

EXPLORING THE EFFECT OF RUMINATION AND LEVEL OF EMOTIONAL  
CONSTRUAL ON STATE BODY IMAGE DISSATISFACTION

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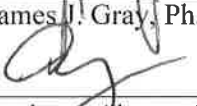
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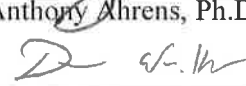
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ABSTRACT

The current study used an experimental design to determine a causal role of rumination on body image dissatisfaction and negative affect. The current study also explored the role of trait rumination and emotion regulation on body image dissatisfaction and negative affect. Participants took baseline measures of rumination and emotion regulation and were presented with a vignette designed to induce negative body image. Participants were randomly assigned to one of three processing conditions following the vignette (rumination, concrete-experiential, and distraction, with the hypothesis that rumination would increase body image dissatisfaction and negative affect). Results indicate that no significant differences were seen in any dependent measure based on condition. Regression analyses indicate that those who have limited effective strategies with which to deal with distress and tend to ruminate experience higher body image dissatisfaction and negative affect than do individuals who do not lack strategies to regulate emotional distress.

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## CHAPTER 1

### INTRODUCTION

Women are twice as likely as men to experience a depressive episode in their lifetimes (Nolen-Hoeksema & Jackson, 2001). Additionally, eating disorders primarily affect women, accounting for 90-95% of cases (APA, 2000). Such gender differences in psychopathology presentations could be due to a number of biological, psychological, and social factors. In particular, the high comorbidity of depression and eating disorders (Harrell & Jackson, 2008) could suggest underlying cognitive vulnerabilities faced by women, such as rumination or maladaptive core beliefs (Jones, Leung, & Harris, 2007; Leung & Price, 2007; Nolen-Hoeksema, 1991).

Based on Nolen-Hoeksema's Response Styles Theory, rumination is defined as the "behaviors and thoughts that focus one's attention on one's depressive symptoms and on the implications of these symptoms" (Nolen-Hoeksema, 1991). Women are more likely to engage in rumination than are men (Nolen-Hoeksema & Jackson, 2001). In a study of adult women using a community sample (n=740), rumination was more prominent in those who believed emotions were uncontrollable, held low perceived mastery of emotions, and were high in unmitigated communion (overinvolvement with others to the exclusion of the self in interpersonal relationships). The authors suggested

that at least part of gender differences in rumination could be based in the social construction of gender, as women may be more encouraged to be concerned not only with their own emotions, but the emotional aspects of interpersonal relationships (Nolen-Hoeksema & Jackson, 2001). Additionally, women are more likely than men to pay attention to their emotional states and feel that attention to emotions is warranted (Thayer, Rossy, Ruiz-Padial, & Johnsen, 2003), leading them to believe rumination is an effective problem-solving strategy, resulting in emotional understanding which will yield a reduction of depressive symptoms (Lyubomirsky & Nolen-Hoeksema, 1993).

In spite of the evidence suggesting rumination predicts the onset of depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), a certain degree of self-focus concerning negative affect may potentially be adaptive, providing insight or clarity (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Identifying which qualities of self-focus are helpful and harmful would be useful in understanding the function of rumination as a cognitive emotion regulation strategy. The most frequently used measure of trait-level rumination, the Ruminative Response Scale (RRS: Treynor, Gonzalez, & Nolen-Hoeksema, 2003), contains two subscales that operationalize rumination as Nolen-Hoeksema conceptualizes it (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). The Pondering subscale contains five items that describe an intentional effort to ponder one's own negative affect in a neutral manner (e.g., "Write down what you are thinking and analyze it"), which negatively predicts depression at one year (Treynor, Gonzalez, & Nolen-Hoeksema, 2003), and is often found to be uncorrelated to depression (e.g., Rawal, Park, & Williams, 2010; Watkins, 2009). By

contrast, the five items that constitute the Brooding scale are more passive, abstract, and involve a comparison to some unspecified, hypothetical standard (e.g., “Think “why do I have problems other people don’t have?”) (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Brooding positively predicts depression at one year and may be the component of rumination that best explains gender differences in depression (Treynor, Gonzalez, & Nolen-Hoeksema, 2003).

### Maladaptive Aspects of Cognitive Emotion Regulation

Despite the belief held by those who ruminate that their self-focus will ultimately be helpful following distress (Lyubomirsky & Nolen-Hoeksema, 1993), “rumination does not lead to active problem solving to change circumstances surrounding these symptoms” (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Experimental and correlational evidence illustrates a few patterns of thought and behavior in dysphoric rumination that serve to inhibit effective problem solving. Dysphoric ruminators show no difference from nondysphoric controls in their ability to generate solutions to interpersonal problems (Lyubomirsky, Tucker, Caldwell, & Berg, 1999). However, dysphoric ruminators are more likely to rate those problems as more severe and unsolvable and rate themselves as less likely to act on the solutions they generate (Lyubomirsky et al., 1999). Further, different traits associated with dysphoria also limit the ability to take action to reduce distress. Specifically, dysphoric ruminators tend to be self-critical and low in optimism, perceived control, and self-confidence as evidenced by their responses to a “think-aloud” experimental rumination induction, coded by independent raters (Lyubomirsky et al., 1999). Thus, ruminators are less likely to attempt other means of

addressing their sources of distress. Yet a recent study suggests that problem solving (a positive emotion regulation strategy) in cognitive emotion regulation does not load onto a latent cognitive emotion regulation factor, while rumination and suppression of emotion do (Aldao & Nolen-Hoeksema, 2010). Taken together, while one detrimental effect of rumination may be the inhibition of problem solving, traits of problem solving itself are less related to overall cognitive emotion regulation than are other means of cognitive emotion regulation, including rumination.

Not engaging in more effective emotion regulation strategies like problem solving may be related to a number of characteristics of rumination. For instance, the hypothetical nature of the content of rumination may serve to help ruminators avoid the aversiveness of the uncertainty of the future, resulting in inaction (suggesting rumination reinforces the lack of attempts at other strategies of dealing with negative affect) (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Avoidance models of generalized anxiety disorder (GAD; Borkovec, Alcaine, & Behar, 2004) state that worry, the hallmark symptom of GAD, serves as a cognitive avoidance mechanism. By anticipating possible outcomes of negative events, or catastrophizing, individuals could theoretically prepare for the worst. In doing so, people with GAD tend to avoid the anxiety-provoking images associated with worry thoughts (Borkovec, Alcaine, & Behar, 2004). Borrowing from GAD theory views of experiential avoidance and worry, Giorgio and colleagues (2010) found that an undergrad sample with high levels of trait rumination (compared to low levels) also scored high on measures of experiential avoidance and fear of affect. Staying past-focused could serve to help ruminators avoid engaging in problem solving, reducing

the risk of further negative affect that would stem from solving one's problems ineffectively.

As modulation of emotional responses and emotional flexibility are lacking in rumination, by definition, Nolen-Hoeksema, Wisco, & Lyubomirsky (2008) suggest that future research consider where facets of rumination fit into the larger structure of emotion regulation. Literature on emotion regulation supports the notion that flexibility within a broad range of emotions is the most psychologically healthy emotion regulation strategy, as the cognitive, behavioral and experiential manifestations of emotion are largely context-dependent (Berking, Orth, Wupperman, Meier, & Caspar, 2008; Feldman Barrett, Gross, Christensen, & Benvenuto, 2001; Gratz & Roemer, 2004). Combining various theories of emotion regulation, Gratz and Roemer (2004) view emotion regulation as a set of skills or strategies in the awareness and acceptance of emotions, understanding of emotions, the ability to control impulses and respond to emotions in accordance with goals, and the ability to modulate emotional experience with flexibility depending on the situation. A few subscales of the Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004) appear to address the above-mentioned maladaptive emotion processing issues that parallel maladaptive aspects of rumination. For instance, the Goals subscale addresses difficulties individuals have engaging in goal-directed behavior and concentrating on tasks when experiencing negative affect (Gratz & Roemer, 2004), and dysphoric ruminators have difficulties engaging in problem solving (Lyubomirsky et al., 1999). Also, the Strategies subscale addresses issues related to the belief that one has limited access to adequate emotion regulation strategies while experiencing negative

affect (Gratz & Roemer, 2004). While rumination is perseverative, and thereby could objectively inhibit flexibility in emotion regulation strategies, (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), it is unclear what role the subjective belief held by many ruminators that rumination leads to emotional clarity is related to this inflexibility in emotion regulation. Finally, a self-report study in a non-clinical sample examined the relationship between alexithymia, depression, and rumination, finding that the abstract quality of rumination is significantly correlated with the inability to identify feelings in alexithymia (Di Schiena, Luminet, & Philippot, 2010). The DERS also contains two scales related to one's awareness and clarity of one's emotional states (Gratz & Roemer, 2004). Overall, the relation between brooding, pondering, and various aspects of maladaptive and adaptive emotion regulation could be better understood.

