



## Does implicit emotion regulation in binge eating disorder matter?



Athena Robinson<sup>a,\*</sup>, Debra L. Safer<sup>a</sup>, Julia L. Austin<sup>a</sup>, Amit Etkin<sup>a,b</sup>

<sup>a</sup> Department of Psychiatry and Behavioral Sciences, Stanford University, School of Medicine, 401 Quarry Road, Stanford, CA 94305-5722, USA

<sup>b</sup> Veterans Affairs Palo Alto Healthcare System and the Sierra Pacific Mental Illness Research Education and Clinical Center (MIRECC), Palo Alto, CA, USA

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### ABSTRACT

**Objective:** To examine if implicit emotion regulation (occurring outside of awareness) is related to binge eating disorder (BED) symptomatology and explicit emotion regulation (occurring within awareness), and can be altered via intervention.

**Methods:** Implicit emotion regulation was assessed via the Emotion Conflict Task (ECT) among a group of adults with BED. Study 1 correlated BED symptomatology and explicit emotion regulation with ECT performance at baseline (BL) and after receiving BED treatment (PT). Study 2 generated effect sizes comparing ECT performance at BL and PT with healthy (non-eating disordered) controls (HC).

**Results:** Study 1 yielded significant correlations ( $p < .05$ ) between both BED symptomatology and explicit emotion regulation with ECT performance. Study 2 found that compared to BL ECT performance, PT shifted ( $d = -.27$ ), closer to HC. Preliminary results suggest a) BED symptomatology and explicit emotion regulation are associated with ECT performance, and b) PT ECT performance normalized after BED treatment.

**Conclusions:** Implicit emotion regulation may be a BED treatment mechanism because psychotherapy, directly or indirectly, decreased sensitivity to implicit emotional conflict. Further understanding implicit emotion regulation may refine conceptualizations and effective BED treatments.

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### 1. Introduction

Emotion regulation can be defined as goal directed processes that function to influence the intensity, duration, and type of emotion experienced (Gross & Thompson, 2007). Such emotion regulation can occur both explicitly and implicitly (Bargh & Williams, 2007; Gross & Thompson, 2007; Mauss, Evers, Wilhelm, & Gross, 2006). Explicit emotion regulation includes processes which demand conscious effort for initiation and require some form of monitoring throughout implementation (Gyurak, Gross, & Etkin, 2011). In contrast, implicit emotion regulation (IER) is a process evoked automatically by a stimulus, completed without monitoring, and occurs without awareness and insight.

There has been substantial interest in explicit emotion regulation and IER within psychiatric research. Similar to cognitive control (Miller & Cohen, 2001), effective explicit emotion regulation requires an ability to detect emotional content and subsequently adjust action (i.e., approach or avoid the stimulus) accordingly (Lang & Davis, 2006;

LeDoux, 2000). Traditional psychological interventions have targeted both cognitive regulation strategies, such as in thought challenging tasks in Cognitive Behavioral Therapy (Persons, 1989), and explicit emotion regulation strategies, such as in distress tolerance skills in Dialectical Behavior Therapy (Linehan, 1993a; Linehan, 1993b). Preliminary data suggest that IER may be related to psychiatric functioning in individuals with Generalized Anxiety Disorder (GAD) and Depression (Etkin, Prater, Hoft, Menon, & Schatzberg, 2010; Etkin & Schatzberg, 2011), yet IER remains unexplored among many other psychiatric conditions. If IER is indeed related to psychiatric conditions, then perhaps interventions can be developed that purposefully target IER, potentially improving the overall efficacy of current treatment approaches which solely target cognitive and explicit emotion regulation strategies.

