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Examining Affect and Perfectionism in Relation to Eating Disorder Symptoms among Women with Anorexia Nervosa

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Abstract

This study examined personality and affective variables in relation to eating disorder symptoms in anorexia nervosa (AN). Women ($N=118$) with DSM-IV AN completed baseline questionnaires (Beck Depression Inventory, Frost Multidimensional Perfectionism Scale) and interviews (Eating Disorder Examination, Yale-Brown-Cornell Eating Disorder Scale), followed by two weeks of ecological momentary assessment (EMA) involving multiple daily reports of affective states and eating disorder behaviors. Hierarchical regression analyses were conducted using eating disorder symptoms as dependent variables (i.e., EMA binge eating, EMA self-induced vomiting, eating disorder rituals, eating disorder preoccupations, dietary restraint). Predictor variables were maladaptive perfectionism (baseline), depressive symptoms (baseline), and affect lability (EMA). Results revealed that affect lability was independently associated with binge eating, whereas depressive symptoms were independently associated with self-induced vomiting. Depressive symptoms were independently associated with eating disorder rituals, whereas both depressive symptoms and maladaptive perfectionism were independently associated with eating disorder preoccupations. Finally, maladaptive perfectionism and affect lability were both independently associated with dietary restraint. This pattern of findings suggests the importance of affective and personality constructs in relation to eating disorder symptoms in AN and may highlight the importance of targeting these variables in the context of treatment.

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Keywords

eating pathology; personality; emotion; rituals; preoccupations

1. Introduction

Anorexia nervosa (AN) is an eating disorder that is characterized by a myriad of maladaptive cognitive and behavioral symptoms (APA, 2015). Some of these features are central to the disorder, such as caloric restriction relative to energy expenditure leading to low body weight. Other symptoms distinguish the AN diagnostic subtypes (i.e., presence or absence of recurrent binge eating and/or purging behaviors). Although not directly specified within the diagnostic criteria or subtypes of AN, other common symptoms include various forms of affective disturbance (e.g., poor distress tolerance, emotional non-acceptance/suppression; Lavender et al., 2015; Oldershaw et al., 2015), as well as eating- and body-related rituals (e.g., cutting food into small pieces, body checking; Sunday et al., 1995) and preoccupations (e.g., excessive cognitions about the caloric or macronutrient content of food; Sunday et al., 1995).

Several theoretical models of AN and other eating disorders have been proposed that address many of the symptoms noted above (e.g., Fairburn et al., 2003; Haynos and Fruzzetti, 2011; Schmidt and Treasure, 2006; Wildes et al., 2010). Within these models, two constructs that have been broadly identified as salient to eating disorder psychopathology are personality and affect. For instance, the role of obsessive-compulsive personality traits as potential AN risk and maintenance factors is addressed in Schmidt and Treasure's (2006) cognitive-interpersonal maintenance model. In contrast, Haynos and Fruzzetti (2011) emphasize emotion dysregulation and Wildes and colleagues (2010) highlight avoidance of depressive/anxious symptoms in their respective models of AN. The relevance of such personality and affective constructs to eating disorder psychopathology has also received empirical support. For example, the temperament variable of harm avoidance and personality constructs such as obsessive-compulsiveness and neuroticism have been identified as salient to AN (Cassin and von Ranson, 2005), and evidence also supports the relevance of affective variables including lack of emotional awareness/clarity, emotion dysregulation, and emotion avoidance (e.g., Lavender et al., 2015; Oldershaw et al., 2015; Wildes et al., 2010).

With regard to the role of personality in AN, the construct of perfectionism has long been a focus in both theoretical models and empirical investigations. In particular, perfectionism is highlighted in both the transdiagnostic model of eating disorders (Fairburn et al., 2003) and the cognitive-interpersonal maintenance model of AN (Schmidt and Treasure, 2006). Perfectionism has been conceptualized as a multidimensional construct comprised of both adaptive and maladaptive facets (e.g., Stoeber and Otto, 2006). Empirical evidence suggests that this construct may function as a risk and/or maintenance factor for eating disorder psychopathology, with maladaptive facets of perfectionism highlighted as being particularly salient across eating disorder diagnostic groups (e.g., Bardone-Cone et al., 2007; Bulik et al. 2003; Forbush et al., 2007; Stice, 2002). Further, in terms of affective variables in AN, much existing research has focused on various measures of the intensity of negative affective

