



Relations between pure dietary and dietary-negative affect subtypes and impulsivity and reinforcement sensitivity in binge eating individuals

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ABSTRACT

To investigate potential predictors of the severity of binge eating disorder (BED), two subtypes of patients with the disorder, a pure dietary subtype and a dietary-negative affect subtype, were identified. This study investigated the relationships between the two subtypes and impulsivity and reinforcement sensitivity. Ninety-two women meeting threshold and subthreshold criteria for BED diagnosis filled out questionnaires to determine eating disorder severity, impulsivity and reinforcement sensitivity before and after participating in an online guided self-help program for BED. Cluster analyses revealed a pure dietary subtype ($N = 66, 71.7\%$) and a dietary-negative affect subtype ($N = 26, 28.3\%$). Compared to the pure dietary subtype, the dietary-negative affect subtype reported a higher frequency of objective binge episodes, more severe eating disorders, higher urgency scores (defined as a tendency to act rashly in the context of negative affect), a greater sensitivity to punishment, and a higher dropout rate during treatment. These findings suggest that BED patients in the dietary-negative affect subtype exhibit heightened anxiety and are highly impulsive, especially in contexts of negative affect. For these individuals, psychological interventions for BED should focus on inhibiting automatic responses to negative emotions.

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1. Introduction

Cognitive behavioral therapy (CBT) has been found to be effective for the treatment of binge eating disorder (BED; Wilfley et al., 2002). A recent study showed that guided CBT-based self-help intervention was a first-line treatment option for the majority of BED patients (Wilson, Wilfley, Agras, & Bryson, 2010). Despite these positive findings, the literature also indicates that a significant proportion of patients remain symptomatic after treatment. Moreover, very few studies have investigated factors that predict BED treatment outcomes (Wilson, Grilo, & Vitousek, 2007). The identification of specific factors that maintain BED and hinder recovery would promote the development of more customized treatments.

1.1. Dietary and dietary-negative affect subtypes

In studies of potential predictors of BED outcomes, two binge eating subtypes have regularly emerged from cluster analyses in samples of patients with eating disorders: a pure “dietary” subtype, characterized by dietary restraint, and a “dietary-negative affect” subtype,

characterized by dietary restraint and negative affect. Previous studies of bulimic patients have revealed that the dietary-negative affect subtype, also termed the dietary-depressive subtype, is associated with higher levels of concern regarding their eating, shape, and weight, higher levels of social maladjustment, and a poorer response to treatment than the pure dietary subtype (Grilo, Masheb, & Berman, 2001; Stice & Agras, 1999; Stice & Fairburn, 2003). These findings are consistent with proposals such as Stice's dual-pathway model of bulimia nervosa (BN; Stice, 1994, 2001), which claim that both dieting and negative affect play a role in the development and maintenance of bulimia nervosa.

Recent studies have replicated the distinction between these subtypes in individuals with BED (Grilo, Masheb, & Wilson, 2001b; Masheb & Grilo, 2008; Stice et al., 2001). Stice et al. (2001) described a pure dietary subtype (64% of the whole sample) and a dietary-negative affect subtype (36%) in a sample of 159 women with BED. The dietary-negative affect subtype displayed a higher frequency of objective binge episodes and greater concern regarding their eating, shape, and weight, as well as higher levels of lifetime psychiatric disorders and social maladjustment than the pure dietary subtype. Moreover, the dietary-negative affect classification predicted negative outcomes after dialectical behavior therapy in a sample of 58 women suffering from BED (Stice et al., 2001).

Grilo et al. (2001b) demonstrated the stability of classification involving these subtypes, finding significant consistency at two points in time that were four weeks apart. They tested whether 101

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individuals with BED could be classified along the dimensions of dietary restraint and negative affect. Cluster analyses revealed a dietary subtype (67.3%) and a dietary-negative affect subtype (32.7%). For 82% of the cases, the individuals were classified into the same subtypes four weeks later. Alternative approaches that classified individuals with BED based on the presence of Major Depressive Disorder (MDD) or frequency of binge eating were found to be less informative than subtyping based on dietary restraint and negative affect because subgroups defined according to the presence of MDD or frequency of binge eating did not exhibit distinctive differences (Grilo et al., 2001b). Grilo et al. (2001b) found that while the subtypes did not differ with regard to gender, body mass index (BMI), or frequency of binge eating, the dietary-negative affect subtype had significantly greater concerns with regard to eating, weight, and shape, higher levels of body dissatisfaction, and higher impulsivity than the dietary subtype.

Another study compared two types of sub-categorization methods for BED (Masheb & Grilo, 2008). Seventy-five overweight patients presenting with BED were categorized into a dietary subtype (71%) or a dietary-negative affect subtype (29%) using cluster analyses. Patients were also classified into two groups based on self-evaluation of shape or weight, which appeared to significantly predict the post-treatment severity of the eating disorder. In contrast, subtyping on the basis of dietary restraint and negative affect predicted the post-treatment frequency of binge episodes. Compared to patients in the pure dietary group, patients in the dietary-negative affect group reported eating disorders that were more severe, and a higher percentage of these patients reported DSM-IV (American Psychiatric Association, 1994) lifetime Axis I diagnoses, particularly anxiety disorders.

