanford, & Barratt, 1995) is a 30-item self-report questionnaire measuring impulsivity in three higher order factors (Attentional, Motor, and Non-planning Impulsiveness). Items are composed of statements of behaviors/personality characteristics with higher scores indicating

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