states. Depressive symptoms in particular have received substantial attention in studies of AN. Of note, major depressive disorder is the most common co-occurring psychiatric diagnosis among adults with AN, and negative affect more broadly is an established risk factor for eating pathology (Hudson et al., 2007; Stice, 2002). More recent AN research has also begun to consider not just the intensity of affect, but the lability of affect, with evidence suggesting that affective variability may also be salient to eating disorder symptoms in AN (e.g., Engel et al., 2005; Vansteelandt et al., 2013).

1.1. Current Study

Theoretical and empirical accounts thus support the salience of perfectionism and affective variables in relation to eating disorder psychopathology, including AN. However, there has been limited research on the nature of the association between these variables and eating disorder symptoms in AN that vary in terms of form, frequency, and hypothesized function. Therefore, the purpose of this study was to examine perfectionism and affective variables representing both intensity (i.e., depressive symptoms) and variability (i.e., affect lability) in relation to a broader range of eating disorder symptoms in AN, including those that are considered central to the disorder (i.e., dietary restraint), those associated with AN diagnostic subtypes (i.e., binge eating and self-induced vomiting), and other commonly occurring symptoms (e.g., eating disorder rituals and preoccupations). The specific predictor variables (i.e., maladaptive perfectionism, depressive symptoms, and affect lability) were selected given their hypothesized role in AN, as well as the potential for differential associations between the predictors and the various eating disorder symptoms. For instance, affect lability may be more salient to eating disorder symptoms known to be precipitated by increasing levels of negative affect (e.g., binge eating), whereas maladaptive perfectionism may be more salient to eating disorder symptoms of an obsessional and/or compulsive nature (e.g., eating disorder rituals and preoccupations). To further extend prior research, both predictor variables and dependent variables included traditional self-report (i.e., interview and questionnaire) and ecological momentary assessment (EMA; naturalistic, repeated assessments in the moment) measures. The use of EMA provides several benefits over traditional self-report forms of assessment, particularly increased ecological validity and reduced reliance on retrospective recall.

There were four main hypotheses in the current study. First, given evidence that depression is associated with multiple aspects of eating disorder psychopathology (e.g., Jordan et al., 2009; Spoor et al., 2006; Puccio et al., in press), it was hypothesized that depressive symptoms would be independently associated with all eating disorder symptom variables. Second, consistent with evidence that variability in affect commonly precipitates (increases in negative affect, decreases in positive affect) and follows (decreases in negative affect, increases in positive affect) binge eating and purging behaviors (e.g., Engel et al., 2013; Smyth et al., 2007), it was hypothesized that affect lability would emerge as the most salient predictor for binge eating and self-induced vomiting. Third, given the association between perfectionism and obsessive-compulsive symptoms (e.g., Rheaume et al., 1995), as well as prior research suggesting an association between perfectionism and rituals/preoccupations (e.g., Halmi et al., 2000), it was hypothesized that maladaptive perfectionism would emerge as the most salient predictor for eating disorder rituals and preoccupations. Finally, in light

of prior evidence linking dietary restraint and restriction to perfectionism and the various affective constructs examined here (e.g., Engel et al., 2005; Jordan et al., 2009; McLaren et al., 2001; Puccio et al., in press), it was hypothesized that all of the predictor variables would be independently associated with dietary restraint.

2. Method

2.1. Participants

Participants were eligible for this study if they were female, at least 18 years of age, and met criteria for Diagnostic and Statistical Manual of Mental Disorders (4th Edition: DSM-IV; APA, 1994) AN or subthreshold AN, defined as meeting all DSM-IV criteria for AN except: body mass index (BMI) of 17.6 to 18.5 kg/m², or absence of amenorrhea or the cognitive symptoms of AN. More specifically, the subthreshold AN group was comprised of individuals characterized by one of three symptom presentations: (a) amenorrhea, cognitive symptoms, and BMI of 17.6 to 18.5 kg/m², (b) amenorrhea, no cognitive symptoms, and BMI < 17.5 kg/m², and (c) no amenorrhea, cognitive symptoms, and BMI < 17.5 kg/m² (see Le Grange et al., 2012 for further details). A total of 601 potential participants were initially phone screened for eligibility, and of those, 166 were further evaluated at the research facilities; 121 participants met final eligibility criteria, agreed to participate, and enrolled in the study. Three participants with EMA compliance rates of less than 50% were excluded from analyses, resulting in a final sample of 118 participants (59 with full AN, 59 with subthreshold AN). Seventy-three (61.9%) participants were diagnosed with AN restricting type (ANr) and 45 (38.1%) were diagnosed with AN binge eating/purging type (ANbp). The sample was predominantly Caucasian (96.6%) with a mean age of 25.3 years (*SD* = 8.4) and a mean BMI of 17.2 kg/m² (*SD* = 1.0).

