



The moderating effect of impulsivity on negative affect and body checking

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ABSTRACT

This study examined the moderating effects of different aspects of trait impulsivity on trajectories of negative affect prior to and following body checking in the natural environment in women with anorexia nervosa (AN). Body checking is a compulsive behavior that may maintain the cycle of eating disordered behavior through negative reinforcement. Previous studies regarding the relationship of negative affect to body checking have been inconsistent, making it unclear how negative affect functions as an antecedent to this behavior in the natural environment. We hypothesized that individual differences in trait impulsivity may influence body checking in response to negative affect. Negative urgency (NU) (the tendency to act rashly under distress) and (lack of) perseverance (the tendency to give up on goal directed behavior) may be unique facets of impulsivity that play a role in body checking. Women with AN ($n = 82$) completed a self-report measure of impulsivity and used ecological momentary assessment (EMA) to record negative affect and body checking for two weeks. Results indicated that women with low (lack of) perseverance experienced a greater increase in negative affect than those with high (lack of) perseverance prior to and following body checking. Overall, results indicate that individual differences in trait impulsivity moderated the relationship of negative affect to body checking in women with AN.

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1. Introduction

Anorexia nervosa (AN) is a psychiatric disorder characterized by restriction of food intake leading to significant low body weight, an intense fear of gaining weight, and body image disturbance [1]. Individuals with AN engage in ritualistic and compulsive behaviors based on beliefs about their bodies [2]. One example is body checking, a behavioral manifestation of the core feature of overvaluation of shape and weight that underlies eating disorder pathology [3]. Body checking involves repeatedly checking one's body for weight gain such as examining specific body parts in the mirror, feeling for protruding bones, and pinching flesh [4].

Current theoretical models have suggested that body checking functions to maintain eating disorder (ED) symptoms. According to some cognitive-behavioral theories of EDs, body checking is performed in response to negative affect, which then decreases, strengthening the ED behavior through negative reinforcement [5]. However, one study

found no difference in the extent of negative affect before body checking behavior and in control situations, indicating that negative affect is not a unique precursor to body checking [6]. Moreover, ecological momentary assessment (EMA) studies examining the consequence of body checking have found that the behavior led to increased negative affect and anxiety, body dissatisfaction, and weight concerns, which encouraged compensatory behavior, dietary restriction [6,7], and continued body checking, maintaining the cycle to in an attempt to control shape and weight [5]. It is unclear how negative affect functions as an antecedent to body checking in the natural environment. Therefore, it is important to examine direct antecedents to body checking, and to examine variables that may potentially moderate the impact of body checking on negative emotions.

Body checking is often described as a negatively-reinforced compulsion, a repetitive behavior performed to alleviate anxiety or distress [2]. A compulsion can also be defined by habitual engagement in a behavior despite awareness of its harmful consequences [8]. Although previous research conceptualized impulsivity and compulsivity as negatively-related constructs on opposite ends of a single continuum [9], empirical studies have found that impulsivity and compulsivity are positively correlated traits within eating disorder populations [10–14]. Both

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impulsivity and compulsivity involve engaging in recurring behaviors and deficient pre-potent response inhibition. Pre-potent response inhibition theoretically functions to inhibit maladaptive learned behavior patterns. Additionally, Torregrossa, Quinn, and Taylor (2008) found that impulsiveness may yield vulnerability toward compulsion due to overlapping neurobiology (e.g. activation of the OFC) that regulates these behaviors. Furthermore, Pearson, Wonderlich, and Smith (2015) theorized that although eating disorder behavior begins as an emotion-related impulsive action, it later develops compulsive behavioral features that may function to avoid negative affect despite awareness of the harmful consequences of the behavior. These findings suggest that impulsivity may play a role in the development of compulsive body checking behavior.

The two facets of trait impulsivity that are most relevant to the cycle of body checking are negative urgency (NU) and (lack of) perseverance. NU is the tendency to act rashly when experiencing negative affect, and is considered a risk and maintenance factor for eating disorder symptoms [15]. In clinical samples, individuals with high levels of NU exhibited greater ED severity than those with low levels of NU [16]. Previous EMA research has indicated that individual differences in NU moderate the antecedent relationship of negative affect and binge eating, such that negative affect significantly increases prior to binge eating at lower levels of NU [17,18]. These findings also indicate that individuals with high levels of NU tend to engage in binge eating following small, incremental shifts in negative affect rather than large escalations.

Moreover, those high in NU are disposed to engage in impulsive acts to alleviate distress, which may transition into compulsive, habitual behaviors [19]. Individual differences in NU are linked to difficulties in pre-potent response inhibition [20,21]. For example, NU appears to differentiate individuals who engage in compulsive behaviors such as skin picking and trichotillomania from a comparison sample, and accounts for significant variance in compulsive skin picking beyond that of negative affect [22]. This supports the hypothesis that individuals with high NU may be more vulnerable to transition into compulsive behaviors, and that NU may moderate the relationship between negative affect and body checking. Since those with higher levels of NU tend to act rashly when experiencing negative affect, these individuals may body check sooner after experiencing small, incremental shifts in negative affect compared to those with lower levels of NU.

