

The Multifaceted Role of Distress Tolerance in Dysregulated Eating Behaviors

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ABSTRACT

Objective: Few empirical studies have examined the potential role of affect in dysregulated eating. The authors hypothesized that distress tolerance would predict EDI-Bulimia, even when controlling for several covariates, including depressive and anxiety symptoms, and all four subscales of the UPPS Impulsive Behavior Scale. Additionally, the authors predicted low levels of distress tolerance would interact with high levels of urgency to predict EDI-Bulimia. Finally, the authors predicted that distress tolerance would mediate the previously reported relationship between anxiety sensitivity and EDI-Bulimia.

Method: A sample of undergraduates ($N = 200$) filled out a series of question-

naires pertaining to the variables of interest, including the Eating Disorder Inventory, UPPS Impulsive Behavior Scale, Distress Tolerance Scale, and Anxiety Sensitivity Index.

Results: All three hypotheses were supported by the data.

Conclusion: Authors suggest that deficits in distress tolerance might play a significant role in the etiology and maintenance of bulimic symptoms. © 2007 by Wiley Periodicals, Inc.

Keywords: bulimia nervosa; emotion regulation; distress tolerance; anxiety sensitivity; impulsivity

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Introduction

The symptoms of bulimia nervosa (BN) are characterized by dysregulated eating behaviors such as binge-eating and purging. Recent lines of research have pointed toward the presence of maladaptive personality traits that increase the risk of developing such behaviors, and much of this attention has been devoted to the role of impulsivity. Building upon this research, this article has two central purposes. First, we seek to clarify the role of impulsivity in the dysregulated eating behaviors characteristic of bulimia. Second, we intend to demonstrate that individuals who have difficulty in tolerating emotional distress and a tendency to act rashly in the face of such sensations are at particularly elevated risk for the maintenance of dysregulated eating behaviors. In doing so, we hope to elucidate the role of affective processes in the maintenance of such behaviors.

Numerous studies have implicated impulsivity in the maintenance of bulimic symptoms.^{1–3} For

example, a study by Wolfe et al.⁴ found that women with bulimia nervosa scored significantly higher than healthy controls on the Barratt Impulsivity Scale – Version 10.⁵ In another study, Casper et al.⁶ compared participants with restrictive anorexia nervosa (AN), binge/purge AN, and BN on impulsivity scores. The authors found that the three groups differed significantly on impulsivity scores, with restricting individuals with anorexia nervosa scoring the lowest. This group was followed by the binge/purge subtype of AN displaying moderate impulsivity scores, and the BN group scoring the highest on impulsivity.

Findings linking impulsivity to bulimic symptoms in general, and binge eating in particular, have been limited to some degree due to the multitude of different operational definitions of impulsivity across studies.⁷ In an attempt to clarify the meaning of impulsivity, Whiteside and Lynam⁸ created the UPPS Impulsive Behavior Scale, which identifies four underlying facets of the construct: urgency, (lack of) premeditation, (lack of) persistence, and sensation-seeking. Urgency is defined as the tendency to act rashly in the face of negative emotions in an effort to achieve an immediate reduction of that affective sensation; lack of premeditation as basic lack of planning; lack of persistence as giving up easily on tasks; and sensation-seeking as the tendency to seek out and try novel

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experiences. This distinction has allowed researchers to study the personality trait of impulsivity in finer detail, and several studies have indicated that urgency is positively correlated with bulimic symptoms. For example, Fischer et al.⁹ reported that elevated scores of urgency were significantly related to participants endorsing binge eating symptoms. In an additional study, Fischer et al.¹⁰ found that participants exhibiting bulimic symptoms had elevated urgency scores. However, their scores on other impulsivity scales were no higher than those of participants with no eating pathology. This study thus served two important purposes: first, it highlighted the need to parse the construct of impulsivity into distinct components, and second, it provided support for an emotion regulation model of bulimic symptoms, within which dysregulated eating behaviors are conceptualized as being motivated by the drive to ameliorate the experience of negative affect. These findings thus imply that bulimic symptoms might need to be viewed, at least in part, as a result of misguided attempts to modulate negative emotions. As such, empirical work is needed that could further investigate potential affective processes underlying dysregulated eating behaviors.

While some previous research has reported the importance of negative affect in the etiology and maintenance of bulimic symptoms,^{11,12} we believe that it might not simply be the presence of negative affect that influences these behaviors, but rather the manner in which individuals subjectively experience and evaluate the presence of negative affect. One variable already linked to bulimic symptoms in such a manner is anxiety sensitivity (AS), which Reiss and McNally¹³ defined as the fear of the physical symptoms of anxiety and the potential consequences of those sensations. Anestis et al.¹⁴ recently demonstrated that there is a significant relationship between AS and bulimic symptoms as measured by the Eating Disorder Inventory (EDI; Ref. 15) in both an undergraduate sample and an outpatient clinical sample, even when controlling for the effects of depressive symptoms, anxiety symptoms, and impulsivity.