In regards to eating disorders (ED) specifically, there similarly has been an exponential research growth on the role of emotion regulation in binge eating (Gianini, White, & Masheb, 2013; Whiteside et al., 2007). Such research consistently links greater difficulties with explicit emotion regulation, including deficits in emotion recognition, among individuals with ED compared to those without (Brockmeyer et al., 2014; Gilboa-Schechtman, Avnon, Zubery, & Jeczmiern, 2006; Harrison, Sullivan, Tchanturia, & Treasure, 2010; Haynos & Fruzzetti, 2011; Oldershaw, 2009; Racine & Wildes, 2013). Indeed, compared to individuals without binge eating disorder (BED), those with BED report both increased experiences of negative affect and lowered ability to both identify and describe their emotional states (Zeeck, Stelzer, Linster, Joos, & Hartmann, 2010). In addition, extensive data document associations specifically

*Abbreviations:* BED, binge eating disorder; ECT, Emotional Conflict Task; GAD, Generalized Anxiety Disorder; BL, baseline; PT, post treatment; HC, healthy (non-eating disordered) controls; CBT, Cognitive Behavioral Therapy; IRT, Integrative Response Therapy; BMI, Body Mass Index; il, incongruent–Incongruent; iC, incongruent–Congruent; cC, congruent–Congruent; cl, congruent–Incongruent; EDE, Eating Disorder Examination; OBE, objective binge episode; ERQ, Emotion Regulation Questionnaire; DERS, Difficulties in Emotions Regulation Scales.

\* Corresponding author. Tel.: +1 650 736 0943; fax: +1 650 723 9807.

E-mail address: athenar@stanford.edu (A. Robinson).

between explicit emotion regulation and binge eating (Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006; Whiteside et al., 2007; Womble et al., 2001).

Limited research on IER in ED has been conducted within anorexia nervosa (AN) or bulimia nervosa (BN). For example, compared to healthy controls, women with AN or BN demonstrated more attentional biases (yielding a large effect size) to a Stroop Task presentation of angry faces (Stroop, 1935). To date, it is unknown whether IER processes differ between individuals with and without BED. Similarly, no data exist regarding the existence, strength, and direction of associations between IER and specific BED symptomatology (i.e., binge eating frequency, weight and shape concerns) within a BED population, either before or after a BED manualized treatment. Such knowledge would be useful, for example, by potentially refining current theoretical models of binge eating, such as Escape Theory (Heatherton & Baumeister, 1991) and/or the Affect Regulation Model (Polivy & Herman, 1993; Wisner & Telch, 1999). Escape Theory proposes that binge eating is used as an attempt to escape self-awareness. The Affect Regulation Model conceptualizes binge eating as an attempt to alter painful emotional states, maintained via negative reinforcement through provision of temporary relief from aversive emotions. Moreover, such knowledge may indicate if IER is indeed related to binge eating and can be altered via intervention. Thus, it would serve as an important yet currently overlooked intervention target which might ultimately improve treatment outcomes.

One of the few assessments of IER is the use of a behavioral task called the Emotional Conflict Task (ECT; 28). The ECT has been validated for use in healthy control and psychiatric populations (Etkin, Egner, Peraza, Kandel, & Hirsch, 2006; Etkin & Schatzberg, 2011; Etkin et al., 2010) and is the only emotion regulation task now supported by lesion evidence (Algom, Chajut, & Lev, 2004). The ECT is a variant of the classic Stroop paradigm (Haynos & Fruzzetti, 2011) in which words are presented in colors either congruent with the word itself (red in red ink) or incongruent with the word (red in blue ink) to provide a measure of cognitive, rather than emotional, conflict (MacLeod, 1991). In the ECT, emotional conflict arises from incompatibility between the task-relevant and task-irrelevant emotional dimensions of a stimulus, hence representing an emotional analog to the color-word Stroop task (First, Spitzer, Gibbon, & Williams, 2002). Specifically, participants in the ECT are presented with photographs of emotional faces (fearful or happy) with a word (“fear” or “happy”) written over them. The word written on the photo either matches the facial expression (e.g., in a no-conflict trial the happy face has the word “happy”), or is incongruent with it (e.g., in a conflict trial the happy face has the word “fear”). The task is for participants to indicate whether the facial expression is happy or fearful by pressing a button, and not to respond based upon the overlaying word. Implicit emotion regulation is evidenced by trial-to-trial changes in one’s ability to respond to conflicting sequential presentations. The emotion regulation process is implicit because individuals are unaware of the modulation of the emotional control elicited by the stimuli on their behavioral response (Maier & di Pellegrino, 2012). Relatedly, despite careful probing, participants do not report any awareness of the task’s key processes.

