



## Research report

# The role of impulsivity traits and delayed reward discounting in dysregulated eating and drinking among heavy drinkers <sup>☆</sup>



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## ABSTRACT

Impulsivity is a multifaceted construct that has been linked to dysregulated eating and problematic alcohol use. The UPPS model identifies five personality-based impulsivity traits that have unique predictive utility: Negative Urgency, Perseverance, Premeditation, Sensation Seeking, and Positive Urgency. Delayed reward discounting (DRD) is an index of impulsive decision making characterized by preference for smaller immediate gains at the cost of larger delayed gains. In the current study, we sought to refine the influence of impulsive personality traits and DRD on disordered eating patterns and problematic drinking. One hundred and eight treatment-seeking heavy drinkers were assessed for UPPS impulsivity traits, DRD, disordered eating, alcohol use, and demographic information. With regard to disordered eating patterns, DRD predicted higher levels of Dietary Restraint and Weight and Shape Concerns. Negative Urgency predicted binge eating and Weight and Shape Concerns. Positive Urgency predicted Eating Concerns. Female sex predicted Eating, Weight, and Shape Concerns. When considering problematic alcohol use, only Negative Urgency and Sensation Seeking were predictive. This is the first study to examine both personality-based impulsivity and DRD in relation to pathological eating and drinking behavior. The results suggest the importance of disentangling the contributions of various impulsivity constructs on dysregulated eating.

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## Introduction

Impulsivity is generally defined as a tendency to act without thinking, but different definitions of impulsivity emphasize specific aspects of personality and behavior such as the tendencies to respond prematurely, to respond without reflecting when making decisions, to inhibit responses poorly, and to prefer smaller immediate rewards instead of larger delayed ones (Evenden, 1999). It is increasingly accepted that “impulsivity” is not a unitary construct but rather a family of constructs, some of which are closely related while others are quite distinct (Evenden, 1999; Robbins, Curran, & de Wit, 2012; Whiteside & Lynam, 2001). These separate constructs have unique predictive properties, thus it is important to study separate impulsivity domains and study their unique influences on psychopathology (Meda et al., 2009; Papachristou, Nederkoorn, Havermans, van der Horst, & Jansen, 2012). The constellation of traits and behaviors related to impulsivity has been linked to a number of psychiatric conditions, including substance use disorders (de Wit,

2009; Dalley, Everitt, & Robbins, 2011; Reynolds, 2006). Increasingly, these constructs have also been examined in relation to dysregulated eating (e.g., Claes, Vandereycken, & Vertommen, 2005; Lyke & Spinella, 2004). There is increasing agreement that impulsivity may be divided into three broad categories: personality-based constructs of impulsivity, behavioral indices of response inhibition, and indices of impulsive decision making (de Wit, 2009). In this study, we examined the influence of the personality-based impulsivity traits and the impulsive decision-making index on dysregulated eating patterns and problematic alcohol use.

### The UPPS as a trait-based model of impulsivity and its correlates

In structural models of personality, impulsivity is conceptualized as a continuous trait. One such model was derived using the Five Factor Model of personality (Whiteside & Lynam, 2001). Whiteside and Lynam (2001) and Smith et al. (2007) have identified four separate but related impulsivity traits which have specific behavioral correlates and predictive utility, and can be understood within a comprehensive personality framework: (*lack of*) *Perseverance* is the inability to sustain attention and motivation on a task; *Sensation Seeking* is a tendency to seek out novel and thrilling experiences; (*lack of*) *Premeditation* is the tendency to act without thinking or failure to plan ahead; and *Urgency* is the tendency to act rashly

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while experiencing strong emotions. This latter domain has been further refined into *Positive Urgency*, the tendency to act rashly when experiencing positive emotions, and *Negative Urgency*, the tendency to act rashly when experiencing negative emotions (Cyders & Smith, 2007; Cyders et al., 2007).

Research on alcohol use and disordered eating using the UPPS framework has focused on under-control, or poor ability to self-regulate. Both problematic alcohol use (Fischer, Anderson, & Smith, 2004; Fischer, Settles, Collins, Gunn, & Smith, 2011; Smith et al., 2007; Stojek & Fischer, 2013; Whiteside & Lynam, 2009) and binge eating (Claes et al., 2005; Fischer et al., 2004, 2011; Fischer, Smith, & Cyders, 2008) are associated with Negative Urgency, and excessive drinking is associated with a number of other traits characterized by under-control (Cyders, Flory, Rainer, & Smith, 2009; Fischer & Smith, 2008; Miller, Flory, Lynam, & Leukefeld, 2003). In fact, alcohol use disorders and EDs often co-occur (Herzog, Keller, Sacks, Yeh, & Lavori, 1992) and Negative Urgency has been hypothesized as one of the underlying factors for this comorbidity (Anestis, Selby, & Joiner, 2007; Fischer et al., 2004, 2011; Fischer, Smith, & Cyders, 2006; Smith et al., 2007). Individuals with alcohol use disorders display higher levels of Negative Urgency when compared with healthy controls (Fischer et al., 2011; Whiteside & Lynam, 2009). Negative Urgency differentiated fifth graders who initiated alcohol drinking from those who did not, and it predicted increases in alcohol dependence symptoms in women across the first semester of college (Fischer et al., 2011; Stojek & Fischer, 2013), and Positive Urgency has prospectively predicted increases in alcohol consumption among college students (Cyders et al., 2009). In contrast, Sensation Seeking has been consistently associated with the frequency of alcohol use although not necessarily with levels of alcohol misuse (Cyders et al., 2009; Fischer & Smith, 2008; Miller et al., 2003).