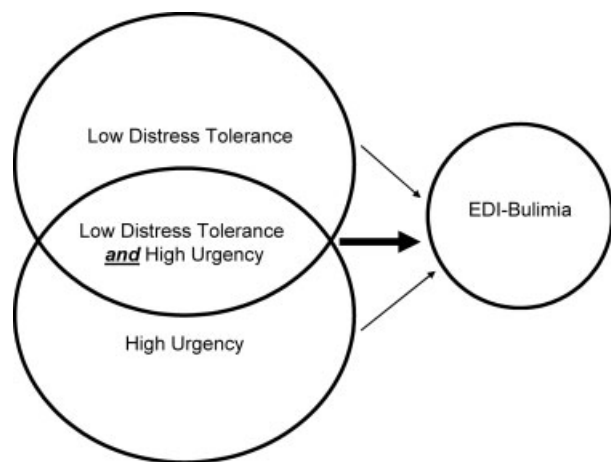
The link between AS and bulimic symptoms as measured by the EDI points toward discomfort with the sensations associated with anxiety as a potentially important variable in dysregulated eating behaviors and other impulsive behaviors; however, the question remains to what degree such findings are specific to anxiety rather than generalizing across the category of negative affect. In other words, it remains possible that this finding did not fully explain the link between these two variables

and that a more general discomfort with negative affect mediates the relationship. Along these lines, distress tolerance, defined as the degree to which the experience of negative affect is deemed unbearable,¹⁶ may more fully explain the relationship and provide stronger support for an emotion regulation model of BN symptomatology.

Supportive evidence for this potential relationship has been provided in several studies that have linked distress tolerance to a number of negative outcomes, particularly substance abuse and relapse.^{17–20} Brandon et al.¹⁷ reported that previous performance on a psychologically distressing task predicted the ability to maintain abstinence in 144 cigarette smokers at a 12-month follow-up. In another study, immediate smoking relapsers displayed more baseline negative affect and stress reactivity than delayed smoking relapsers did during stressful physiological and psychological tasks.²⁰ Distress tolerance has also been linked to a host of other addiction problems. For example, Daughters et al.¹⁸ found that individuals who dropped out of a substance use treatment center were significantly less likely to persist on psychologically distressing tasks than were individuals who were able to complete a 30 day treatment plan. These findings were significant even when controlling for negative and positive affect, impulsivity, and social support.

When the above mentioned findings are considered in combination with one another, a cohesive picture of potential underlying affective disturbances starts to become clearer. Individuals with elevated levels of urgency and diminished levels of distress tolerance might be at heightened risk to exhibit affect driven impulsive behavioral patterns such as those characteristic of dysregulated eating. Figure 1 provides a visual representation of this theorized relationship, with both distress tolerance and urgency predicting EDI-Bulimia individually, but the two in combination serving as a much stronger predictor. Quick to deem the experience of negative affect as unbearable and highly motivated to act in such a way to immediately ameliorate such sensations, individuals high in urgency and low in distress tolerance could fit into an important risk category for dysregulated eating. Behaviors such as binge-eating may be a way for such high risk individuals to distract themselves from their negative emotional state, similar to the experiential avoidance function of self-injurious behavior that Chapman et al.²¹ have proposed. When urgency and distress tolerance are integrated in this fashion, the notion that dysregulated eating

FIGURE 1. Hypothesized relationship of distress tolerance, urgency, and the interaction of distress tolerance and urgency with EDI-Bulimia.



behaviors serve emotion regulatory functions becomes more evident.

In an effort to more precisely examine the potential role of distress tolerance in eating pathology, we designed a study in which 200 undergraduates at a large southeastern university filled out a series of questionnaires addressing personality characteristics, symptoms of various forms of psychopathology, and behavioral tendencies. The specific goal of this study was to examine the cross-sectional role that distress tolerance plays in bulimic symptoms as measured by the EDI. Examining this relationship has the potential to clarify the role of impulsivity in the experience of bulimic symptoms as well as provide future direction in treatment research on individuals demonstrating these symptoms.