#### Contribution of Gender in Emotion Regulation and Psychopathology

Consideration of gender differences in psychopathology other than depression could also shed light on the different ways in which women attempt to regulate negative affect. Given the body of evidence suggesting rumination mediates gender differences in depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), researchers have begun to investigate whether or not women display ruminative tendencies in other negative affect domains. Mezulis, Abramson, and Hyde (2002) found that gender differences in ruminative tendencies are more pronounced in body image-related and interpersonal events than in response to stressful life events. Research since Nolen-Hoeksema's initial work has also illustrated the role of rumination in binge drinking and eating. A five-year longitudinal study in a community sample of adolescent females (n=496) demonstrated

that rumination predicted future substance abuse and bulimic symptomology as well as it did depression; and bulimic and depressive symptoms predicted future rumination (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007). A recent study of undergraduates (n=329) assessed rumination as one potential mediator of the relation between depressive and eating disordered symptomology, finding that rumination fully mediated the relationship when disordered eating predicted depression, and partially mediated the relationship when depression predicted disordered eating (Harrell & Jackson, 2008). Additionally, Nolen-Hoeksema, Wisco, and Lyubomirsky (2008) note that some ruminators may choose maladaptive escapist behaviors, such as binge drinking or eating, to end the distressing thought patterns of rumination. A review of the literature concerning the processing of negative affect suggests that thinking about negative events is not typically an effective means of dealing with negative affect relative to other means, such as talking or writing (Lyubomirsky, Sousa, & Dickerhoof, 2006).

An examination of emotional processing deficits in eating disorder pathology could inform understanding of the impact of rumination in eating disorder domains. The assertion that emotional processing deficits are common (and perhaps partially explanatory) in the etiology of disordered eating is not new. Bruch (1961, 1963) noted that many patients with eating pathology (both anorexia nervosa patients and obese patients) were unable to distinguish bodily states such as satiety and hunger from emotions. However, the current research on alexithymia (the inability to identify and describe feelings) and eating disorders is inconclusive. Although alexithymia is associated with higher levels of body image dissatisfaction and disordered eating

behavior in nonclinical samples (De Berardis et al., 2009), levels of alexithymia do not differentiate between diagnostic groups of eating disorders as was once hypothesized (Lawson, Emmanuelli, Sines, & Waller, 2008). Further evidence comparing patients with anorexia nervosa and bulimia nervosa found no difference in their levels of emotional awareness or emotion regulation (defined here as how individuals alter their experience and expression of affect), although they have deficits in both areas relative to non-patient controls (Gilboa-Schechtman et al., 2006). One study found that after controlling for emotional distress (indicated by measures of anxiety and depression), no differences remain between eating disorder patients and normal controls on measures of emotional processing deficits (awareness and regulation) (Gilboa-Schechtman et al., 2006). These findings suggest that the range and quality of emotional processing deficits in eating disorders is less differentiated by disorder than was once thought.

A recent study suggests that thoughts about eating disorders and rumination may explain their impact on disordered eating behavior. Comparing anorexia nervosa patients to normal controls, Rawal, Park, and Williams (2010) found evidence for a positive relation between eating disordered concerns and rumination, beliefs that rumination is useful, emotional avoidance, and eating disorder-related cognitions. Notably, rumination was related to depression and anxiety to a greater extent than to eating disordered behaviors. The same pattern of results held in both samples, with stronger correlations seen in the disordered sample (Rawal, Park, & Williams, 2010). This could suggest that rumination is one important maladaptive process engaged in by those with disordered eating behavior, but “shares the stage” so to speak with other maladaptive cognitive

emotion regulation strategies in such populations, such as experiential avoidance. The distinction between rumination and broader emotion regulation strategies in eating disorders as compared to mood disorders is important, given the body of literature on rumination in mood disorders.

Further evidence suggests that emotional processing deficits may be common in eating disorders. In a study by Bydlowski et al. (2005), 70 eating disordered patients and 70 controls (with levels of depression and anxiety similar to that of the population base rate) were given measures of depression, anxiety, the Toronto Alexithymia Scale, and the free response Levels of Emotional Awareness Scale. Overall, after controlling for affective disorders, eating disordered patients had greater emotional processing deficits than non-patient controls in both measures of emotional processing deficits. Anorexic patients exhibited the lowest levels of emotional awareness, but not alexithymia (Bydlowski et al, 2005). Recent efforts to understand emotion regulation strategies' specificity to psychological disorders are beginning to favor a transdiagnostic understanding of emotion regulation (Aldao & Nolen-Hoeksema, 2010; Allen, McHugh, & Barlow, 2008; Watkins, 2009). While previous research has suggested emotion dysregulation contributes most significantly to mood disorders, followed by eating disorders, then substance use disorders, new evidence suggests there are few differences between specific emotion regulation strategies and specific psychological disorders. A global factor of deficient cognitive emotion regulation contributes to mood disorders and eating disordered behavior, while problem solving does not appear to be related to eating disorders (Aldao & Nolen-Hoeksema, 2010). While emotion processing deficits have

been extensively studied in mood disorders, their contribution to the etiology and maintenance of eating disorders is significant and calls for continued research.

One criticism of much of the body image and eating disorders literature is the frequent exclusion of male participants. Recognizing the unique behavioral and body image issues typically relevant in men (e.g., excessive exercise and muscularity), Lavender and Anderson (2010) found that nonacceptance of emotional states (using the DERS) predicted both disordered eating behavior and negative body image. Limited strategies for regulating emotion also predicted disordered eating, but not body image. Together, BMI, negative affect, and difficulties regulating emotion predicted nearly 17% of the variance in body image dissatisfaction and 24% of the variance in disordered eating (Lavender & Anderson, 2010). Men and women may share many of the same vulnerabilities that may determine disordered eating and body image disturbance, and inclusion of male participants in models of eating pathology should be considered.

### Cognitive Patterns in Eating Disorders

In addition to maladaptive emotion processing, new evidence suggests that an understanding of the cognitive vulnerabilities in disordered eating is also useful for the understanding of eating disorder etiology and maintenance models. For instance, core beliefs common in eating disorder pathology are often not domain-specific to eating behavior and body image (Jones, Leung, & Harris, 2007). Feelings of failure and negative self-schemata are common more globally in eating disorders, extending beyond the self to others and the world around them, especially when comorbid with personality

disorders (Jones, Leung, & Harris, 2007). Additionally, stronger endorsement of core beliefs predicts worse therapeutic outcomes for patients with eating disorders (Jones, Leung, & Harris, 2007).

As one of the criteria for having either anorexia nervosa or bulimia nervosa is an overemphasis of weight and shape on self-evaluation (APA, 2000), researchers also address possible cognitive patterns in body image domains, such as schema activation (e.g., Altabe & Thompson, 1996; Brown & Dittmar, 2005). Altabe and Thompson (1996) describe a body image self-schema as a “dense associative mental network between body weight and personal values, such as self-control”. In a sentence completion task, undergraduate females ( $n=117$ ) were assigned to one of three conditions: body/self-relevant, body/non-self relevant, or non-body/non-self relevant sentence stems. Finally, participants were asked to recall as many of the stems as possible. Those in the body/self-relevant condition exhibited greater depressiveness and anxiety, and had greater recall for body/self-relevant words, indicating the existence of a body image self-schema (Altabe & Thompson, 1996). The authors believe this indicates a causal link between body schema activation and body image distress and negative affect (Altabe & Thompson, 1996). Recent development of an eating disorders sentence completion task (Rawal, Park, & Williams, 2010) suggests those with disordered eating do have a schema similar to the one Altabe and Thompson (1996) describe. In other words, the set of beliefs related to body image-related topics may set in motion a reaction of psychological distress typical of body image dissatisfaction and eating disorders.

Body-related cognitions are present in a diverse range of eating pathology. For instance, in a sample of 30 bulimia nervosa patients, 30 binge eating disorder patients, and 30 normal controls, patients were exposed to a mirror while wearing white leotards and asked to verbalize their thoughts and given a measure of body-related cognitions (Hilbert & Tuschen-Caffier, 2005). Binge eating disorder and bulimia nervosa patients showed no significant differences between each other on either content or valence of their body-related cognitions after the mirror exposure, but both had significantly greater and more numerous negative body-related cognitions than normal controls (Hilbert & Tuschen-Caffier, 2005). Thus, while there is evidence for a body self-schema in non-patient females (Altabe & Thompson, 1996; Brown & Dittmar, 2005), body-related cognitions are more prominent and more negative in those with eating pathology (Hilbert & Tuschen-Caffier, 2005). Additionally, there may be a reciprocal relation between the act of body checking – a frequent habit of those with disordered eating behaviors – and an attentional bias toward parts of one's body that one dislikes. In a non-clinical sample, Smeets and colleagues (2011) found that body checking led to increased body dissatisfaction relative to a control condition and a body exposure condition, which both increased body satisfaction. The function of different behaviors like body checking may provide easily activated mechanisms (like schemas) to engender body image dissatisfaction and negative affect.

However, other theorists argue that the content of negative self-thought is not as revealing as the frequency or automaticity of that thinking (Verplanken, Friborg, Wang, Trafimow, & Woolf, 2007). Considering that in Western culture, the majority of women

express a “normative discontent” with physical appearance (Cash & Henry, 1995), one might expect to see body image self-schema activation yielding negative affect and state body image distress. Content alone might not be pathologically revealing, and other patterns might reveal more distinctive individual differences. For instance, metacognitive reflection is the appraisal, monitoring, or control of one’s cognitions or mental functions, and is more broad than rumination, which is self-focused (Verplanken et al., 2007).

