



Addiction vulnerability and binge eating in women: Exploring reward sensitivity, affect regulation, impulsivity & weight/shape concerns[☆]



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ABSTRACT

Almost 40% of individuals with eating disorders have a comorbid addiction. The current study examined weight/shape concerns as a potential moderator of the relation between the hypothesized latent factor “addiction vulnerability” (i.e., impairments in reward sensitivity, affect regulation and impulsivity) and binge eating. Undergraduate women ($n = 272$) with either high or low weight/shape concerns completed self-report measures examining reward sensitivity, emotion regulation, impulsivity and disordered (binge) eating. Results showed that (1) reward sensitivity, affect regulation and impulsivity all loaded onto a latent “addiction vulnerability” factor for both women with high and with low weight/shape concerns, (2) women with higher weight/shape concerns reported more impairment in these areas, and (3) weight/shape concerns moderated the relation between addiction vulnerability and binge eating. These findings suggest that underlying processes identified in addiction are present in individuals who binge eat, though weight/shape concerns may be a unique characteristic of disordered eating.

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1. Introduction

Eating Disorders (EDs; e.g., anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED)) have lifetime prevalence rates ranging from 0.6 to 2.8% of the population (American Psychiatric Association, 2013; Hudson, Hiripi, Pope, & Kessler, 2007). Binge eating, (i.e., the consumption of atypically large amounts of food while experiencing loss of control) occurs across EDs and is characteristic of BED. Criteria for BED include recurrent bingeing (≥ 1 /week for 3 months) without compensatory behaviors and at least 3 characteristics of bingeing (e.g., eating rapidly, eating until uncomfortably full) (American Psychiatric Association, 2013). Binge eating is the most common ED symptom occurring in 4.5%–6.9% of people and is associated with medical complications (e.g., infertility, obesity, metabolic syndrome) (American Psychiatric Association, 2013; Mitchell, 2015).

1.1. Overlap of eating and addictive disorders

Both EDs and addictive disorders¹ show a similar developmental trajectory, with onset often occurring in adolescence, following a chronic

course, and frequently involving periods of remission and recurrence (American Psychiatric Association, 2013; Koob & Volkow, 2010; Stice, Marti, & Rohde, 2013). Further, there is significant comorbidity, with nearly 40% of individuals with EDs meeting criteria for addiction (Hudson et al., 2007). These behavioral similarities are associated with neurobiological impairments in dopaminergic and serotonergic systems (Avena & Bocarsly, 2012; Davis, Levitan, Reid, et al., 2009; Koob & Volkow, 2010). However, while some argue that bingeing in EDs is a form of addiction (Davis, 2013; Gold, Frost-Pineda, & Jacobs, 2003), others maintain that binge eating and addiction represent distinct conditions (Cassin & von Ranson, 2007; Wilson, 2010). Examining impairments in common underlying mechanisms of bingeing and addiction (i.e., reward sensitivity, affect regulation, and impulsivity) may clarify the extent to which these phenotypes overlap and may improve assessment, prevention, and treatment of EDs.

1.2. Reward dysfunction

Reward dysfunction is implicated in EDs and addiction; however, it is unclear whether hypo- or hypersensitivity is responsible (Schulte, Grilo, & Gearhardt, 2016). Reward deficiency theory (Blum, Braverman, Holder, et al., 2000), which is commonly associated with substance use disorders, posits that individuals resort to using drugs (or other highly rewarding behaviors) to compensate for an innate hyposensitive response to reward caused by a genetic determinant attributed to reduced dopamine receptors. Reward sensitivity theory

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¹ Although much of the literature on addictions is related to substances, wherever available, literature examining behavioral addictions and these constructs were utilized.

(Robinson & Berridge, 2000) posits that hypersensitivity to rewarding properties of stimuli (e.g., drug or food) increases the addictive potential of those stimuli. Either variant of reward dysfunction manifests as difficulty tolerating delayed reward and increased desire for the rewarding stimuli (Goodman, 2008). Individuals with addiction endorse impaired reward sensitivity (Dissabandara et al., 2014) and perform poorly on delay discounting tasks (Stevens, Verdejo-García, Roeyers, Goudriaan, & Vanderplassen, 2015). Similarly, in addition to being hyper-responsive to the hedonistic properties of food (Davis et al., 2009), individuals who binge eat report impaired reward processing (Harrison, O'Brien, Lopez, & Treasure, 2010; Schienle, Schäfer, Hermann, & Vaitl, 2009), and perform poorly on delay discounting (Davis, Patte, Curtis, & Reid, 2010; Schienle et al., 2009). Reward dysfunction has been linked to neurological and genetic underpinnings in both addiction and EDs (Davis et al., 2012; Volkow Nora & Morales, 2015), providing further evidence that individuals with EDs exhibit similar reward system dysfunction as in addiction although the dysfunction (i.e., deficiency or hypersensitivity) may differ (Blum et al., 2000; Robinson & Berridge, 2000; Schulte et al., 2016).