2.2. Procedure

Participants were recruited through clinical, community, and campus settings at three sites in the Midwestern United States. Individuals who met preliminary criteria based on an initial phone screen attended two study visits to complete a screening physical examination (including measurement of height and weight), laboratory tests, structured interviews, and self-report measures. Research personnel provided training in the use of the palmtop computer during the first study visit, after which participants completed two practice days (practice data were not used in analyses) to establish familiarity with the EMA measures and procedures. Participants then completed a two-week EMA protocol, which involved (a) completing ratings in response to six semi-random signals throughout the waking hours of the day, (b) completing ratings when an eating disorder behavior (e.g., binge eating, self-induced vomiting) occurred, and (c) completing ratings at the end of the day. Compensation for participation included \$100 per week for completing EMA measures and a random signal compliance-based bonus of \$50. Additional details regarding the study methodology can be found in Lavender and colleagues (2013). This study was approved by the relevant Institutional Review Boards at each site.

2.3. Measures

2.3.1. Structured Clinical Interview for DSM-IV Axis I Disorders, Patient Edition (SCID-I/P; First et al., 1995)—The SCID-I/P is a semi-structured interview that was used to determine DSM-IV diagnostic criteria for AN and subthreshold AN. SCID interviews were recorded and a second independent assessor rated current eating disorder diagnoses in a random sample of 25% of these interviews. Interrater reliability for current AN diagnosis based upon a kappa coefficient was .929.

2.3.2. Eating Disorder Examination (EDE; Fairburn et al., 2008)—The EDE is a semi-structured interview that was used to assess eating disorder symptoms during the previous 28 days. The EDE contains four subscales: restraint, eating concern, weight concern, and shape concern. EDE interviews were recorded and 25% were rated by a second independent assessor. The EDE is a widely used measure of ED psychopathology, and evidence supports its validity and reliability (Berg et al., 2012). In the current study, only the restraint subscale was used. Interrater reliability based upon intraclass correlations coefficients was 0.997 for this subscale, and Cronbach's alpha was 0.739.

2.3.3. Yale-Brown-Cornell Eating Disorder Scale (YBC-EDS; Sunday et al., 1995)—The YBC-EDS is a semi-structured interview that was used to assess eating- and body-related rituals (e.g., needing to cut food into specific sizes, needing to repeatedly feel hip bones, needing to exercise after eating) and preoccupations (e.g., thinking excessively about caloric content of food, fear of eating a full plate of food, fear of wearing specific types of clothing). Separate scores reflect the severity of rituals and preoccupations during the previous 28 days. The YBC-EDS has demonstrated excellent interrater reliability, internal consistency, and convergent validity (Mazure et al., 1994). In the current study, alpha coefficients were 0.829 for rituals and 0.806 for preoccupations.

2.3.4. Beck Depression Inventory (BDI; Beck et al., 1961)—The BDI is a 21-item self-report measure that was used to assess depressive symptoms, reflecting the intensity of negative affective experiences. The psychometric properties of the BDI have been well established (Beck et al., 1988). The alpha coefficient for the BDI in the current study was 0.922.

2.3.5. Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990)—The FMPS is a 35-item self-report measure that was used to assess facets of perfectionism. Consistent with prior research (e.g., Di Schiena et al., 2012), two subscales that are typically conceptualized as maladaptive facets of perfectionism (e.g., Stoeber and Otto, 2006) were combined to form a maladaptive perfectionism scale. More specifically, maladaptive perfectionism was calculated as the mean of the z-scores for the FMPS subscales of Concern over Mistakes (e.g., "I should be upset if I make a mistake") and Doubt about Actions (e.g., "I usually have doubts about the simple everyday things I do"). The FMPS has demonstrated good internal consistency and convergent validity (Frost et al., 1990). The alpha coefficient for this combined scale was 0.929 in the current study.