When negative thoughts were habitual (meaning repetitive and automatic), they accounted for variance in self-worth over and above measures of negative thought content in a sample of Norwegian university students ( $n=61$  males;  $n=95$  females) (Verplanken et al., 2007). Further, the habitual quality of negative thinking was the largest predictor of anxiety and depression at nine months (Verplanken et al., 2007). Thus, it appears that the automatic quality of negative thinking is perhaps more detrimental to overall mental health than negative thinking itself. In a Norwegian sample of adolescent males ( $n=126$ ) and females ( $n=120$ ), the habitual quality of negative thinking predicted variance in self-esteem and propensity towards eating disorders over and above levels of body dissatisfaction. This pattern held in both genders (Verplanken & Velsvik, 2008). Body image might provide an easily activated schema from which such automaticity may be engendered.

Although recent work suggests that rumination may explain etiology or maintenance mechanisms in psychopathology other than depression, few experimental manipulations have examined this directly. The few existing studies will be reviewed. Wade, George, and Atkinson (2009) conducted a randomized control trial of three brief,

six-session written interventions for body dissatisfaction rumination. After inducing rumination by presenting the participants with images of the thin ideal as seen in the media and asking them to rate the attractiveness of the models and compare themselves to the images, participants were assigned to one of five conditions: two controls (one with no training, one instructed to focus on the images to approximate rumination), acceptance, cognitive dissonance, or distraction interventions. Based on the principles of mindfulness research, the acceptance intervention increased body satisfaction more than all other conditions. However, the cognitive dissonance condition, in which participants were asked to note the costs and consequences of the pursuit of the thin ideal and positive attributes about themselves, led to the greatest number of people who experienced large improvements in terms of body image dissatisfaction. Additionally, acceptance and distraction interventions decreased body-focused anxiety to the same degree (Wade, George, & Atkinson, 2009). This study has several implications for future treatment research in body image dissatisfaction, as all three proposed interventions had an effect on measures of body dissatisfaction, albeit in different ways.

While this study is important for the current study in that it uses an experimental design to induce rumination as it relates to body dissatisfaction, and further suggests that written interventions are helpful in increasing body satisfaction or decreasing body dissatisfaction, it is important that the manipulations be replicated for the following reasons. In particular, the author's choice of ruminative prompts (comparison to a series of photographs) was different from the narrative rumination induction seen in depression literature (e.g. Nolen-Hoeksema & Morrow, 1993), and did not include a manipulation

check to ensure participants in that condition ruminated. Etu and Gray (2010) recently induced body image-focused rumination in undergraduate females ( $n=99$ ) using a narrative prompt given to all participants. Participants were then randomly assigned to either a rumination group or a distraction control group. Those in the rumination group were instructed to focus on their thoughts and feelings about the event described in the prompt, while those in the distraction condition were instructed to focus on a neutral subject, such as the structure of the NCAA playoffs. Each group responded to their respective prompts by writing an essay for eight minutes (Etu & Gray, 2010). Measures of body image dissatisfaction and depressiveness were taken. Their results indicated that the rumination condition, but not the distraction condition, was associated with increased state body image dissatisfaction and body-focused anxiety following the manipulation, although trait-level body image dissatisfaction did not change (Etu & Gray, 2010). The above studies provide early support for a body focused-rumination in undergraduate women (Etu & Gray, 2010; Wade, George, & Atkinson, 2009) that should be examined further.

### Countering Rumination

As rumination requires effort and perpetuates negative affect, Lyubomirsky and Nolen-Hoeksema (1993) hypothesize that distraction – finding something enjoyable and relatively effortless to take one's thoughts away from the depressive symptoms – is a means of preventing the detrimental effects of rumination. Those with ruminative tendencies are less likely to naturally engage in distraction than are others who do not ruminate (Lyubomirsky & Nolen-Hoeksema, 1993). Yet evidence examining the role of

distraction is less conclusive than the evidence concerning rumination. A meta-analysis studying the effect sizes of rumination, distraction, and depression (and the impact of gender) in childhood and adolescence found that effect sizes of gender differences in distraction are weak and unstable, while clear gender differences in rumination emerge by adolescence (Rood et al., 2009). However, Nolen-Hoeksema's conceptualization of rumination allows for another explanation for the lack of distraction afforded by rumination. She posits that ruminators either lack the ability or the motivation to seek out opportunities for distraction, as they feel their rumination is effective (Lyubomirsky & Nolen-Hoeksema, 1993). Further, not only did distraction not always correlate inversely to levels of depressiveness, gender differences in distraction do not adequately explain gender differences in the emergence of depression in adolescence (Rood et al., 2009). Thus, while distraction may be beneficial and one potential means of reducing negative affect, its role in gender differences in rumination and depression remain unclear.

As the impact of distraction on rumination and depression is inconclusive, other theories on cognitive processing of emotion could identify alternate attempts to counter rumination. Research has evaluated expressive writing as another potential means of countering rumination. The expressive writing paradigm stipulates that those who habitually self-focus on negative affect may engage in cognitive restructuring when expressing those negative emotions in written form (Gortner, Rude, & Pennebaker, 2006; Smyth & Pennebaker, 2008). Interventions structured in this paradigm have been shown to reduce the risk of future depressive symptomology in previously depressed individuals (Gortner, Rude, & Pennebaker, 2006). In this study, 90 undergraduates who had previous

depressive episodes completed three 20-minute expressive writing sessions or three neutral writing sessions over three days. Participants were also split into high and low emotional suppression groups, measured by Emotional Regulation Questionnaire scores (Gross & John, 2003). Follow-ups at six months, but not five weeks, showed a significant interaction between suppression and writing condition, such that participants in the expressive writing condition with high suppression scores on the ERQ had lower BDI scores at the six-month follow-up (Gortner, Rude, & Pennebaker, 2006).

Since its inception, the expressive writing paradigm has received a good deal of research attention and has been utilized in a number of physical and mental health interventions (Smyth & Pennebaker, 2008). There is no specified length or frequency that emerges as the most effective or most recommended, and in some cases, can show significant changes in outcome variables in a single intervention (Smyth & Pennebaker, 2008). However, in spite of its promise as an easily administered, efficacious intervention, it remains unclear how, why, or for whom the expressive writing paradigm works. Some evidence suggests it is particularly helpful for those who suppress their emotions or do not frequently engage in emotional disclosure (Gortner, Rude, & Pennebaker, 2009; Smyth & Pennebaker, 2008). Although this provides one identifier of those for whom this intervention might be effective, suppression may not be the only relevant personality variable. To understand more fully the mechanisms by which the expressive writing paradigm operates, other personality variables, cognitive, and affective processes should be examined.

A review of the literature on different forms of emotional expression suggests that writing and talking about negative events is more adaptive than thinking about them (Lyubomirsky, Sousa, & Dickerhoof, 2006). Writing or talking about negative experiences offers one the possibility to integrate and synthesize the experience, contrary to the typical effects of rumination (Lyubomirsky, Sousa, & Dickerhoof, 2006). Sloan, Marx, Epstein, and Dobbs (2008) addressed rumination as a potential moderator of the effects of expressive writing in a sample of incoming freshmen, with two, four, and six month follow-ups. Participants were randomly assigned within gender to either an expressive writing (n=35) or a control writing (n=34) condition, for three 20-minute sessions. In the expressive writing condition, participants were instructed to write about their upcoming transition with as many feeling words as possible, linking the experience to other aspects of their lives, wrapping up with an anticipation of the future. In the control condition, participants were instructed to write neutrally about how they spend their time each day. At baseline, they were given measures of rumination and depression, and depression measures were administered at the two, four, and six month follow-ups. With depressiveness as the outcome measure, main effects were observed for both trait levels of brooding and condition, along with a significant condition by brooding interaction (Sloan, Marx, Epstein, & Dobbs, 2008). Brooding scores moderated the effects of the expressive writing condition, such that depression scores at two, four, and six months were lower for those who scored high on the brooding scale relative to those who scored low on the brooding scale. Pondering scores did not moderate the outcome of the depression measures in either condition (Sloan, Marx, Epstein, & Dobbs, 2008).

Thus, expressive writing might provide another avenue for those who are prone to maladaptive rumination to integrate their reactions to negative events in a more encapsulated, productive manner, linking one's emotional experience to external reality as opposed to the hypothetical, self- and symptom-focused aspects of rumination. Further experiments could possibly vary the writing instructions to see which mechanisms are most effective in promoting the proposed cognitive restructuring that expressive writing offers.