1.3. Affect regulation

Another impairment in addiction and EDs is poor affect regulation. Affect regulation encompasses awareness, understanding, and acceptance of emotions, as well as the ability to modulate responses to emotion (Gratz & Roemer, 2004). According to the Self-Medicating Hypothesis, individuals engage in continued drug use to avoid or escape negative affect (Khantzian, 1997). Drug use initially reduces negative affect but ultimately results in increased negative affect (Baker, Piper, & McCarthy, 2004). Similarly, individuals who binge eat often report engaging in bingeing to escape from negative emotions (Grilo, Shiffman, & Carter-Campbell, 1994; Leehr et al., 2015). While bingeing can temporarily emotional relief, distress is often ultimately exacerbated due to feelings of shame and guilt from losing control over eating (Corstorphine, 2006). Individuals with addiction or EDs endorse impaired affect regulation (Brockmeyer, Skunde, Wu, et al., 2014; Thorberg & Lyvers, 2006) and lower levels of emotional control than non-clinical participants (Pierrehumbert et al., 2002). Further, both have a high rate of comorbid depressive and anxiety disorders (American Psychiatric Association, 2013; Hudson et al., 2007). Thus, impaired affect regulation appears to contribute to both EDs and addiction.

1.4. Impulsivity-urgency

Impulsivity is a multifaceted construct (Dawe & Loxton, 2004; Lynam, Smith, Whiteside, & Cyders, 2006) that encompasses behavior that occurs without careful consideration, exhibiting a component of rashness. Across a variety of domains, individuals with EDs or addictions demonstrate increased levels of trait and behavioral impulsivity (Dawe & Loxton, 2004; Petry, 2001; Robinson, Pearce, Engel, & Wonderlich, 2009; Svaldi, Naumann, Trentowska, & Schmitz, 2014). However, negative and positive urgency (i.e., acting rashly in response to negative or positive mood) have emerged as the strongest impulsivity domains related to EDs and addiction (Berg, Latzman, Bliwise, & Lilienfeld, 2015; Fischer, Smith, & Cyders, 2008). Taken together, the data suggest impulsivity, specifically urgency, is associated with addiction and EDs.

1.5. Addiction vulnerability

Significant commonalities between addiction and EDs with bingeing behavior are found in three impairments: 1) reward processing, 2) affect regulation, and 3) impulsivity (Goodman, 2008). Although these constructs are distinct, they are interrelated. For example, the rash action defined by urgency is a behavioral response to emotions. Additionally, it is difficult to inhibit behavior in the presence of something extremely rewarding. Furthermore, evidence suggests these constructs likely have

overlapping neurocircuitry (Davis et al., 2010; Robinson & Berridge, 2000; Volkow et al., 2010; Wierenga et al., 2014). Together these three deficits are posited to contribute to an “addiction vulnerability” (see Fig. 1). The present study extends the use of this model to identify when impairments in these three areas might lead to the development of binge eating.

Weight and shape concerns are a defining characteristic of EDs (American Psychiatric Association, 2013; Goldschmidt, Hilbert, Manwaring, et al., 2010). Specifically, greater shape and weight concerns are associated with greater ED symptomatology and can differentiate individuals with or without EDs (Goldschmidt et al., 2010). Yet, no data suggest weight/shape concerns are associated with addictive disorders. Accordingly, weight and shape concerns may differentiate individuals with and without binge eating, who are predisposed to addiction vulnerability, such that individuals with high weight/shape concerns will develop binge eating, whereas those with low weight/shape concerns will not (see Fig. 2).

The current study aimed to better characterize impaired processes, which may be related to a common phenotype underlying addiction vulnerability. Self-report measures were utilized to examine three key deficits established in the addiction literature (Goodman, 2008): 1) impaired reward, 2) impaired affect regulation and 3) impaired impulsivity (i.e., urgency) in relation to binge eating in college women. Binge eating was the ED behavior of interest because of its prevalence across EDs (American Psychiatric Association, 2013). The primary aims were to: 1) evaluate the addiction vulnerability construct itself and 2) in relation to binge eating (see Fig. 2). We hypothesized that 1) reward sensitivity, affect regulation and impulsivity would load on the addiction vulnerability construct and 2) weight and shape concerns would moderate the relationship between addiction vulnerability and binge eating.

2. Method

2.1. Participants and procedures

Undergraduate females ($N = 486$) from a mid-Atlantic university were recruited via a secure online system through which students enroll in research studies to earn credits for course requirements. Details of the study were provided via an online consent form. After agreeing to participate, participants completed self-report measures via the online system. Exclusion criteria were being male or age being outside of 18–25 years old. Females ($n = 272$) who met criteria for either high (i.e., scored in the top third of the weight (≥ 3.20) and shape (≥ 3.625) subscales of the Eating Disorder Examination-Questionnaire (EDE-Q), $n = 135$) or low (i.e., scored in the bottom third of the weight (≤ 1.20) and shape (≤ 1.75) subscales, $n = 137$) weight/shape concerns were included in these analyses. Average age of participants was 20.16 years ($SD = 1.67$), average self-report BMI was 23.50 kg/m² ($SD = 4.5$) and the sample was mostly Caucasian (61.5%; African American—16.5%, Asian—8.1%, Latino—5.1%). This study was approved by the university's Institutional Review Board.

2.2. Self-report measures

All questionnaires utilized have good psychometric properties (Caseras, Àvila, & Torrubia, 2003; Cyders & Smith, 2007; Gratz & Roemer, 2004; Mond, Hay, Rodgers, Owen, & Beumont, 2004a, 2004b) and α levels for this sample are provided below.

The *Eating Disorder Examination Questionnaire* (Fairburn & Beglin, 1994) (EDE-Q) is a 28-item self-report questionnaire that assesses the presence of ED symptomatology and attitudes over the previous 4 weeks. The item “Over the past 28 days, on how many days have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?” assessed binge eating. Weight and shape concerns were assessed using the weight ($\alpha = 0.93$) and shape ($\alpha = 0.96$) concerns

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