Our first hypothesis was that low levels of distress tolerance would predict bulimic symptomatology as measured by the EDI above and beyond the effects of a host of covariates, including depression and anxiety symptoms, impulsivity, interoceptive awareness, drive for thinness, and perfectionism. We chose to utilize such a long list of covariates because we believe our predictors will account for a significant amount of variance above and beyond the extensive work that has already been done on potential correlates of dysregulated eating behaviors. Failure to include all of these variables would leave open the possibility that previously reported correlates better account for any significant relationships found between our predictors and EDI-Bulimia. This analysis as currently structured would not only link low levels of distress tolerance to bulimic symptomatology as measured by the EDI, but by exhibiting significance after controlling

for these covariates, it would also reduce the risk of potential spurious findings.

Our second hypothesis was that low levels of distress tolerance would interact with high levels of urgency to predict bulimic symptoms as measured by the EDI above and beyond the effects of either risk factor alone and those of the same list of covariates utilized in the first hypothesis. If significant, the results of this analysis would bolster the suggestion that bulimic symptoms are not a result of general impulsivity, but rather impulsivity related to the avoidance of emotional distress through behavioral means.

Our final hypothesis was that low levels of distress tolerance would mediate the relationship between anxiety sensitivity and bulimic symptoms as measured by the EDI. This relationship will be tested to demonstrate that it is not anxiety sensitivity itself that aggravates bulimic symptoms, but rather the inability to tolerate negative emotional states that may be caused by sensitivity to anxiety cues. Findings of a mediational effect would implicate that anxiety sensitivity is not necessarily a unique contributor to the maintenance of bulimic symptoms, but rather one form of emotional distress that bulimic individuals may have difficulty tolerating.

Method

Participants

This study was reviewed and approved by the university institutional review board. Participants in this study were undergraduates enrolled in a general psychology course at a large southeastern university. Each participant received course credit for his or her participation and signed an informed consent form before participating in the experiment. Participants were told that they would be participating in a study examining emotions and behavior that would require them to fill out a packet of questionnaires; informed consent was obtained from all participants at the start of the study. In total, 200 participants (68.5% female) took part in the study.

The ethnic composition of the sample was 68.0% white or Caucasian, 15.0% African American, 9.5% Hispanic or Latino, 2.5% Asian American, and 3.0% other. Four participants chose not to indicate membership in an ethnic or racial group. The age range for the sample was 16–25 (mean = 18.32, standard deviation = 1.09).

Measures

The Distress Tolerance Scale²² is a 15-item self-report questionnaire examining the degree to which individuals experience negative emotions as intolerable (e.g., “I can’t

handle feeling distressed or upset.”). Items utilize a Likert scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree), with lower scores indicating a tendency to experience psychological distress as unacceptable. The Distress Tolerance Scale served as the independent variable in these analyses and the coefficient α for this sample was .91.

The Urgency, (lack of) Premeditation, (lack of) Perseverance, and Sensation Seeking Impulsive Behavior Scale (UPPS; Ref. 11) is a 45-item self-response scale that features four subcategories: Urgency, Sensation Seeking, (lack of) Premeditation, and (lack of) Perseverance. Each item uses a Likert type scale ranging from 1 “Not true of me” to 5 “Very true of me.” The Urgency subscale consists of 12 items measuring the degree to which individuals act rashly in the face of negative affect (e.g., “I often make matters worse because I act without thinking when I am upset.”). This subscale served as a covariate in the first and follow-up analyses and as a predictor in the second analysis. The coefficient α for the Urgency subscale was .86. The (lack of) Premeditation subscale consists of 11 items measuring the degree to which individuals consider the consequences of their actions before engaging in them (e.g., “I usually make up my mind through careful reasoning.”). The coefficient α for the (lack of) Premeditation subscale was .88. The (lack of) Perseverance subscale consists of 10 items measuring the degree to which an individual tends to persist in the face of difficulty or frustration (e.g., “Once I get going on something I hate to stop.”) The coefficient α for the (lack of) Perseverance subscale was .82. The Sensation Seeking subscale consists of 12 items measuring the degree to which individuals seek out activities that involve risk or thrill (e.g., “I would enjoy fast driving.”). This subscale served as a control variable in the initial main effects analysis and as a predictor in the second and third analyses. The coefficient α for the Sensation Seeking subscale was .871. The final three subscales were used as covariates in all analyses.

The Beck Depression Inventory II (BDI-II; Ref. 23) is a 21-item self-report questionnaire that measures depressive symptoms. Items use a Likert type scale (0–3) and examine the degree to which various affective symptoms have been present over the course of the past 2 weeks. The reliability and stability of the BDI-II have been reviewed extensively.^{23,24} The total range of scores is 0–63, with scores <10 indicating minimal symptomatology, scores 10–18 indicating mild symptomatology, and scores >18 indicating moderate to severe presence of depressive symptoms. The BDI-II served as a covariate in these analyses and the coefficient α was .88.