#### Processing Mode Theory: An Alternative Theory of Rumination

The processing-mode theory of rumination, proposed by Watkins and colleagues, asserts that the level of construal of emotion is the mechanism by which emotional reactivity operates in rumination. The processing mode theory of rumination is adapted from Strober and Borkovec's (2002) level of processing theory of worry, which states that the level of abstraction of worry explains why it is maladaptive, as "concrete problem elaborations are likely to lead to concrete solutions" (Strober & Borkovec, 2002). Nolen-Hoeksema, Wisco, and Lyubomirsky (2008) note that the "maladaptive component of rumination may be its abstract analytical aspects, whereas a more experiential form of self-reflection is not maladaptive," citing the work of Watkins. In Watkins' theory (Watkins, Moberly, & Moulds, 2008), abstract construal of emotion refers to the verbal-analytical, typically maladaptive cognitive style characteristic of depressive rumination in which a person focuses on the thoughts, meanings, and implications of distressing emotions. Studies of other cognitive vulnerabilities implicated in depression as compared to rumination also give evidence that the abstract nature of

rumination may explain why it is maladaptive. For instance, Watkins and Teasdale (2001) found that the abstract-analytic process of rumination was related to increased overgeneral memory (another vulnerability to depression), while the self-focused nature was more closely related to increased negative affect. By contrast, low construal of emotion refers to the concrete, experiential analysis of the events and circumstances involved in the distressing emotional experience (Watkins, Moberly, & Moulds, 2008). This experiential construal increases positive thinking following negative events to the same extent that distraction does (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

In the last few years, a number of independent labs have begun to gather experimental, comparative, and correlational data in support of these two distinct processing modes. Watkins, Moberly, and Moulds (2008) experimentally manipulated emotion-focused processing or concrete processing through a training condition. Participants in both conditions were given the same 30 three-sentence scenarios, half with positive emotional valence and half with negative emotional valence. Then, participants were given a task designed to induce feelings of stress following failure. Finally, they completed measures of mood, self-focus, depressive symptomology, and a manipulation check for one of the scenarios. Results indicated that the training method (emotional versus event-focused construal) was effective; and further, levels of despondency increased over time in the emotional construal group but not the event-focused construal group (Watkins, Moberly, & Moulds, 2008). Adding a control condition in a second experiment, investigators sought to see whether the emotion-focused condition increased depressiveness or the event-focused condition decreased depressiveness. The no-training

control group paralleled the effects seen in the emotion-focused processing condition (Watkins, Moberly, & Moulds, 2008), suggesting that given an emotionally arousing prompt, participants naturally focus abstractly on the implications of the event, not concretely on the events and circumstances surrounding it. Moreover, the event-focused construal of emotions can be experimentally manipulated (Watkins, Moberly, & Moulds, 2008). Watkins, Baeyans, and Read (2009) applied this training method in a clinical sample. Dysphoric patients demonstrated reduced levels of depressive symptoms in the concrete construal condition compared to a waitlist control and bogus training conditions (Watkins, Baeyans, & Read, 2009). Thus, not only is analytical rumination detrimental, but ruminators can be helped by experiential processing of emotional stimuli.

Another study by Watkins (2004) evaluated the interaction of individual differences in ruminative tendencies and level of construal of emotion. Participants were randomly assigned to either an event-focused or emotions-focused writing condition, three times, for 15 minutes, over a 24-hour period following an experimentally manipulated failure experience. Those in the emotions-focused condition with higher trait levels of rumination demonstrated with greater levels of negative affect relative to baseline twelve hours following the failure experience, while this pattern did not hold in the events-focused construal (Watkins, 2004). Thus, even in experimentally induced experiences of negative affect, ruminators appear to be more emotionally reactive to more abstract, emotion-focused construal of those negative emotions than individuals with low ruminative tendencies.

Processing modes have also been examined in their relation to alexithymia and depression. Depression scores account for all shared variance between trait analytical rumination and alexithymia global scores (Di Schiena, Luminet, & Philippot, 2011). Specifically, analytic-abstract ruminative styles (Brooding) are moderately correlated with difficulty identifying feelings (Di Schiena, Luminet, & Philippot, 2011). In other words, all the abstract thinking of the implications of emotional events and their consequences does not result in emotional understanding. Other direct comparisons of processing modes and aspects of emotion regulation are limited at this time.

Because of the similarities between mindfulness (nonjudgmental awareness of the present moment) and concrete-experiential processing, it is worth investigating what role trait levels of mindfulness play in processing modes. Sanders and Lam (2010) took baseline measures of trait rumination, mindfulness, and negative affect and randomly assigned currently depressed and never-depressed individuals to either a mindful or a ruminative processing mode condition. With social problem solving (responses in a means-ends social problem solving task) as the dependent variable, depressed and nondepressed individuals did not significantly differ from each other. However, when analyzed together, those with high levels of trait rumination showed more effective social problem solving in the experiential condition relative to low ruminators (Sanders & Lam, 2010). Trait levels of mindfulness did not moderate or mediate any outcome variables. Overall, this lends support to further efforts at training high ruminators in an experiential processing mode to prevent the self-perpetuating negative affect inherent in analytical rumination.

Recent survey evidence also suggests that natural web and written diary-keeping tendencies are associated with different patterns of alexithymia and ruminative tendencies in style (emotions or events-focused) and frequency of writing. Yukawa (2008) found that diary keepers who wrote in an emotion-based style experienced greater alexithymia and rumination, while those who wrote in an event-focused style only scored lower on the Difficulty Identifying Feelings scale of the Toronto Alexithymia Scale (Japanese version). While the demonstration that alexithymia and rumination are more prominent in self-reported emotional diary keeping is theoretically informative, this study was correlational, did not assume equal variance across groups, and had very few written diary keepers (Yukawa, 2008). In theory, greater cognitive restructuring might occur if ruminators were to address the events and potential actions surrounding their symptoms than they would by having access to another form of evaluating their emotional experience (Gortner, Rude, & Pennebaker, 2006). Varying the focus of the written intervention (and associated cognitive style) in an experimental fashion might offer a better means of understanding the mechanisms involved in the expressive writing paradigm.

### The Current Study

Watkins' work on processing mode has important implications for the understanding of rumination and what it explains about cognitive emotion regulation. The key distinction between the two processing modes is that one is abstract-analytic and the other is concrete-experiential. Di Schiena, Luminet, and Philippot (2011) go so far as to label these two maladaptive (abstract) and adaptive (concrete) rumination. Namely,

Watkins' work suggests that participants trained to focus on emotions resulting from negative events rather than the events themselves display more depressive symptoms following experimentally induced failure scenarios (Watkins, 2004; Watkins, Moberly, & Moulds, 2008). Conversely, those who score high on measures of trait rumination have more greatly reduced distress following experimental manipulation of concrete processing than do those who do not ruminate frequently (Sanders & Lam, 2010; Watkins, Baeyens, & Read, 2009). Incorporating this theory in an experimental manipulation of rumination could help distinguish the role processing mode has in the experience of negative affect enhanced by rumination (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Because of the emotional deficits implicated in the etiology of eating disorders (Aldao & Nolen-Hoeksema, 2010; Bydlowski et al, 2005; Gilboa-Schechtman et al, 2006) and the prevalence of body image self-schemas (Altabe & Thompson, 1996; Brown & Dittmar, 2005; Rawal, Park, & Williams, 2010), testing the processing mode theory in a body image context could be informative. Therefore, the goal of the manipulation in the present study is twofold: to expand on Etu and Gray's (2010) findings, demonstrating that rumination could also play a role in the etiology and maintenance of body image dissatisfaction, using the same rumination and distraction conditions as Etu and Gray (2010); and to examine the impact of processing mode (abstract or concrete) (Gortner, Rude, & Pennebaker, 2006; Smyth & Pennebaker, 2008; Watkins, Moberly, & Moulds, 2008), by adding an additional event-based, concrete-experiential rumination condition to Etu and Gray's original design (2010). Finally, because of the suggestion in the literature that rumination interferes with effective

emotional processing (Lyubomirsky & Nolen-Hoeksema, 1993; Lyubomirsky et al., 1995; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), trait measures of emotion regulation and rumination will also be included to determine their role in predicting body image dissatisfaction and negative affect.

### Hypotheses

It is expected that subjects in the rumination condition with emotion-focused prompts (adapted from the rumination induction of Etu and Gray, 2010) will demonstrate the greatest degree of state body image dissatisfaction and negative affect, relative to those in both the distraction condition and the added concrete, event-based processing condition. This incorporates Etu and Gray's (2010) findings and the findings of Watkins (2004, 2009). Differences between the distraction and concrete processing conditions on measures of state body image dissatisfaction and negative affect are not expected. Additionally, baseline measures of emotion regulation and rumination tendencies are expected to have a main effect on negative affect and indicators of body image dissatisfaction and anxiety, such that those who score high in maladaptive trait rumination (namely, Brooding) and other indices of maladaptive emotion regulation (Strategies and Nonacceptance) will exhibit higher levels of negative affect and body image dissatisfaction than those who do not score high in maladaptive trait emotion regulation tendencies.

## CHAPTER 2

### METHODS

#### Participants

Undergraduate females (ages 18-25) were recruited from the Psychology Department subject pool. Participants were compensated with course credit (and entry in a lottery for \$50 cash). A power analysis yielded a sample size of 31 per condition, or 93 total. The power analysis was based on the results of Etu and Gray's (2010) regression and MANCOVA data on the state body image anxiety measure used in the current study (PASTAS-W,  $SD=9.33$  and  $SD=8.59$ , for rumination and distraction, respectively). The alpha was set at .05 and the desired power was set at  $\beta=.20$ , with a desired effect size of  $d=.50$ . The analysis was based on Etu and Gray's (2010) PASTAS-W scores, as those were the only state body image dissatisfaction scores to be significantly greater in the rumination condition as predicted. Participants were given informed consent and randomly assigned into one of three conditions (rumination, distraction control, or event-focused). Data from 96 participants was collected. Thirty percent were freshman, 54% were sophomores, 10% were juniors, and 6% were seniors. The average age for the sample was 19.1, ( $SD=1.17$ ). Ethnicity was assessed through self-report, and 74% identified as Caucasian, 7% identified as other, 5% identified as multiracial, 4% identified as Asian, 4% identified as African American, and 4% identified as Hispanic.

The three conditions did not significantly differ on demographic variables, including age, ethnicity, year in school, and BMI.