2.3.6. EMA measures—Momentary negative affect was assessed using eight items from the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson and Clark, 1994): afraid, angry at self, ashamed, nervous, disgusted, dissatisfied with self, distressed, and sad ($\alpha = 0.94$). Items from the full PANAS-X were chosen on the basis of high factor loadings and theoretical relevance to AN. These momentary ratings were used to derive the Mean Squared Successive Difference (MSSD) statistic, calculated as the squared difference across successive time points in relation to the distance between the measured time points. Consistent with prior research in samples with various forms of psychopathology, including eating disorders, (e.g., Santangelo et al., 2014; Woyshville et al., 1999), this statistic was used as an EMA-based measure affect lability, as it represents the extent to which consecutive negative affect ratings vary across time points. Finally, participants were instructed to report the occurrence of each episode of binge eating and self-induced vomiting, and were also given the opportunity at each random signal to report recent behaviors (i.e., those that had occurred since their last recording) that they had not previously reported. Given variability in the total number of days for which participants provided EMA data, the frequency of binge eating and self-induced vomiting episodes reported by each participant in the EMA protocol was divided by the number of days for which that participant provided EMA data. This provided an index of binge eating and self-induced vomiting frequency for each participant.

2.4. Statistical Analysis

A series of hierarchical multiple regression analyses were conducted to examine the independent associations between the three predictor variables (i.e., maladaptive perfectionism, depressive symptoms, affect lability) and several distinct types of eating disorder symptoms assessed via EMA and interview (i.e., EMA binge eating, EMA self-induced vomiting, eating disorder rituals, eating disorder preoccupations, dietary restraint). For each regression, covariates selected due to their theoretical relevance to eating disorder symptoms (i.e., age, BMI, AN diagnostic subtype) were entered in Step 1, and the three predictor variables were entered in Step 2.

3. Results

Participants provided 14,945 separate EMA recordings across the course of the study, and compliance rates averaged 87% for random signal recordings and 89% for end of day recordings. Table 1 presents results for the regressions predicting EMA binge eating and EMA self-induced vomiting. Preliminary examination of the distributions of the variables revealed that the EMA binge eating and EMA vomiting frequency proportions were skewed, thus these variables were transformed using a square root transformation prior to analysis. For EMA binge eating, not surprisingly, diagnostic subtype was a significant covariate in Step 1 (greater frequency in ANbp). In Step 2, EMA affect lability was independently positively associated with binge eating. For EMA self-induced vomiting, again unsurprisingly, diagnostic subtype was also a significant covariate in Step 1 (greater frequency in ANbp). In Step 2, depressive symptoms were independently positively associated with self-induced vomiting.

Table 2 presents results for the regressions predicting eating disorder rituals, eating disorder preoccupations, and restraint. For eating disorder rituals, diagnostic subtype was a significant covariate in Step 1 (greater rituals in ANbp), and depressive symptoms were independently positively associated with eating disorder rituals in Step 2. For eating disorder preoccupations, both age and diagnostic subtype were significant covariates in Step 1, with results indicating a positive association with age and greater preoccupations in ANbp. Both depressive symptoms and maladaptive perfectionism were independently positively associated with preoccupations in Step 2. Finally, for dietary restraint, both BMI and diagnostic subtype were significant covariates in Step 1, with results indicating a positive association with BMI and greater dietary restraint in ANbp. In Step 2, both maladaptive perfectionism and affect lability were independently positively associated with dietary restraint.