Although NU is associated with the onset of compulsive behavior (i.e. binge-eating and non-suicidal self-injury), (lack of) perseverance is related to the maintenance of behavior over time [23–27]. Therefore, (lack of) perseverance, the inability to follow through on tasks, or remain focused under distraction, may also be a facet of impulsivity that contributes to the maintenance of body checking. Individuals who have difficulty regulating behavior to meet long-term goals may be more likely to engage in eating disorder symptoms when experiencing urges or compulsions. In the current sample, the women are fully established in their disorder; thus our data will be examining the maintenance of the cycle of body checking.

Given the limited information on the role of negative affect as an antecedent to body checking as well as the moderating role of impulsivity on ED behaviors, we sought to investigate the potential moderating effects of NU and (lack of) perseverance on trajectories of negative affect prior to and following body checking in a sample of women with AN. Both impulsivity variables have theoretical links to compulsive behavior and appear to have different empirical links to compulsive behavior at different points in time, onset vs. maintenance. Although several impulsivity related variables have been studied in relation to disordered eating behaviors (e.g. (lack of) deliberation and sensation seeking), we chose to focus on these two constructs (NU and (lack of) perseverance). Two meta-analyses have demonstrated that the association of NU to disordered eating behaviors has the largest effect size [25,28]. Although effect sizes of (lack of) deliberation on disordered eating were statistically significant in those analyses, the effects were quite small. (Lack of) perseverance also had smaller effect sizes than NU in those studies.

However, this trait has also been associated with disordered eating symptoms in at least two longitudinal studies which examined the association of UPPS impulsivity related variables to disordered eating over time [26,27]. In those studies, (lack of) deliberation and sensation seeking had null relationships to disordered eating over time. Thus, given the findings from the two meta-analyses and longitudinal studies, we focused on NU and (lack of) perseverance. To clarify previous inconsistent results, we hypothesized that negative affect will increase prior to body checking, based on conceptual models of this behavior. We also hypothesized that NU and (lack of) perseverance will moderate the relationship between negative affect and body checking. Specifically, we expected that those with high NU and or (lack of) perseverance would engage in body checking sooner during the escalation of negative affect than those with low NU and (lack of) perseverance. We did not differentiate between the effects of NU and (lack of) perseverance in our a priori hypotheses. It is unclear how long the participants may have had AN. Thus, we would not be able to determine how these variables may be related to the new onset vs. the establishment of a compulsive behavior pattern. Rather, given that these two variables seem to be most closely linked to stages of disordered eating behavior, we considered both of them worthy of investigation. Furthermore, a few studies utilizing EMA have documented mean increases in negative affect following body checking [6,7]. Thus, we also examined individual differences in NU and (lack of) perseverance as moderators of the trajectory of negative affect following body checking.

The data from the current study has been used in previous publications [29–32]; however, this study utilized data collected from the UPPS Impulsive Behavior Scale-Revised measure, which only one of the past publications incorporated [17]. Two studies using these data examined body checking behavior [31,32], but neither investigated the moderation of impulsivity; therefore, we believe that the current study uniquely contributes to the literature.

2. Method and materials

2.1. Participants

The participants were 82 females (ages 18–58; M age = 25.23, SD = 8.69) who met *Diagnostic and Statistical Manual of Mental Disorders* (4th Edition: *DSM-IV*; American Psychiatric Association, 1994) criteria for AN (n = 38) or sub-threshold AN (n = 44). Participants needed to meet specific eligibility criteria: 1) at least 18 years of age, 2) female, and 3) met *DSM-IV* criteria for AN or met criteria for sub-threshold AN. To meet criteria for sub-threshold AN in this study, participants needed to meet all of the *DSM-IV* criteria for AN, or all of the criteria except for one of the following: 1) body mass index between 17.5 and 18.5, 2) absence of the cognitive features of AN or 3) absence of amenorrhea. Of the 82 participants who met criteria for AN, 57 (69%) were classified as AN-restricting type and 25 (31%) were classified as AN-binge purge type. Our sample was predominately Caucasian (97.6%), single/never married (73.2%), had at least some college education (87.8%) with a mean body mass index of 17.11 kg/m² (SD = 1.16; range = 13.4–18.5), and earned a total household income of \geq \$30,000 (55.5%).

From April 2006 to July 2010, participants were recruited from three sites: 1) Neuropsychiatric Research Institute (Fargo, ND); 2) University of Minnesota (Minneapolis, MN); 3) The University of Chicago (Chicago, IL). The researchers used various recruitment methods including: newspaper, radio, TV, or Internet advertisements, flyers, and mailings to ED clinicians/facilities. Of the initial 601 participants who completed phone screens, 121 (20.1%) met the eligibility requirements and agreed to participate. Data from three participants were excluded from the final analyses due to EMA compliance rates of $<$ 50% (average EMA compliance rates \sim 87%–89%) and data from two participants were excluded due to significant missing data on the UPPS-R. Additionally, the NU measure was added after data collection began; therefore, the current study includes only participants with NU data (n = 82/118, 69.4% of total

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