The Beck Anxiety Inventory, (BAI; Ref. 25) is a 21-item self-report questionnaire. Each item uses a Likert Scale (0–3) to measure the degree to which participants have experienced particular symptoms of anxiety over the course of the past 2 weeks. The measure shows impres-

sive test-retest reliability and extensive information regarding the validity of the measure has been published by the authors. The BAI served as a covariate in these analyses and the coefficient α was .90.

The Positive Affect Negative Affect Schedule (PANAS; Ref. 26) is a 20-item self-report measure of current positive and negative emotional states. Only the Negative Affect subscale was utilized in these analyses. Questions on the Negative Affect subscale ask participants to what degree particular affect related adjectives apply to them (e.g., “scared”). Answers are measured with a Likert scale (1–5). The PANAS-Negative Affect subscale served as a covariate in these analyses and the coefficient α was .82.

The Anxiety Sensitivity Index (ASI; Ref. 27) was utilized to assess anxiety sensitivity. The ASI is a 16-item self-report measure and includes items such as “It scares me when my heart beats rapidly.” Each item on the questionnaire is rated on a five-point scale ranging from 0 (very little) to 4 (very much). The ASI is widely used, and is a valid and reliable measure of anxiety sensitivity.²⁸ The ASI served as a covariate in the first two analyses and as the predictor variable in the mediational analysis. The coefficient α for the ASI was .88.

The Eating Disorder Inventory (EDI; Ref. 14) is a self-report questionnaire consisting of 64 items used to assess pathological eating, cognitions, and behaviors. The measure has eight subscales: Drive for Thinness, Bulimia, Interpersonal Distrust, Interoceptive Awareness, Perfectionism, Maturity Fears, Body Dissatisfaction, and Ineffectiveness. Individual items use a Likert scale (1 = never, 6 = always) and the internal consistency of the measure has been widely reported as acceptable. In this study, the Interoceptive Awareness, Drive for Thinness, Perfectionism, and Body Dissatisfaction subscales were used as covariates. The EDI-Interoceptive Awareness self-report subscale measures the degree to which individuals feel capable of discerning between subtle affective and visceral cues (e.g., “I get confused about what emotion I’m feeling.”). The coefficient α for this subscale was .81. The EDI-Body Dissatisfaction self-report subscale measures the degree to which individuals feel distress regarding their body shape and size (e.g., “I think that my thighs are too large.”). The coefficient α for this subscale was .90. The EDI-Perfectionism self-report subscale measures the degree to which individuals maintain unrealistically high expectations for their performance (e.g., “I have extremely high goals.”). The coefficient α for this subscale was .73. The EDI-Drive for Thinness scale measures the degree to which individuals feel driven to reduce the size of their bodies (e.g., “I am preoccupied by the desire to be thinner.”). The coefficient α for this subscale was .91.

The Bulimia subscale of the EDI is a measure of dysregulated eating behaviors, and served as the dependent variable in all analyses. Items on the Bulimia subscale examine the degree to which individuals experience a

TABLE 1. Means, standard deviations, and intercorrelations for variables utilized in the analyses

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
BDI-II	1													
BAI	.447*	1												
ASI	.281*	.435*	1											
Urg	.485*	.341*	.319*	1										
Prem	-.155**	-.171**	-.131	-.328*	1									
SS	-.036	-.061	-.028	.122	-.155**	1								
Pers	-.336*	-.187*	-.190*	-.353*	.574*	.049	1							
PANAS	.332*	.362*	.347*	.279*	.023	-.064	-.104	1						
EDI-P	.100	.145**	.138	.036	.289*	.104	.382*	.119	1					
EDI-BD	.247*	.220*	.265*	.261*	-.149**	-.164**	-.231*	.130	-.014	1				
EDI-DFT	.163**	.201*	.278*	.190*	-.098	-.096	-.134	.122	.133	.778*	1			
EDI-IA	.382*	.374*	.479*	.478*	-.222*	-.053	-.293*	.457*	.126	.551*	.582*	1		
DTS	-.274*	-.242*	-.279*	-.286*	.048	.136	.146**	-.373*	-.142**	-.178**	-.227*	-.399*	1	
EDI-B	.320*	.233*	.297*	.400*	-.201*	.039	-.246*	.358*	.105	.560*	.569*	.657*	-.386*	1
Mean:	7.33	11.22	21.78	31.78	37.21	38.71	35.30	16.55	22.76	29.49	20.59	24.96	47.62	14.54
SD:	6.55	9.43	10.97	9.25	8.55	11.02	6.81	6.87	5.75	11.17	9.80	8.08	12.14	6.25

* Correlation is significant at the 0.01 level (2-tailed).