To date, ECT studies in clinical populations showed slowed ECT performance. For example, individuals with GAD and comorbid GAD and depression demonstrate slower ECT performance compared to healthy controls and depression-only patients (Etkin & Schatzberg, 2011; Etkin et al., 2010). Although exaggerated ECT performance has not yet been demonstrated by a particular clinical population, it is nonetheless plausible and would indicate abnormal IER (i.e., prolonged heightened sensitivity; inability to down-regulate). Indeed, assessing IER may provide additional detail regarding symptom manifestation and differentiation from healthy controls.

The present study sought to address these gaps in the literature and investigate the nature of ECT measured IER within BED. Specifically, a two part study was conducted to explore both IER’s associations with

explicit emotion regulation and BED symptomatology, and potential differences in IER between adults with and without BED.

## 2. Method

### 2.1. Study purpose

To investigate IER in BED via two preliminary observational studies. Study 1 (BED Correlates Study) correlated BED symptomatology and explicit emotion regulation with ECT measured IER among adults with BED at baseline (BL) and after receiving a BED treatment (PT). We hypothesized that BED symptomatology and explicit emotion regulation would correlate with ECT measured IER at each assessment time point (BL or percent change at PT).

Study 2 (ECT Performance Study) compared ECT measured IER between BED participants (assessed at BL and PT) and healthy (non-eating disordered) controls (HC). We hypothesized that a) BED BL ECT performance would differ (be either faster or slower) from HC and b) BED PT ECT performance would shift after BED treatment so as to more closely resemble HC performance.

### 2.2. Participants

BL and PT data for BED participants ( $n = 43$ ) were collected as part of a larger randomized clinical trial of a treatment outcome study comparing two manualized BED treatments: Cognitive Behavioral Therapy (CBT;  $n = 19$ ; 44%; based largely on the restraint model of binge eating) and Integrative Response Therapy (IRT;  $n = 24$ ; 56%; based on affect regulation models of binge eating (Robinson, 2013)). The current study’s sample was selected from the larger BED trial’s sample of  $n = 86$  participants because they were not taking psychotropic medications nor had used a benzodiazepine within 48 hours of completing the task, and thus were eligible.

HCs were recruited separately, during the same time period as the BED trial, and consented to participate in a one-time assessment.

#### 2.2.1. BED participants

Adult BED participants ( $n = 43$ ) met DSM-5 criteria for BED. Exclusion criteria included: 1) concurrent psychotherapy; 2) regular purging or other compensatory behaviors over the past six months; 3) current psychosis; 4) current alcohol/drug abuse or dependence; 5) severe depression with recent (e.g., within past month) suicidality; 6) current use of weight altering medications (e.g., phentermine); 7) severe medical condition affecting weight or appetite (e.g., cancer requiring active chemotherapy); 8) current pregnancy or breast feeding; and 9) imminently planning or undergoing gastric bypass surgery. BED participants with both BL and PT ECT data were included in the present analysis. There was no monetary incentive for the BED participants; they received BED treatment as part of their participation in the larger study.

#### 2.2.2. Healthy control comparison participants

Adult HC participants ( $n = 23$ ) were recruited via online advertising for participation in a one-time assessment battery and paid \$50. Exclusion criteria included current: 1) ED; 2) psychosis; 3) alcohol/drug abuse or dependence; 4) severe depression with recent (e.g., within past month) suicidality; 5) use of weight altering medications (e.g., phentermine); 6) severe medical condition affecting weight or appetite; and 7) pregnancy or breast feeding.

All participants spoke and read English as surveys and the ECT were presented in English. No participants were taking psychotropic medications or had used a benzodiazepine within 48 hours of completing the ECT, as the impact of such medications on ECT performance is currently unknown.

Eligibility was assessed via a telephone screen followed by an in-person clinical interview and informed consent. The Institutional Review

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