4. Discussion

Overall, the findings of the present study are consistent with previous research suggesting the importance of perfectionism and affect in eating disorder psychopathology, including AN (Bardone-Cone et al., 2007; Lavender et al., 2015; Oldershaw et al., 2015; Stice, 2002). Results were partially supportive of the study hypotheses. Each of the variables examined in this investigation was independently associated with one or more specific eating disorder symptoms, with depressive symptoms showing the greatest number of associations. In particular, depressive symptoms were independently associated with both eating disorder rituals and preoccupations, as well as self-induced vomiting, but not with binge eating or dietary restraint. With regard to maladaptive perfectionism, there was an independent association with the more cognitively-oriented symptoms of dietary restraint and eating disorder preoccupations, but not with the more behaviorally-oriented symptoms of binge eating, self-induced vomiting, or eating disorder rituals. As such, this pattern suggests that maladaptive perfectionism may be more strongly associated with cognitively- versus behaviorally-oriented eating disorder symptoms, at least in this sample.

Affect lability emerged as an independent predictor of both binge eating and dietary restraint. This result is consistent with theoretical models suggesting that binge eating and dietary restraint may function as methods of avoiding, escaping, or regulating aversive and/or labile affective states; alternatively this finding could also indicate that engaging in binge eating and dietary restraint may produce greater fluctuations in negative affective states. Of note, results differed for binge eating and self-induced vomiting, with the findings suggesting a greater role of lability of affect in relation to binge eating and a greater role of intensity of negative affect in relation to self-induced vomiting. The potentially differential importance of lability versus intensity of negative affect in relation to various eating disorder symptoms may explain why depressive symptoms were not significantly associated with either dietary restraint or binge eating after accounting for affect lability.

In addition to the primary results, several other findings from the current investigation were noteworthy. For example, AN diagnostic subtype emerged as a significant covariate in all analyses. Specifically, the ANbp subtype was found to consistently display greater severity of each type of ED symptom when accounting for the predictor variables. This finding

supports prior research suggesting that ANbp may represent a more severe presentation of AN (e.g., Peat et al., 2009; Wonderlich et al., 2007). Further, although the DSM-5 (APA, 2013) uses BMI as severity indicator for AN, BMI was not found to be associated with severity of any ED symptoms in the current study after accounting for the predictor variables.

4.1. Strengths and Limitations

There were three primary strengths of the current study: (a) the large, multisite sample of women with AN; (b) the inclusion of data collected via traditional self-report and EMA as both predictor and dependent variables; and (c) an examination of perfectionism and affective constructs in relation to a broader range of eating disorder symptoms than has typically been investigated in research on AN. However, certain limitations of this investigation should also be noted. First, the timeframe assessed by the various predictor and outcome measures differed somewhat. Regarding the baseline measures, the EDE and YBC-EDS required participants to report symptoms over the previous 28 days/1 month and the BDI assessed symptoms over the past week. The EMA-based measures assessed binge eating, self-induced vomiting, and affect lability over the two-week EMA protocol (which was subsequent to the baseline assessments). As such, models predicting EMA-based eating disorder symptoms addressed a slightly different timeframe than models predicting interview-based eating disorder symptoms. While evidence suggests good convergence/temporal stability of affective and eating disorder symptom measures administered at baseline and in a subsequent EMA protocol (e.g., Wonderlich et al., 2015), it is nonetheless possible that differential findings across models actually reflect differences in experiences during the timeframes that the specific measures assessed. Second, given the use of varying assessment formats (i.e., traditional self-report and EMA), it is possible that the findings were impacted by shared method variance. Third, the design of this investigation does not allow for a determination of the causality of the effects; experimental and prospective research is needed to investigate the extent to which the identified associations are causal in nature. Fourth, while compliance rates in the EMA protocol were high, it is possible that participants did not report every instance of binge eating or self-induced vomiting. Finally, the characteristics of the current sample (i.e., all female, limited ethnic diversity, mild AN severity on average) may limit the generalizability of the findings.

4.2. Future Directions and Clinical Implications

Despite these limitations, the current findings extend the literature on personality and affective variables in AN, demonstrating that particular variables may be differentially associated with various eating disorder symptoms that occur among women with AN. These findings are consistent with several theoretical models of AN that emphasize the role of one or more of the predictor variables examined in this study (e.g., Fairburn et al., 2003; Haynos and Fruzzetti, 2011; Schmidt and Treasure, 2006; Wildes et al., 2010); however, these results are also suggestive of greater complexity in the associations, with certain eating disorder symptoms being more strongly linked to the theoretically salient constructs. Additional research is needed to further elucidate the nature of these associations, including potential moderating and mediating relationships. Additionally, other theoretically relevant constructs should be examined in relation to various forms of eating disorder symptoms in AN,

including temperament/personality variables such as sensitivity to reward/punishment, or affective variables such as distress tolerance or emotional avoidance. In particular, further examination of constructs that may have particular relevance to either behaviorally- or cognitive-oriented eating disorder symptoms in AN, such as negative urgency (i.e., the tendency to engage in rash behaviors in response to intense negative affect) or rumination, is warranted.