** Correlation is significant at the 0.05 level (2-tailed).

loss of control while eating large quantities of food and then subsequently purge (e.g., “I have gone on eating binges where I have felt that I could not stop.”). Discriminant validity for Bulimia Nervosa and Anorexia Nervosa diagnoses has been reported.¹⁴ The α coefficient for the EDI-Bulimia scale was .82.

Data Analytic Procedure

A linear regression was used to assess the cross-sectional relationship between distress tolerance and EDI-Bulimia, controlling for a host of covariates. An additional linear regression was used to test the interaction of distress tolerance and urgency as a predictor for EDI-Bulimia. Finally, a series of linear regressions were used to test the hypothesis that distress tolerance mediates the relationship between anxiety sensitivity and EDI-Bulimia, using guidelines set forth by Baron and Kenny.²⁹

Results

Means, standard deviations, and the intercorrelations for the variables utilized in each analysis can be found in **Table 1**.

Distress Tolerance Predicting EDI-Bulimia

A regression equation was constructed to predict EDI-Bulimia scores from distress tolerance scores, controlling for gender, BDI-II, BAI, ASI, PANAS-NA, urgency, sensation seeking, (lack of) premeditation, (lack of) perseverance, EDI-Interoceptive Awareness, EDI-Perfectionism, EDI-Body Dissatisfaction, and EDI-Drive for Thinness. EDI-Bulimia served as the dependent variable. Step 1: all of the covariates listed above were entered. Step 2: distress tolerance

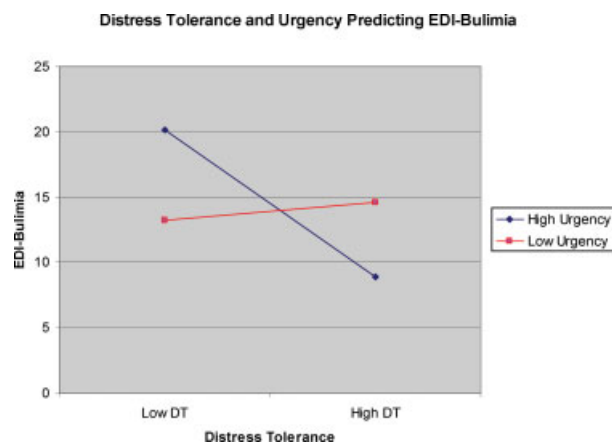
was entered as the independent variable. As would be expected, the covariates absorbed substantial amounts of variances, such that the zero-order correlation between distress tolerance and EDI-Bulimia exceeds the same association with covariates included. Nonetheless, distress tolerance significantly predicted scores on EDI-Bulimia in this analysis ($sr = -0.13$, $t = -2.56$, $p < .01$).

Two-Way Interaction of Distress Tolerance and Urgency Predicting EDI-Bulimia

A regression equation was constructed to predict EDI-Bulimia scores from the interaction of urgency scores and distress tolerance scores, controlling for gender, BDI-II, BAI, ASI, sensation seeking, (lack of) perseverance, (lack of) premeditation, PANAS-Negative Affect, EDI-Body Dissatisfaction, EDI-Perfectionism, EDI-Drive for Thinness, and EDI-Interoceptive Awareness. EDI-Bulimia served as the dependent variable. This regression equation encompasses the equation used in the first analysis, but for presentation purposes, the two are presented separately. Step 1: the above listed covariates were entered. Step 2: distress tolerance and urgency were entered. Step 3: the interaction between distress tolerance and urgency was entered. The two-way interaction between distress tolerance and urgency significantly predicted EDI-Bulimia scores ($sr = -0.118$, $t = -2.28$, $p < .02$).

To appraise the nature of this interaction, we calculated EDI-Bulimia residual change scores by using “high” and “low” combinations of each of the main effect variables involved in the significant two-way interaction (using values that were two standard deviations above and below the mean for distress tolerance and urgency). Mean values were

FIGURE 2. Two-way interaction of urgency and distress tolerance predicting EDI-Bulimia. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]



entered for covariates (BDI-II, BAI, ASI, sensation seeking, (lack of) premeditation, (lack of) perseverance, PANAS-Negative Affect, EDI-Body Dissatisfaction, EDI-Drive for Thinness, EDI-Perfectionism, and EDI-Interoceptive Awareness scores). The findings supported our prediction that individuals with high urgency scores combined with low distress tolerance scores were most likely to experience relatively high levels of bulimic symptoms as measured by the EDI. These results are presented in **Figure 2**.