### Measures

*Negative Affect.* The Positive Affect and Negative Affect Scale-Extended (PANAS-X; Watson & Clark, 1994) consists of 60 items (each representing a particular positive or negative emotion) and has seven negative affect subscales and four positive affect subscales. Participants are instructed to indicate to what degree they experience each feeling word (on a 5-point Likert scale ranging from very slightly or not at all to extremely) at the present moment, today, or over the past few weeks. In the present experiment, the present moment prompt was used. The Positive Affect subscales have shown strong internal consistency ( $r=.88$ ), as have the Negative Affect Subscales ( $r=.85$ ), with no correlation between the two ( $r=-.06$ ) (Watson & Clark, 1994). Further, self-report measures and peer ratings using the PANAS have demonstrated adequate convergent validity for the Positive Affect subscale ( $r=.48, p<.05$ ) and Negative Affect subscale ( $r=.36, p<.05$ ) (Watson & Clark, 1994). In the current study, the GenNeg, sadness, guilt, hostility, and fear subscales had strong internal consistency ( $\alpha \geq .90$ ).

*Body Dissatisfaction.* The Contour Drawing Rating Scale (CDRS; Thompson & Gray, 1995) was used to assess trait-level body dissatisfaction. Participants were presented with nine artist-rendered figure drawings ranging in size from thin to heavy with realistic, precise, and gradual shifts in size and waist-to-hip ratio. In its original validation, the CDRS has shown strong retest reliability ( $r=.78, p<.001$ ) and concurrent

validity, with participants correctly selecting the image that most closely displays their own body size and shape (as indicated by the correlation with participant's recorded weight,  $r=.71$ ,  $p<.001$ ). In this study, participants were asked to indicate their current size and shape and ideal size and shape to give an index of self-discrepancy as a measure of trait-level body dissatisfaction (Thompson & Gray, 1995). The figures had one-millimeter hash marks along a 200 millimeter line, and participants were asked to mark the hash mark that most represents their actual and ideal size in relation to the figures above.

*Emotion Regulation.* The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) was used to assess trait-level emotion regulation in all participants, given the aforementioned similarities between typical difficulties associated with rumination and subscales of the DERS. The DERS is a 36-item scale comprised of six factors related to behavioral, cognitive, and affective aspects of emotional experience. The first factor (Nonacceptance) relates to the tendency to experience secondary distress to negative affect. The second factor (Goals) addresses difficulties engaging in goal-directed behavior while experiencing negative affect. The third factor (Impulse) contains items related to emotional control. The fourth factor (Awareness) contains items pertaining to attention to and awareness of emotions. The fifth factor (Strategies) addresses items related to the belief that there are limited available strategies for regulating emotions (sample item: "When I'm upset, I believe that there is nothing I can do to make myself feel better"). The sixth factor (Clarity) contains items related to a clear understanding of one's emotional experience. The DERS demonstrated strong

internal consistency ( $\alpha=.91$ ). An examination of the inter-scale correlations (See Table 3) revealed that the scales were inter-correlated as expected (Gratz & Roemer, 2004). The strongest correlations were between Strategies and Impulse ( $r=.68, p<.01$ ) and Strategies and Goals ( $r=.53, p<.01$ ). See Table 1 for a correlation matrix of all emotion regulation subscales in the current study.

*Rumination.* The Ruminative Response Scale (RRS; Treynor, Gonzalez, Nolen-Hoeksema, 2003) measures rumination in 22 items (e.g., “go away by yourself and think about why you feel this way”) and has three factors: Depression-Related, Brooding, and Reflection subscales. The Reflection and Brooding subscales have strong coefficient alpha scores (.72 and .77, respectively) (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Brooding and Depression-related subscores, taken together, are strong predictors of depression, but not significantly greater than the overall rumination scores (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Brooding scores have also been shown to be related to other psychopathology, such as social phobia, but to a lesser degree than to depression (Joormann, Dkane, & Gotlib, 2006). In the current study, Brooding and Depression scores were more strongly correlated than Pondering and Depression scores (Brooding and Depression,  $r=.64, p<.01$ ; Pondering and Depression,  $r=.37, p<.01$ ).

Table 1

*Correlations of Emotion Regulation Measures*

	Nonacc	Goals	Impuls	Aware	Clarity	Strat	Ponder	Brood	Dep
Nonacc									

Goals	.232*							
Impuls	.302**	.452**						
Aware	.276**	-.091	.076					
Clarity	.325**	.075	.212*	.457**				
Strat	.449**	.530**	.680**	.194	.355**			
Ponder	.173	.317**	.130	-.313*	.014	.223*		
Brood	.404**	.436**	.425**	.130	.339**	.592**	.489**	
Dep	.384**	.543**	.494**	.055	.345**	.597**	.372**	.643**

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*Note:* DERS: Nonacceptance, Goals, Impulse, Awareness, Clarity, Strategies; RRS: Pondering, Brooding, Depression

\* $p < .05$ ; \*\* $p < .01$

*State Body-Focused Anxiety.* In the present study, the state version of the Physical Appearance State and Trait Anxiety Scale was used (PASTAS; Reed, Thompson, Brannick, & Sacco, 1991). The PASTAS is a 16-item questionnaire that assesses current or immediate body image anxiety on weight-related (e.g., “Right now, I feel anxious, tense, or nervous about the extent to which I look overweight”) and non-weight related dimensions (e.g., “Right now, I feel anxious, tense, or nervous about my wrists”). The weight-related dimensions have high criterion-related validity in their prediction of eating disorders. The PASTAS has also demonstrated high internal consistency, retest reliability, and sensitivity to situational differences (Reed et al., 1991), which is why it was selected for this study. A correlation matrix of the body image dissatisfaction measures is displayed below (Table 2).

Table 2

*Correlations of Body Image Dissatisfaction Measures*

	PASTAS- W	PASTAS- NW	Pre-manipulation CDRS Discrepancy	Post- manipulation CDRS Discrepancy	BMI
PASTAS-W					
PASTAS-NW	.321**				
Pre-manipulation CDRS Discrepancy	.234**	.109			
Post- manipulation CDRS Discrepancy	.349**	.042	.828**		
BMI	.161	.024	.481**	.493**	

\*p&lt;.05; \*\*p&lt;.01

Procedure

Data was collected in groups of 1-5 participants by either the principle investigator or one of two female research assistants trained by the principle investigator. Initially, informed consent was obtained from all participants. The participants were then given the CDRS, the DERS, and the RRS, to assess baseline levels of body image self-discrepancy, emotion regulation, and rumination, respectively. The RRS and DERS were counterbalanced in order to eliminate order effects. All participants were then read a

short narrative designed to induce negative body image and negative emotions that contains the phrase, “You stare at the mirror and can’t help but feel disgusted with yourself...you promised yourself you would lose weight” (Etu & Gray, 2010). Those in the control condition ( $n=31$ ) were given 7 distraction prompts (e.g., a description of one’s local shopping center), selected from Etu & Gray’s original list of 14 (2010). This number was reduced based on the suggestions from the discussion section of Etu and Gray (2010) that suggested that a smaller selection of prompts may guarantee increased abstract, emotion-focus for participants. Those in the abstract-analytic rumination condition (rumination;  $n=33$ ) were given 7 self-focused rumination prompts, instructing them to focus on their feelings toward their bodies (e.g., “think about how angry you are with yourself for not losing weight”), while those in the concrete-experiential rumination condition (CE;  $n=32$ ) were given 7 event-focused prompts, instructing them to focus on the events and circumstances surrounding the narrative (e.g., “describe the events in detail, like a movie on a screen”). The event focused prompts were adapted from Etu and Gray (2010) and made to resemble prompts in concrete levels of processing inductions, which have been shown to reduce the effects of rumination on emotional reactivity (Watkins, Moberly, & Moulds, 2008). All participants were given a moment to look over the instructions and prompts, and were then instructed to write about any combination of prompts in their condition for 8 minutes. After the essay portion, all participants were given the PANAS-X, the PASTAS, and the CDRS as measures of positive and negative affect, state body image dissatisfaction, and body image self-discrepancy, respectively. The PANAS-X and the PASTAS were counterbalanced to eliminate order effects, but the

CDRS was given last in order to remain consistent with Etu and Gray (2010) and to keep it as far from the first CDRS as possible in an effort to reduce any sort of expectancy bias. The CDRS was the only scale utilized in a pre-post design for a few reasons. First of all, it was done to remain in keeping with Etu and Gray (2010). Second, random assignment was expected to eliminate any between group differences on any other outcome variable. Third, because it was a relatively short study, not choosing a pre-post design was expected to eliminate the risk of practice effects. Finally, those in the rumination and event-focused conditions were read a successful, happy resolution to the first prompt and asked to write an essay on any combination of the resolution prompts for three minutes. Finally, demographic information and a manipulation check were collected. All participants were debriefed and monitored for residual distress.

## CHAPTER 3

### RESULTS

Preliminary data screening revealed all scores were normally distributed. There was one outlier with a particularly high CDRS discrepancy score. When analyses were run with and without this outlier, there was no significant change in the pattern of scores, so the outlier was kept in. Demographic characteristics between the analytic-rumination, concrete-experiential, and distraction control conditions were compared using one-way analyses of variance (ANOVAs). No statistically significant differences were found. Finally, each essay was examined by the principal investigator for adherence to the prompts. Essays were rated on a five-point scale with 5 indicating the largest degree of adherence. Comparing conditions using one-way ANOVAs for the essay ratings and self-report manipulation checks, no significant between-group differences were found. This indicates that participants did adhere to the instructions in the prompts as they were written.