There is a well-established link between Negative Urgency and loss of control over eating, e.g., frequency of objective binge eating (Fischer et al., 2004). This relationship is consistent across clinical and nonclinical samples (Claes et al., 2005; Fischer et al., 2004, 2011; Fischer & Smith, 2008). The evidence for a link between Premeditation or Perseverance and binge eating is less consistent such that some researchers have found a negative relationship between these two traits and bulimic behaviors (Claes et al., 2005; Miller et al., 2003) while others have not (Fischer, Smith, & Anderson, 2003). Interestingly, Negative Urgency has also been linked to pathological eating behaviors and attitudes that may be conceptualized as examples of over-control or excessive self-regulation. Specifically, Negative Urgency has been associated with dietary restraint as well as Concern for Dieting subscale of the Restraint Scale in a nonclinical sample (Mobbs, Ghisletta, & Van der Linden, 2008). Research on individuals with Binge Eating Disorder and Bulimia Nervosa has identified a dietary-negative affect subtype characterized by both dietary restraint and negative affect (Grilo, Masheb, & Wilson, 2001; Masheb & Grilo, 2008; Stice, 2001). Individuals who fall into this subtype have higher Negative Urgency scores than individuals with pure dietary subtype of binge eating (Carrard, Crépin, Ceschi, Golay, & Van der Linden, 2012). Thus, it appears that Negative Urgency may be related to different dimensions of disordered eating behavior, including those that represent excessive self-regulation.

Overall, there is evidence that these different dispositional traits are uniquely associated with different motives for drinking and eating, and represent unique predisposing sensitivities to pathological drinking and dysregulated eating patterns. The common link between Negative Urgency and pathological eating and drinking patterns may be explained using negative reinforcement theory (Bandura, 1969; Cooper, 1994; Fischer et al., 2004; Heatherton & Baumeister, 1991), as well as Baumeister's self-control theory (Muraven & Baumeister, 2000). From the negative reinforcement perspective, individuals may tend to turn to alcohol and/or food to alleviate negative affect and cope with distress. In the short-term, the

experience of drinking and/or eating is reinforcing because it regulates emotions. Therefore, Urgency is a common underlying factor for pathological drinking and eating insofar that it predisposes individuals to engage in these maladaptive behaviors when experiencing negative affect. Additionally, self-control has been hypothesized to be akin to a muscle – easily strained when additional pressure, such as stress or resisting temptation, is applied (Muraven & Baumeister, 2000). Thus, individuals who try to exert over-control (e.g., follow dietary rules) may have a higher tendency to make impulsive decisions when distressed because their self-control is strained. Overall, the theoretical basis for the comorbidity between pathological drinking and eating points to specific dispositional traits, particularly those associated with the ability to make effective decisions when experiencing distress.

#### *DRD as a form of impulsivity and its relationship to appetitive behavior patterns*

Delayed reward discounting (DRD) is a behavioral economic index of impulsive decision making (Madden & Bickel, 2009). DRD indexes the discounting of a reward's value based on its delay – or how quickly a reward loses its value as a function of time (MacKillop et al., 2011). This may be conceptualized as an inability to delay gratification in that DRD conveys the preference for a smaller immediate reward relative to a larger delayed reward, and is a hallmark feature present in addiction (MacKillop et al., 2011). High DRD can be conceptualized as an index of under-control (i.e., failure to self-regulate) and low DRD as over-control (i.e., excessive or rigid self-regulation). The majority of research has focused on the relationship of DRD to addiction, thus the under-control aspects of DRD. A large body of empirical evidence has accumulated linking DRD and addictive behaviors (for a meta-analytic review, see MacKillop et al., 2011). Overall, individuals with alcohol misuse and dependence have higher levels of DRD (i.e., they discount future rewards more steeply) than normal controls (MacKillop et al., 2011). Thus, there appears to be a link between DRD and problematic appetitive behaviors present in addiction.

Past research on eating dysregulation has concentrated on the under-control aspects of DRD, or the relationship between inability to delay gratification and obesity or binge eating behavior. One study has found that obese women discount future rewards more steeply than normal-weight controls (Weller, Cook, Avsar, & Cox, 2008), suggesting that women with higher Body Mass Index (BMI) may discount the long-term benefits of not consuming excess calories when presented with the immediate opportunity to do so. A study that compared obese women and women with Binge Eating Disorder to healthy controls found that obese women and those with Binge Eating Disorder had higher level of DRD compared with normal controls (Davis, Patte, Curtis, & Reid, 2010). Another study that recruited a nonclinical sample of women found that DRD was related to the tendency to overeat with a sense of loss of control (i.e., disinhibition), but not restraint on the Three-Factor Eating Questionnaire, such that women with higher DRD were more likely to binge eat compared with those with lower DRD levels (Yeomans, Leitch, & Mobini, 2008). However, as disordered eating behaviors and attitudes can be characterized by both under-control (e.g., binge eating) and over-control (e.g., severe dietary restraint), DRD may be an informative index of pathological overvaluing of future rewards. In fact, one study comparing individuals with Anorexia Nervosa with healthy controls found that individuals with Anorexia discount future rewards significantly less steeply than controls (Steinglass et al., 2012) lending some support to the notion of pathologically low discounting in eating disordered behaviors characterized by over-control. Thus, while there is some support for a link between DRD and binge eating behavior, it appears that the role of DRD in disordered eating, which encompasses weight and shape concerns as well as dietary

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