Distress Tolerance Mediating the Relationship Between ASI and EDI-Bulimia

A mediational analysis was used to test the hypothesis that distress tolerance mediates the relationship between ASI and EDI-Bulimia, controlling for gender, BDI-II, BAI, urgency, sensation seeking, (lack of) premeditation, and (lack of) perseverance. According to Baron and Kenny,²⁹ four criteria must be met to indicate the presence of a significant mediating variable: The predictor variable (ASI) must significantly predict the mediator variable (distress tolerance; $sr = -0.151$, $t = -2.162$, $p < .03$), the mediating variable must predict the dependent variable (EDI – Bulimia; $sr = -0.318$, $t = -5.09$, $p < .001$), the predictor variable must predict the dependent variable ($sr = 0.166$, $t = 2.437$, $p < .01$), and the relationship between the predictor variable and the dependent variable must decrease (perhaps to nonsignificance) when the mediator variable is added to the model (ASI's new values: $sr = 0.116$, $t = 1.852$, $p = ns$). Thus, our results were consistent with all four criteria.

Additionally, a direct significance test of the mediated pathway was conducted as suggested by Sobel.³⁰ This test was significant ($z = 2.00$, $p < .04$), suggesting that distress tolerance scores mediated the relationship between ASI scores and EDI-Bulimia scores.

Conclusion

The purpose of this study was to examine the role of distress tolerance in bulimic symptoms as measured by the EDI, and to consider that role in light of the effects of other potentially significant variables. In our initial analysis, distress tolerance significantly predicted EDI-Bulimia, controlling for depressive symptoms, anxiety symptoms, anxiety sensitivity, negative affect, urgency, (lack of) premeditation, (lack of) perseverance, sensation seeking, EDI-Interoceptive Awareness, EDI-Body Dissatisfaction, EDI-Perfectionism, and EDI-Drive for Thinness ($sr = -0.134$, $t = -2.558$, $p < .01$). The use of so many potentially significant covariates constitutes a stringent test of the effects of distress tolerance and, as such, calls particular attention to the resilience of the relationship it has with EDI-Bulimia. In other words, it appears not simply to be the presence of negative affect or the tendency to react impulsively in response to such sensations that predicts EDI-Bulimia; instead, distress tolerance—the degree to which varying degrees of negative affect are subjectively perceived to be intolerable—accounts for a significant amount of the variance in the dysregulated eating behaviors that comprise EDI-Bulimia.

There are several important considerations with regard to this finding. First, it points toward distress tolerance as a relevant predictor beyond the realm of substance abuse and thus indicates that the inability to tolerate negative affective states is a significant variable with relation to a variety of behaviors. The significant relationship reported here between distress tolerance and bulimic symptoms as measured by the EDI paints the picture of individuals overwhelmed by negative emotions turning to food as a potential mood regulatory tool and then consequently purging in an effort to stave off the feared negative consequences of their binge.

A second important consideration is the resilience of the finding. Distress tolerance not only predicted EDI-Bulimia, but did so above and beyond the effects of an impressive list of covariates. This list included four theoretically relevant

subscales of the EDI, which because they come from the same measure as the dependent variable, could be expected to account for a degree of variance that actually overstates the power of their relationship (due to common method variance), and thus heightens confidence in the significant finding for distress tolerance. Additionally, the list includes several measures of depressive and anxiety symptoms, which implies that the finding for distress tolerance is not simply indicative of participants being in a negative affective state at the time of the study.

In light of this finding, it appears that distress tolerance needs to be considered when discussing potential risk factors for bulimic or binge eating symptoms. Additionally, the fact that distress tolerance significantly predicted EDI-Bulimia above and beyond the numerous other covariates provides a rationale for examining how it might interact with other significant predictors or even explain the relationships between certain risk factors and EDI-Bulimia.

Specifically, we found that distress tolerance interacts with urgency to significantly predict EDI-Bulimia, controlling for depressive symptoms, anxiety symptoms, anxiety sensitivity, gender, negative affect, EDI-Perfectionism, EDI-Body Dissatisfaction, EDI-Drive for Thinness, EDI-Interceptive Awareness, and the other three subscales of the UPPS Impulsive Behavior Scale ($sr = -0.141$, $t = -2.28$, $p < .02$). This finding indicates that individuals who exhibit low levels of distress tolerance and high levels of urgency are more likely to demonstrate clinically relevant levels of bulimic symptoms as measured by the EDI. In other words, individuals who find negative affect to be an intolerable experience and who are highly motivated to act quickly in an effort to attain immediate relief from that affective sensation are more likely to exhibit elevated scores on the EDI-Bulimia scale. Individuals exhibiting maladaptive tendencies in both of these risk areas, as opposed to only one, are thus more frequently confronted with affective crises and more highly motivated to use whatever behavioral means they believe will bring an immediate resolution, regardless of potential long-term consequences.