A series of hierarchical regression analyses was run to identify which emotion regulation scores, rumination tendencies, and experimental manipulations contributed to body image dissatisfaction and anxiety and negative affect, after controlling for baseline levels of body image dissatisfaction. For all regressions, regardless of dependent measures, pre-manipulation CDRS discrepancy scores were entered at the first step. This

was done in order to control for baseline trait-level body image dissatisfaction in all regressions in order to see changes in response over and above baseline body dissatisfaction. At the second step, condition was entered in the following way. Contrast coefficients comparing rumination to CE and distraction, and distraction to CE were entered. These will be referred to as “rumination contrasts” and “distraction contrasts”, respectively. Strategies, Nonacceptance, Brooding, and Depression were entered at the third step. (Recall that Strategies and Nonacceptance scores are from the DERS; Brooding and Depression are from the RRS). At the fourth step, the interactions between rumination contrasts and Strategies, Nonacceptance, and Brooding were entered. The dependent measures of interest were post-manipulation CDRS discrepancies, PASTAS-W, General Negative Mood, Sadness, and Guilt. Criterion for entry was set at  $\alpha=.05$ , and a trend toward significance was considered wherever  $.05 < \alpha < .10$ . Results of the regressions are outlined below. Means of dependent measures are illustrated in Table 3, below.

Table 3

*Means of Dependent Measures by Condition*

Condition	Dependent Variable				
	Post-Manipulation CDRS Discrepancy	PASTAS-W	GenNeg	Sadness	Guilt
Rumination	34.00 (25.9)	13.88 (8.0)	16.26 (5.8)	8.35 (3.4)	11.39 (5.2)

Concrete- Experiential	30.87 (31.3)	12.93 (7.2)	15.27 (7.0)	9.43 (5.1)	10.43 (6.7)
Distraction	22.42 (27.4)	12.67 (6.1)	15.65 (3.9)	9.35 (4.4)	9.42 (3.9)

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*Note:* Standard Deviations in parentheses.

### Body Image Dissatisfaction and Anxiety

To test the hypothesis that maladaptive cognitive emotion regulation strategies, rumination, and manipulation would affect body image dissatisfaction, regression analyses were run as outlined above, with post-manipulation CDRS discrepancy scores as a measure of body image dissatisfaction in one regression and PASTAS-W (weight-related) scores as a measure of state body image anxiety in a second. For the post-manipulation CDRS discrepancy, after controlling for pre-manipulation CDRS discrepancy scores, rumination contrasts and distraction contrasts were not significant. Strategies was significant, such that a lower perceived ability to use multiple emotion regulation strategies was related to increased body image dissatisfaction, as predicted. Nonacceptance showed trends toward significance, such that higher Nonacceptance scores predicted increased body dissatisfaction. See Table 4 for a summary of these data. These patterns supported the hypothesis that there would be a main effect for maladaptive cognitive emotion regulation patterns on body image dissatisfaction, such that a pattern of negative emotion regulation leads to a more negative body image. The hypothesis that condition would affect body image dissatisfaction was not supported.

Table 4

*CDRS Post-Manipulation Regression Table*

Step	Degrees of Freedom	Variable	F	$\beta$
1	1, 91	CDRS pre-manipulation	198.89***	.828
2	89	Rumination contrast	.93	.057
		Distraction contrast	.00	-.002
3	85	Strategies	4.26**	.159
		Nonacceptance	3.08*	-.115
		Brooding	1.62	.102
		Depression	.15	-.031
4	82	Rumination by Strategies interaction	.20	.094
		Rumination by Nonacceptance interaction	1.92	.248
		Rumination by Brooding interaction	.09	-.083

*Note:* Strategies and Nonacceptance are from the DERS; Brooding and Depression are from the RRS.

\*\*\* $p < .01$ ; \*\* $.01 < p < .05$ ; \* $.05 < p < .10$ .

Table 1 shows that the various scores of emotion regulation tendencies show a moderate degree of intercorrelation. As such, an examination of the variables excluded from each step would indicate whether each variable excluded is contributing to the relevant outcome measures before having controlled for the other variables. When this was done for the CDRS post-manipulation data, Strategies and Brooding were significant ( $F(1, 88) = 6.81$  and  $4.67$ ,  $p = .011$  and  $.033$ , respectively). These carried moderate effect sizes ( $pr = .268$  and  $.224$ , respectively). This indicates that Strategies and Brooding

contribute to CDRS post-manipulation scores prior to controlling for other variables, such that higher Strategies and Brooding predict increased post-manipulation CDRS discrepancy scores.

For the PASTAS-W, after controlling for pre-manipulation CDRS discrepancy scores, neither the rumination contrasts nor the distraction contrasts were significant. Strategies, Brooding, and Depression were significant, such that perceived effective use of multiple emotion regulation strategies and a tendency to ruminate predicted increased body image anxiety. However, increased depressive symptoms predicted decreased body-focused anxiety. See Table 5 for a summary of these data. This supports the hypothesis that maladaptive cognitive emotion regulation strategies will negatively affect body image anxiety. The hypothesis that those in the rumination condition will display the most body image anxiety following the manipulation was not supported.

As with the CDRS post-manipulation regression, excluded variables were examined in an effort to determine the contribution of each variable to PASTAS-W scores before controlling for the other variables. In this instance, Strategies and Brooding were marginally significant,  $F(1,89)=3.21$  and  $3.90$ ,  $p=.051$  and  $.076$ , respectively. This responded to low effect sizes, ( $pr=.204$  and  $.186$ , respectively). This indicates that Strategies and Brooding may contribute to PASTAS-W scores when no other variables are controlled for, such that higher Strategies and Brooding scores are related to higher PASTAS-W scores.

Table 5

*PASTAS-W Regression Table*

Step	Degrees of Freedom	Variable Entered	F	$\beta$
1	1, 93	CDRS Pre-manipulation	4.57**	.234
2	91	Rumination contrast	.24	.050
		Distraction contrast	.82	.014
3	87	Strategies	4.65**	.289
		Nonacceptance	1.12	-.120
		Brooding	3.97**	.274
		Depression	5.64**	-.329
4	84	Rumination by Strategies interaction	1.69	.466
		Rumination by Nonacceptance interaction	.94	-.288
		Rumination by Brooding interaction	1.33	.539

*Note:* Strategies and Nonacceptance are from the DERS; Brooding and Depression are from the RRS.

\*\*\* $p < .01$ ; \*\* $.01 < p < .05$ ; \* $.05 < p < .10$ .

Negative Affect

Three subscales of the PANAS-X were used as dependent variables for three separate regressions: GenNeg (overall general negative mood), Sadness, and Guilt. Considering the hypotheses, it is important to note that pre-manipulation CDRS discrepancies did not explain variance in GenNeg scores. For GenNeg, rumination and distraction contrasts also did not reach significance. Strategies was significant, such that lower perceived ability to use multiple emotion regulation strategies predicted greater

overall general negative mood. Brooding approached significance, such that higher trait rumination predicted increased overall general negative mood. See Table 6 for a summary of these data.

Table 6

*GenNeg Regression Table*

Step	Degrees of Freedom	Variable Entered	F	$\beta$
1	1, 93	CDRS Pre-manipulation	2.16	.151
2	91	Rumination contrast	.14	.039
		Distraction contrast	.29	.057
3	87	Strategies	5.19**	.284
		Nonacceptance	.97	.103
		Brooding	3.10*	.226
		Depression	.00	.004
4	84	Rumination by Strategies interaction	.51	-.245
		Rumination by Nonacceptance interaction	.30	.157
		Rumination by Brooding interaction	.05	.097

*Note:* Strategies and Nonacceptance are from the DERS; Brooding and Depression are from the RRS.

\*\*\* $p < .01$ ; \*\* $.01 < p < .05$ ; \* $.05 < p < .10$ .

For Sadness, rumination and distraction contrasts did not reach significance after controlling for pre-manipulation CDRS discrepancy scores. Strategies was the only other

variable that reached significance in the regression. See Table 7 for a summary of these data.

Table 7

*Sadness Regression Table*

Step	Degrees of Freedom	Variable Entered	F	$\beta$
1	1, 93	CDRS Pre-manipulation	5.30**	.232
2	91	Rumination contrast	2.19	-.149
		Distraction contrast	.06	.024
3	87	Strategies	13.06***	.433
		Nonacceptance	.54	-.074
		Brooding	1.94	.167
		Depression	.01	.937
4	84	Rumination by Strategies interaction	1.93	-.453
		Rumination by Nonacceptance interaction	1.01	.271
		Rumination by Brooding interaction	.01	-.043

*Note:* Strategies and Nonacceptance are from the DERS; Brooding and Depression are from the RRS.

\*\*\* $p < .01$ ; \*\* $.01 < p < .05$ ; \* $.05 < p < .10$ .

For Guilt, after controlling for pre-manipulation CDRS discrepancy scores, rumination contrasts were not significant. Strategies and Brooding were significant, such

that a lower perceived ability to use multiple emotion regulation strategies and a tendency to ruminate predicted higher levels of guilt. See Table 8 for a summary of these data.