Finally, there are potential clinical implications of the current findings. First, these results suggest the potential benefits of conducting baseline assessments of a variety of affective and personality constructs for patients with AN in order to identify relevant treatment targets in these domains. Broadly, the differing pattern of results found in this study is also consistent with the use of interventions that target both personality-based and affective constructs in AN treatment to address the various cognitive and behavioral symptoms characterizing the disorder. Additionally, these findings point to the potential utility of examining the possible functions of various eating disorder symptoms in AN (e.g., dietary restraint or binge eating as a method of coping with affective instability), as well as the importance of considering both intensity and lability of affective states.

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References

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. APA Press; Washington, DC: 1994.
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. APA Press; Washington, DC: 2013.
- Anestis MD, Selby EA, Crosby RD, Wonderlich SA, Engel SG, Joiner TE. A comparison of retrospective self-report versus ecological momentary assessment measures of affective lability in the examination of its relationship with bulimic symptomatology. *Behav. Res. Ther.* 2010; 48:607–613. [PubMed: 20392437]
- Bardone-Cone AM, Wonderlich SA, Frost RO, Bulik CM, Mitchell JE, Uppala S, Simonich H. Perfectionism and eating disorders: Current status and future directions. *Clin. Psychol. Rev.* 2007; 27:384–405. [PubMed: 17267086]
- Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch. Gen. Psychiatry.* 1961; 4:561–571. [PubMed: 13688369]
- Beck AT, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clin. Psychol. Rev.* 1988; 8:77–100.
- Berg KC, Peterson CB, Frazier P, Crow SJ. Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: a systematic review of the literature. *Int. J. Eat. Disorder.* 2012; 45:428–438.
- Bulik CM, Tozzi F, Anderson C, Mazzeo SE, Aggen S, Sullivan PF. The relation between eating disorders and components of perfectionism. *Am. J. Psychiatry.* 2003; 160:366–368. [PubMed: 12562586]
- Cassin SE, von Ranson KM. Personality and eating disorders: A decade in review. *Clin. Psychol. Rev.* 2005; 25:895–916. [PubMed: 16099563]