Much like the findings for the main effect of distress tolerance on EDI-Bulimia, the interaction between distress tolerance and urgency is predictive above and beyond an impressive selection of covariates, including four additional subscales from the EDI. This indicates that the role of these two significant variables is not better accounted for or over-powered by the effects of other varia-

bles widely known to be associated with bulimic symptoms as measured by the EDI. Again, the use of four covariates formed from the same measure as the dependent variable likely exaggerated the magnitude of the relationship between those covariates and EDI-Bulimia. As such, the significant finding for the interaction between urgency and distress tolerance predicting EDI-Bulimia seems reliable, as it accounted for variance above and beyond a host of other important predictors and overcame potential measurement difficulties.

As an additional follow-up to the initial analyses, we also sought to examine the role of distress tolerance relative to the significant relationship between anxiety sensitivity and EDI-Bulimia first reported by Anestis et al.¹⁴ In the current study, utilizing a different sample, we sought to examine whether this relationship is best accounted for by a lack of distress tolerance, indicating that the relationship between anxiety sensitivity and EDI-Bulimia is due to a general inability to withstand negative emotions rather than a specific fear of anxiety symptoms. This indeed proved to be the case, as distress tolerance mediated the relationship between anxiety sensitivity and EDI-Bulimia. The theoretical utility of this particular finding likely outweighs its clinical utility; however, a better understanding of this relationship could potentially be informative for clinicians seeing clients with elevated levels of anxiety sensitivity.

The three main findings of this article—which distress tolerance predicts EDI-Bulimia above and beyond a host of important covariates, interacts with urgency to predict EDI-Bulimia above and beyond those same covariates, and mediates the relationship between anxiety sensitivity and EDI-Bulimia—are somewhat broad in scope; however, they are all founded upon one central theme: that distress tolerance is a significant factor in symptoms of bulimia as measured by the EDI. The findings of this article have clinical significance as they imply that clinicians might need to consider teaching distress tolerance skills to clients exhibiting symptoms consistent with BN in an effort to help them replace their current maladaptive behavioral approaches toward managing their emotions with healthier, less dangerous alternatives.

There were some limitations in this study that must be considered when analyzing the reported results. First, to better understand the role of distress tolerance in dysregulated eating behaviors, a longitudinal study with several time points would be necessary. The cross-sectional nature of these

findings, while significant in scope, preclude any conclusions about causality. As such, while our assumptions of directionality are consistent with previous findings, directionality in these particular findings is open to question. For instance, another possible interpretation of the findings could be that undergraduates currently engaging in bulimic behaviors might evaluate their behavior as indicative of a general inability to tolerate distress and, as such, the behaviors might influence the predictors in a direction counter to our hypotheses. Additionally, a replication of these findings in a clinical sample would be useful, as the behavioral outcome variable would likely be more common in such a sample and would allow for analysis of the relationship between distress tolerance and clinical elevations of bulimic symptoms. Finally, all data were acquired through the use of self-report, which leaves it open to questions related to attendant biases.

Despite these limitations, the above reported findings offer evidence that distress tolerance is an important variable in symptoms of bulimia as measured by the EDI. In light of these findings, it appears that both researchers and clinicians need to not only consider affective motives in the use of destructive coping behaviors, but also the degree to which different individuals perceive relative amounts of negative affect to be intolerable. It appears that different individuals essentially have different affective “boiling points” and that, the lower that point is, the greater the risk is that an individual will engage in destructive behaviors in an attempt to alter an overwhelming affective state. Future interventions that work toward increasing the amount of negative affect that such individuals can effectively manage could potentially provide an invaluable resource for individuals otherwise likely to develop unhealthy behavioral patterns.