When excluded variables were examined, Nonacceptance, Brooding, Strategies and Depression explained a significant portion of the variance in Guilt scores (similar to the pattern observed in GenNeg and Sadness) ( $F(1,90)=27.88, 15.11, 26.73$ , and  $9.57$ ,  $p=.001, .001, .001$ , and  $.003$ , respectively). This corresponded to moderate effect sizes ( $pr=.486, .379, .479$ , and  $.310$ , respectively).

Table 8

*Guilt Regression Table*

Step	Degrees of Freedom	Variable Entered	F	$\beta$
1	1, 93	CDRS Pre-manipulation	12.12***	.340
2	91	Rumination contrast	.84	.090
		Distraction contrast	.15	-.038
3	87	Strategies	6.64**	.293
		Nonacceptance	2.38	.148
		Brooding	6.84**	.305
		Depression	1.20	-.129
4	84	Rumination by Strategies interaction	.04	.066
		Rumination by Nonacceptance interaction	.14	.097
		Rumination by Brooding interaction	.00	.023

*Note:* Strategies and Nonacceptance are from the DERS; Brooding and Depression are from the RRS.

\*\*\* $p < .01$ ; \*\* $.01 < p < .05$ ; \* $.05 < p < .10$ .

As has been described, the concrete-experiential condition was a methodological addition to the design of Etu and Gray (2010) that provided the basis for the main hypothesis of the study concerning condition. Thus, in order to provide a more direct comparison of the results of the current study to Etu and Gray (2010), a separate set of regressions was run excluding the concrete-experiential condition. When this was done, condition still did not reach significance (p-values ranging from .242 to .616). Again, the hypothesis that condition would affect body image dissatisfaction and negative affect was not supported.

Finally, a set of regressions was run in order to test whether or not pre-manipulation CDRS scores (baseline trait body image dissatisfaction) moderated condition for any of the relevant dependent variables. When this was done, pre-manipulation CDRS scores did not moderate any of the effects on condition (p-values for contrasts ranging from .076 to .932).

## CHAPTER 4

### DISCUSSION

The current study supported the hypotheses that measures of emotion regulation deficits and rumination predict higher levels of body dissatisfaction and anxiety as well as indices of negative affect. In particular, higher Strategies and Brooding scores (meaning lower perceived ability to use multiple strategies to regulate emotion and higher trait rumination) consistently predicted the highest scores on all relevant dependent measures. In other words, the perception that one has limited strategies with which to address negative affect and a tendency to ruminate predict body image dissatisfaction and anxiety and certain forms of negative affect. Nonacceptance of one's own emotional states was marginally related to overall body image dissatisfaction and guilt. Depression scores also predicted negative affect scores. Overall, the data in the current study suggest that when people with body image dissatisfaction have limited means of relating to or altering their emotions and/or a tendency to ruminate, they may often demonstrate more negative affect and greater body image dissatisfaction. This is consistent with patterns seen in the literature on emotional construal and depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins, 2004; Watkins, Moberly, & Moulds, 2008) and with the literature supporting the hypothesis that a number of difficulties in emotion regulation are implicated in disordered eating (Bydlowski et al., 2005; DeBerardis et al., 2009; Gilboa-Schechtman et al., 2006; Lavender & Anderson, 2010; Rawal, Park, & Williams, 2010).

Consistently, Strategies and Brooding uniquely predicted poorer performance on all relevant dependent body image measures after controlling for pre-test CDRS discrepancy scores. This indicates that having a low perceived effectiveness at using multiple strategies of emotion regulation or a tendency to ruminate predicted higher levels of body image dissatisfaction and negative affect, regardless of level of pre-existing negative body image. This fits well with existing literature that highlights the importance of flexibility between types of emotion regulation for emotional health (e.g., Berking et al., 2008; Feldman Barrett et al., 2001; Gratz & Roemer, 2004; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Possessing a limited number of emotion regulation strategies in the face of negative affect (and being relatively aware of those limits) could potentially prolong or increase the level of distress as it goes unresolved. The range of possible triggers of negative affect is virtually limitless, and depends on various uncontrollable environmental factors and psychological vulnerabilities. Emotion regulation strategies are also virtually limitless, and can range from modulation of expression, physiological experience, behavioral efforts, cognitive distractions, to environmental manipulation. Which particular emotion regulation strategy will be effective or ineffective, adaptive or maladaptive, varies considerably by individual and sociocultural context. Thus, the significant prediction of negative affect by the perception of possessing limited emotion regulation strategies is particularly disconcerting. Facing multiple possible sources of negative affect – often unexpectedly – throughout the day might make the experience all the more distressing for those who feel they have limited means of coping. Literature on the automaticity of negative thinking in relation to psychopathology suggests the automatic quality rather than the content of

negative thoughts is most predictive of psychopathology (Verplanken et al., 2007; Verplanken & Velsvik, 2008). Perhaps emotion regulation strategies hold an automatic quality of their own for those who feel they have limited strategies. This automatic quality (presumably of maladaptive strategies) could be most predictive of their distress. Maladaptive emotion regulation strategies can be quite effective in reducing momentary distress. Thus, they may be the best-learned response, and there may be fewer opportunities to learn new, adaptive emotion regulation strategies. Over time, an individual may realize that those maladaptive strategies often lead to future distress, and recognize that his or her strategies are limited. If this occurred in a body image context, self-berating judgments about a certain body part might occur, for instance, upon every passing of a mirror. Since body image often develops by early adolescence, such negative responses might be quite well-learned, and, as a result, automatic.

Brooding scores also uniquely predicted certain measures of negative affect. Namely, Brooding predicted Guilt (significantly) and Sadness (marginally), but not a global indicator of negative affect. In Response Styles Theory, rumination, as a perseverative self-focus on depressive symptoms and their implications (Nolen-Hoeksema, 1991), is logically related to negative affect. The self-focus and potential lack of problem-solving or engaging in distraction or a number of other activities inherent in rumination (Lyubomirsky et al., 1999) is theoretically what serves to maintain the negative affect and/or depressive symptoms over time. Perseverative, perhaps even automatic, efforts to think about negative affect or distress in an abstract way likely prevent future efforts to try other emotion regulation strategies. Again, the question of

automaticity as a mediating variable could shed further understanding on how rumination serves to be so maladaptive. Further, as Mezulis, Abramson, and Hyde (2002) note, increased incidence in depression in females is related to increased levels of rumination in interpersonal and body image contexts, and not as much in reaction to negative events. Perhaps interpersonal conflict and body image are much more closely related to the self and thus the subject of rumination, whereas negative events may have a larger environmental component that would not be the subject of rumination. Also, interpersonal events and body image may be more important in the feminine gender role (Mezulis, Abramson, & Hyde, 2002). Finally, the relation to guilt is intriguing, as guilt is a self-conscious emotion, by definition. Perhaps the unique prediction of guilt by Brooding is related to the self-conscious nature of the emotion. Guilt is one possible symptom of depression (APA, 2000) and can have a number of possible sources. If ruminators frequently feel they are in some way deficient for feeling upset (or even having caused their own pain), their self-focus may serve to increase guilt. Alternatively, ruminative brooding may serve to activate secondary emotions like guilt, but not primary emotions like sadness or overall general negativity. Research on guilt and shame indicates that such secondary emotions often maintain primary emotions like sadness (Kim, Thibodeau, & Jorgensen, 2011), but this is beyond the scope of the current study. The range of possible implications of guilt for a ruminator may be limitless. As rumination is abstract and impairs active problem solving, ruminators may be less likely to take advantage of their self-focus to utilize it in more concrete, potentially beneficial, active problem solving. This, in turn, may prevent the guilt from decreasing over time.

The current study marked one of the first times to date in which emotion regulation strategies and rumination tendencies were studied in a body image context specifically. Strategies scores consistently predicted both body image dissatisfaction and anxiety. As with negative affect, the potential sources for body image dissatisfaction and anxiety are innumerable for the average woman throughout the day. A multitude of anti-aging creams, diet products, cosmetic procedures, mirrors in public spaces, window displays, and print media give constant reminders of the possible discrepancy between the aesthetic ideal and one's own level of attractiveness. The link between a self-judgment or subjective sense of anxiety around certain body parts and constant contact with those reminders may make those who feel they are limited in their possession of effective means of regulating emotion particularly vulnerable to further body image dissatisfaction or anxiety. Essentially, scoring high on the Strategies measure indicates that people utilize few means of helping themselves when in distress. Oftentimes, when there is a large discrepancy between one's desired shape and one's perceived current shape, there is also little to be done (aside from drastic behavioral measures such as disordered eating or elective surgery). Having little to do in distress (perhaps associated with body image) is again quite disconcerting. Emerging data on the effectiveness of emotion regulation-focused therapies in the treatment of eating disordered behavior, such as Dialectical Behavior Therapy (Wiser & Telch, 1999), indicates that efforts to increase the availability and utility of multiple emotion regulation strategies in the face of distress associated with disordered eating patterns are one potential addition to other therapeutic interventions for disordered eating.