1.2. Impulsivity and eating disorders

Grilo et al. (2001b) found higher impulsivity scores for the dietary-negative affect subtype than for the pure dietary subtype. Given the inherently impulsive nature of binge eating, several studies have examined impulsivity as a potential mechanism responsible for the maintenance of binge eating in eating disorders. Despite its theoretical importance, a meta-analysis revealed that the correlation between impulsivity and eating disorders was weak but significant (Stice, 2002). These divergent results might be due to the complexity of the impulsivity construct. Impulsivity is multifaceted and can be decomposed into four partially independent dimensions (S. P. Whiteside & Lynam, 2001): *urgency*, a tendency to act rashly in the context of negative affect; *lack of perseverance*, difficulty staying focused on boring or difficult tasks; *lack of premeditation*, a tendency to act without considering the consequences; and *sensation seeking*, a tendency to pursue thrilling activities and novelty. According to Van der Linden, RoCHAT, and Billieux (2006), these four aspects of impulsivity might be related to specific cognitive mechanisms and motivational processes. They suggest that three dimensions of impulsivity are associated with deficits in inhibitory functions, with urgency related to the inability to deliberately suppress dominant responses, lack of premeditation related to decision-making abilities and lack of perseverance to a vulnerability to intrusive thoughts or images. The fourth dimension, sensation seeking, might be associated with the motivational process of reward sensitivity.

In keeping with this perspective, Reinforcement Sensitivity Theory proposes that two independent motivational systems, reward sensitivity and punishment sensitivity, are related to the personality traits of impulsivity and anxiety, respectively (Corr, 2004). Gray and McNaughton (2000) characterize the reward sensitivity dimension as being related to the behavioral approach system (BAS) that regulates activation and engagement responses, while the punishment sensitivity dimension is related to the behavioral inhibition system (BIS) that regulates anxiety, avoidance and fear responses. Both

dimensions are viewed as relevant to the understanding of eating disorders and have been investigated in several studies (Harrison, O'Brien, Lopez, & Treasure, 2010).

A meta-analytic review of 50 studies (Fischer, Smith, & Cyders, 2008) examined the relationship between impulsivity and bulimic symptoms in patients with BN. The largest effect size was found for urgency, revealing that these patients found it difficult to inhibit a dominant response in the context of negative affect. Several authors have suggested that both negative emotions and cognitive difficulties in coping with them play an important role in the maintenance of binge eating (U. Whiteside et al., 2007; Wisner & Telch, 1999). Another recent meta-analysis (Harrison et al., 2010) reviewed 21 studies evaluating differences in reinforcement sensitivity in eating disordered and control groups. This meta-analysis found that few studies examined this characteristic in individuals with eating disorders and study findings were heterogeneous. Altogether, these studies indicate that compared to control individuals, BN patients are more sensitive to both reward and punishment. Heightened sensitivity to reward has been held to play a role in the onset of binge urges and the desire to binge (Dawe & Loxton, 2004). Heightened reward sensitivity to food cues has also been observed in BED patients using functional magnetic resonance imaging (fMRI; Schienle, Schafer, Hermann, & Vaitl, 2009). The higher sensitivity to punishment observed in BN patients also indicates that these individuals experience more anxiety, which is consistent with the elevated rate of anxiety disorders found in this population (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004).

Given the association between impulsivity and binge eating found in BN patients, the current study examined these associations in BED patients, who were classified into two subtypes found to be relevant for the detection of eating disorder severity. The aims of the study were to:

1. Replicate the classification of two subtypes based on dietary restraint and negative affect previously described by Stice and Agras (1999) and Stice et al. (2001) in a population of patients suffering from threshold and subthreshold BED;
2. Explore relationships between BED maintenance and different dimensions of impulsivity by comparing measures of eating disorder severity, impulsivity, reinforcement sensitivity, and response to treatment in these two subtypes.

2. Method

2.1. Participants

The study included 92 women who took part in two studies from 2008 to 2009 to evaluate the degree of acceptance and efficacy of a guided, online CBT-based self-help program (Study 1 $N=22$; Study 2 $N=70$).

The Study 1 sample (Carrard, Crépin, Rouget, Lam, Golay, et al., 2011) was composed of 22 participants seeking treatment for an eating disorder. Participants were recruited from an obesity consultation waiting list at the University Hospitals of Geneva, Switzerland. To meet eligibility criteria, participants had to be females between the ages of 20 and 70 years with a BMI between 30 and 50. Fifty-five percent ($N=12$) of our participants fully met the DSM-IV criteria for BED, and 45% ($N=10$) met the subthreshold criteria. To meet subthreshold criteria for BED in this study, participants had to exhibit at least one binge eating episode per month for the preceding three months. While this is a low threshold, the optimal diagnosis threshold for the frequency of binge eating has yet to be determined (Wilson & Sysko, 2009). Using that threshold, Crow, Agras, Halmi, Mitchell, and Kraemer (2002) demonstrated that BED and subthreshold BED were highly similar.

The Study 2 sample (Carrard, Crépin, Rouget, Lam, Golay, et al., 2011) was composed of 74 participants recruited from the community

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