References

1. Sullivan PF, Bulik CM, Kendler KS. The genetic epidemiology of bingeing and vomiting. *Br J Psychiatry* 1998;173:75–79.
2. Fahy T, Eisler I. Impulsivity and eating disorders. *Br J Psychiatry* 1993;162:193–197.
3. Engel SG, Corneliusen SJ, Wonderlich SA, Crosby RD, le Grange D, Crow S, et al. Impulsivity and compulsivity in bulimia nervosa. *Int J Eat Disord* 2005;38(3):244–251.
4. Wolfe, BE, Jimerson, DC, Levine JM. Impulsivity ratings in bulimia nervosa: Relationship to binge eating behaviors. *Int J Eat Disord* 1994;15(3):289–292.
5. Barratt ES. Impulsiveness substrains: Arousal and information processing. In: Spence JT, Izzard CE, editors. *Motivation, Emotion, and Personality*. North-Holland: Elsevier Science, 1985; pp. 137–146.
6. Casper RC, Hedeker D, McClough JF. Personality dimensions in eating disorders and their relevance for subtyping. *J Am Acad Child Adolesc Psychiatry* 1992;31(5):830–840.
7. Lynam DR, Miller JD. Personality pathways to impulsive behavior and their relations to deviance: Results from three samples. *J Quant Criminol* 2004;20:319–341.
8. Whiteside SP, Lynam DR. The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Pers Individ Diff* 2001;30:669–689.
9. Fischer S, Anderson KG, Smith GT. Coping with distress by eating or drinking: Role of trait urgency and expectancies. *Psychol Addict Behav* 2004;18:269–274.
10. Fischer S, Smith GT, Anderson KG. Clarifying the role of impulsivity in bulimia nervosa. *Int J Eat Disord* 2003;33:406–411.
11. Arnow B, Kenardy J, Agras WS. The emotional eating scale: The development of a measure to assess coping with negative affect by eating. *Int J Eat Disord* 1995;18:79–1890.
12. Wegner KE, Smyth JM, Crosby RD, Wittrock D, Wonderlich SA, Mitchell JE. An evaluation of the relationship between mood and binge eating in the natural environment using ecological momentary assessment. *Int J Eat Disord* 2002;32:352–361.
13. Reiss S, McNally RJ. Expectancy model of fear. In: Reiss S, Bootzin RR, editors. *Theoretical Issues in Behavior Therapy*. San Diego: Academic Press, 1985; pp. 107–121.
14. Anestis MD, Holm-Denoma JM, Gordon KH, Schmidt NB, Joiner TE. The role of anxiety sensitivity in eating pathology. *Cognit Ther Res* (in press).
15. Garner DM, Olmstead MP, Polivy J. Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *Int J Eat Disord* 1983;2:15–19.
16. Brown RA, Lejuez CW, Kahler CW, Strong DR, Zvolensky MJ. Distress tolerance and early smoking lapse. *Clin Psychol Rev* 2005; 25:713–733.
17. Brandon TH, Herzog TA, Juliano LM, Irvin JE, Lavee AB, Nath V. Pretreatment task-persistence predicts smoking cessation outcome. *J Abnorm Psychol* 2003;112(3):448–456.
18. Daughters SB, Lejuez CW, Kahler CW, Strong DR, Brown RA. Psychological distress tolerance and duration of most recent abstinence attempt among residential treatment seeking substance abusers. *Psychol Addictive Behav* 2005;19(2):208–211.
19. Daughters SB, Lejuez CW, Strong DR, Brown RA, Breen RB, Lesieur HR. The relationship among negative affect, distress tolerance, and length of gambling abstinence attempt. *J Gamb Stud* 2005;21(4):363–378.
20. Brown RA, Lejuez CW, Kahler CW, Strong D. Distress tolerance and duration of past smoking cessation attempts. *J Abnorm Psychol* 2002;111(1):180–185.
21. Chapman AL, Gratz KL, Brown MZ. Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behav Res Ther* 2006;44:371–394.
22. Simons JS, Gaher RM. The distress tolerance scale: Development and validation of a self-report measure. *Motiv Emot* 2005;29:83–102.
23. Beck AT, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory twenty-five years of evaluation. *Clin Psychol Rev* 1998;8:77–100.
24. Beck AT, Steer RA, Brown GK. *BDI-II, Beck Depression Inventory Manual*. Harcourt Brace: Psychological Corporation; 1996.
25. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: Psychometric properties. *J Consult Clin Psychol* 1988;56:893–897.

26. Watson D, Tellegen A, Clark L. Development and validation of brief measures of positive and negative affect: The PANAS scales. *J Pers Soc Psychol* 1988;54:1063–1070.
27. Reiss S, Peterson R, Gursky D, McNally R. Anxiety sensitivity, anxiety frequency, and the prediction of fearfulness. *Behav Res Ther* 1986;24:1–8.
28. Peterson RA, Plehn K. Measuring anxiety sensitivity. In: Taylor S, editor. *Anxiety Sensitivity: Theory, Research, and Treatment of the Fear of Anxiety*. The LEA series in Personality and Clinical Psychology. Mahwah: Lawrence Erlbaum Associates, 1999; pp. 61–81.
29. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 1986;51:1173–1182.
30. Sobel ME. Asymptotic confidence intervals for indirect effects in structural equation models. In: Leinhardt S, editor. *Sociological Methodology*. Washington: American Sociological Association, 1982; pp. 290–312.