Higher scores on Brooding predicted higher scores on body image dissatisfaction and anxiety. Specifically, in the regression analyses, after controlling for body image dissatisfaction, Brooding predicted body image anxiety but not dissatisfaction. Without controlling for the other variables, Brooding predicted body image dissatisfaction. A tendency to self-focus in an abstract manner makes women particularly vulnerable to body image-related information (including their own thoughts) in a way that ultimately precludes other means of relating to that negative information about the self. Maladaptive, abstract body-image related thoughts may contain themes such as, “I’m too fat/unattractive to get the attention I crave.” A more adaptive way of relating to negative information about appearance might stay more context-focused, such as “I am unhappy with my figure, but sometimes I can wear things that give the illusion of a slimmer waistline.” Such thoughts might vary, from person to person or within the individual. Generally speaking, having more thoughts about the body that begin with “I wish I had a different...” or that are related to other life circumstances that are likely not strictly related to one’s appearance would be more abstract and more maladaptive. As recent literature suggests, body image interventions centered around changing the nature of thought processes (e.g., towards acceptance of thoughts as thoughts and not as fact) can be effective in improving women’s body image (Wade, George, & Atkinson, 2009). Also, a sample of college-age men found that Nonacceptance (from the DERS) was related to body image dissatisfaction and disordered eating behavior (Lavender & Anderson, 2010). While Nonacceptance was only marginally related to body image dissatisfaction, it could be relevant in clinical populations or in relation to other indices of body image dissatisfaction.

The hypothesis that the rumination condition would lead to higher body image dissatisfaction and anxiety and negative affect than both the CE and distraction conditions was not supported. The hypothesis that the CE and distraction conditions would have lower negative affect and body image dissatisfaction and anxiety than the rumination condition was based on the processing mode theory of rumination (Watkins, 2004). If the results had been significant and in the predicted direction, this could indicate that similar processes responsible for healthy processing of emotional stimuli in depression are responsible for healthier processing of body image-related events. The non-effect of the results might mean that concrete-experiential processing is not effective in reducing body image dissatisfaction and negative affect in body image contexts as it has been shown to be in contexts more germane to depression. Literature examining rumination and other emotion processing deficits as transdiagnostic processes rather than isolated clinical phenomena generally suggests such deficits are more pronounced in depression/anxiety than in eating disorders (Aldao & Nolen-Hoeksema, 2010; Nolen-Hoeksema et al., 2008; Watkins, 2009), but are still prevalent in disordered eating behavior. Examination of the methods used in the current study might help illustrate why the current data set did not show this effect in either negative affect or body image dissatisfaction and anxiety.

Perhaps the lack of distinctiveness between conditions is a reflection of a limit of the prompts used in the concrete-experiential condition. Instructions to be mindful of one's current emotional state and/or physical appearance may be vastly different than instructions to visualize the scenario like frames of a movie, or other instructions used in

the current study. While nonacceptance of emotional states has been shown to be positively correlated with disordered eating behavior and negative body image (Lavender & Anderson, 2010), it may be more difficult to separate the emotion from the visualization of one's body than other forms of cognitive avoidance – like rumination and worry, which are marked by a lack of visualization and avoidance of that imaginal exposure to the underlying fear itself (Stober & Borkovec, 2002). In a body image context, instructions to visualize may actually increase distress. Since participants were instructed to respond to multiple prompts, it is possible some did so in a manner that increased distress and some did so in a manner that decreased distress – even if all followed directions to envision the event as a movie on a screen. If this is the case, it could explain the observed lack of difference between either of the two other conditions. Additionally, concrete processing – while ensuring an approach of distressing material as opposed to avoidance – is not synonymous with acceptance of distress. Concrete processing might be more conducive to acceptance than abstract-avoidant modes of processing, but the current study did not attempt to increase acceptance processing. This highlights the importance of an experiential, accepting stance in assessing one's appearance, and has been shown to be related to increased body satisfaction in non-clinical samples (Wade, George, & Atkinson, 2009). Future studies attempting to understand a concrete, experiential form of processing in body image dissatisfaction would do well to include prompts that either focus on the experiential aspect in an accepting manner or focus on other contextual factors more prominently.

The method of arriving at the concrete-experiential prompts also could have limited any possible effects of condition on relevant dependent measures. First of all, Etu and Gray's (2010) original sets of prompts were twice as long as the sets in the current study. Etu and Gray (2010) had suggested that some prompts appeared to be less abstract than others, and there was no way of assuring to which prompts participants would have chosen to respond. For instance, participants easily could have chosen the less abstract prompts that might not approximate rumination, and the effect on the relevant dependent measures may have increased by efforts to ensure a more abstract, ruminative focus. The rumination set in the current study was systematically selected from the most abstract, emotion-focused prompts in Etu and Gray's (2010) original set in order to ensure a greater likelihood of abstract focus on the implication of possible emotions aroused by the vignette. Then, a few of the remaining prompts from the rumination condition (Etu & Gray, 2010) were adapted in order to remain in keeping with Watkins' (e.g., 2004) concrete-experiential manipulation, with a few additions. The "movie on a screen" prompt was placed first on the list of concrete-experiential prompts. One possibility with this particular selection method is that the altered prompts in the concrete-experiential condition were not sufficiently altered as intended, and in effect resemble rumination. However, the nonsignificance of condition on relevant dependent measures in the current study limits the extent of such speculation.

It remains unclear as to why the rumination condition did not have significant increases in body image anxiety over the distraction condition as it did in Etu and Gray (2010). For instance, those results may reflect a Type I error, in which a null hypothesis

was incorrectly rejected. If Etu and Gray's (2010) results were a Type I error, the current results call into question the hypothesis of a direct parallel between depressive rumination and body image-focused rumination. Depressive rumination is defined as an abstract, perseverative self-focus on one's symptoms. Symptoms of negative body image and the abstract quality of body image-focused rumination are currently not as empirically defined as they are in depressive rumination. Further, the abstract quality may not even be implicated in body image-focus rumination as it is in depressive rumination. It is also possible that body image rumination exists as a phenomenon, but the present study (and Etu & Gray, 2010, if the Type I error interpretation is correct) did not effectively manipulate it. While Mezulis, Abramson, and Hyde's (2002) results indicate much content of rumination is likely to be body-image focused, perhaps the body image content simply serves as a particular vulnerability to negative self-thought. The prompts used in Etu and Gray (2010) and in the present study seem to be more closely focused on the body image related-emotions in a hypothetical context, and may not have activated self-schemas in the same way they are activated in their natural context. Even if Etu and Gray's (2010) results do not reflect a Type I error, it is still possible the current study did not activate self-schemas, which may be necessary to ensure body image rumination. If so, efforts should be made to understand which manipulations ensure the phenomena of body image-focused rumination and which do not, perhaps by making the focus of the manipulation more relevant to the individual participant.

The change in rumination prompts from study to study must also be considered. As discussed above, the rumination prompts were altered from Etu and Gray (2010) in an

effort to ensure more abstract, ruminative responses to the vignette. It does not appear that the narrower, more abstract focus of the rumination prompts had the intended effect of increasing body image dissatisfaction in rumination relative to the other conditions. Regardless of the interpretation in terms of rumination theory, direct comparison of both studies is made difficult by the change in prompts.

One comparison between results between Etu and Gray (2010) and the present study is noteworthy. In both the present study and in Etu and Gray (2010), CDRS discrepancy scores were marginally changed from pre- to post-test, in the predicted direction, across conditions. It is notable that this shift occurred in both studies, even though Etu and Gray (2010) included a longer relevant dependent measure not of interest in the current study. This would place it further from the manipulation in time, although serial position was kept the same. Due to the marginal status of this significance, these results should be interpreted with caution. However, it should be noted that the CDRS – considered a trait-level indicator of body image perception as opposed to a state-dependent measure - is typically fairly resistant to manipulation, even across such a short time span (Thompson & Gray, 1995).

While the current study provides some intriguing preliminary results on the relation of certain emotion regulation indices to body image dissatisfaction and anxiety, it is not without limitations. For instance, the sample is relatively homogeneous, and generalizations are limited to primarily Caucasian, East Coast, urban populations. Also, dependent measures on disordered eating behaviors were not included, as the relation of emotion regulation factors and rumination to body image and negative affect specifically

were of interest. Any links of body image dissatisfaction and eating disorders based on the results of the current study are only presumed. Finally, as discussed above, this was the first time an attempt was made to compare rumination, concrete-experiential processing, and distraction in a body image context. The prompts used in the current study do not establish a distinction between those processes, but other manipulations might.

Given the pervasiveness of body-related cognitions, and their potential for becoming maladaptive, it is important to consider how poor emotion regulation tendencies might be a key vulnerability to the maladaptive effects to exposure to appearance-related cues. Further, robust literature on body image across the lifespan indicates that exposure to appearance-related cues is pervasive in Western culture, and that internalization of those cues is not uncommon (Dittmar, 2005; Grabe, Ward, & Hyde, 2008; Murnen, Smolak, Mills, & Good, 2003; Spitzer, Henderson, & Zivian, 1999). What women do with this information – cognitively and emotionally – is a crucial question in normative and clinical populations. The role of acceptance is a key consideration, given the evidence on avoidance and acceptance in various forms of pathology (Borkovec, Alcaine, & Behar, 2004; Lavendar & Anderson, 2010; Rawal, Park, & Williams, 2010). Future research should continue to address which types of emotion regulation strategies concrete-experiential processing for body image-related cues might resemble. Clinically, evaluation of emotion regulation strategies could help inform interventions over the course of therapy for clients with body image-related vulnerabilities. The intersection of emotion regulation deficits, general subjective

distress, negative body image, and disordered eating behavior is also a possible area for future research.

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