- Di Schiena R, Luminet O, Philippot P, Douilliez C. Adaptive and maladaptive perfectionism in depression: Preliminary evidence on the role of adaptive and maladaptive rumination. *Pers. Individ. Differ.* 2012; 53:774–778.
- Engel SG, Wonderlich SA, Crosby RD, Mitchell JE, Crow SJ, Peterson CB, Le Grange D, Simonich HK, Cao L, Lavender JM, Gordon KH. The role of affect in the maintenance of anorexia nervosa: Evidence from a naturalistic assessment of momentary behaviors and emotion. *J. Abnorm. Psychol.* 2013; 122:709–719. [PubMed: 24016011]
- Engel S, Wonderlich S, Crosby R, Wright T, Mitchell J, Crow S, Venegoni EE. A study of patients with anorexia nervosa using ecologic momentary assessment. *Int. J. Eat. Disord.* 2005; 38:335–339. [PubMed: 16261606]
- Fairburn, CG.; Cooper, Z. The Eating Disorder Examination. In: Fairburn, CG.; Wilson, GT., editors. *Binge Eating: Nature, Assessment, and Treatment*. 12th Ed. Guilford Press; New York: 1993. p. 317-360.
- Fairburn CG, Cooper Z, Shafran R. Cognitive-behavior therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behav. Res. Ther.* 2003; 41:509–528. [PubMed: 12711261]
- First, M.; Spitzer, R.; Gibbon, M.; Williams, J. *Structured Clinical Interview for DSM– IV Axis I Disorders: Patient Edition (SCID-I/P)*. Biometrics; New York: 1995.
- Forbush K, Heatherton TF, Keel PK. Relationships between perfectionism and specific disordered eating behaviors. *Int. J. Eat. Disord.* 2007; 40:37–41. [PubMed: 16958125]
- Frost RO, Marten P, Hahart C, Rosenblate R. The dimensions of perfectionism. *Cognit. Ther. Res.* 1990; 14:449–468.
- Halmi KA, Sunday SR, Strober M, Kaplan A, Woodside DB, Fichter M, Treasure J, Berrettini WH, Kaye WH. Perfectionism in anorexia nervosa: variation by clinical subtype, obsessiveness, and pathological eating behavior. *Am. J. Psychiatry.* 2000; 157:1799–1805. [PubMed: 11058477]
- Haynos AF, Fruzzetti AE. Anorexia nervosa as a disorder of emotion dysregulation: Evidence and treatment implications. *Clin. Psychol.* 2011; 18:183–202.
- Hudson JI, Hiripi E, Pope HG, Kessler RC. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biol. Psychiatry.* 2007; 61:348–358. [PubMed: 16815322]
- Jordan J, Joyce PR, Carter FA, McIntosh VV, Luty SE, McKenzie JM, Frampton CM, Bulik CM. The Yale-Brown-Cornell eating disorder scale in women with anorexia nervosa: what is it measuring? *Int. J. Eat. Disord.* 2009; 42:267–274. [PubMed: 18951459]
- Lavender JM, De Young KP, Wonderlich SA, Crosby RD, Engel SG, Mitchell JE, Crow SJ, Peterson CB, Le Grange D. Daily patterns of anxiety in anorexia nervosa: Associations with eating disorder behaviors in the natural environment. *J. Abnorm. Psychol.* 2013; 122:672–683. [PubMed: 23647124]
- Lavender JM, Wonderlich SA, Engel SG, Gordon KH, Kaye WH, Mitchell JE. Dimensions of emotion dysregulation in anorexia nervosa and bulimia nervosa: A conceptual review of the empirical literature. *Clin. Psychol. Rev.* 2015; 40:111–122. [PubMed: 26112760]
- Le Grange D, Crosby RD, Engel SG, Cao L, Ndungu A, Crow SJ, Peterson CB, Mitchell JE, Wonderlich SA. DSM-IV-Defined Anorexia Nervosa versus Subthreshold Anorexia Nervosa (EDNOS-AN). *Eur. Eat. Disord. Rev.* 2013; 21:1–7. [PubMed: 22847947]
- Mazure CM, Halmi KA, Sunday SR, Romano SJ, Einhorn AM. The Yale-Brown-Cornell Eating Disorder Scale: Development, use, reliability, and validity. *J. Psychiatr. Res.* 1994; 28:425–445. [PubMed: 7897615]
- McLaren L, Gauvin L, White D. The role of perfectionism and excessive commitment to exercise in explaining dietary restraint: replication and extension. *Int. J. Eat. Disord.* 2001; 29:307–313. [PubMed: 11262510]
- Oldershaw A, Lavender T, Sallis H, Stahl D, Schmidt U. Emotion generation and regulation in anorexia nervosa: a systematic review and meta-analysis of self-report data. *Clin. Psychol. Rev.* 2015; 39:83–95. [PubMed: 26043394]
- Peat C, Mitchell JE, Hoek HW, Wonderlich SA. Validity and utility of subtyping anorexia nervosa. *Int. J. Eat. Disord.* 2009; 42:590–594. [PubMed: 19598270]

- Puccio F, Fuller-Tyszkiewicz M, Ong D, Krug I. A systematic review and meta-analysis on the longitudinal relationship between eating pathology and depression. *Int. J. Eat. Disord.* in press.
- Rheaume J, Freeston MH, Dugas MJ, Letarte H, Ladouceur R. Perfectionism responsibility and obsessive-compulsive symptoms. *Behav. Res. Ther.* 1995; 33:785–794. [PubMed: 7677716]
- Santangelo P, Reinhard I, Mussgay L, Steil R, Sawitzki G, Klein C, Trull TJ, Bohus M, Ebner-Priemer UW. Specificity of affective instability in patients with borderline personality disorder compared to posttraumatic stress disorder, bulimia nervosa, and healthy controls. *J. Abnorm. Psychol.* 2014; 123:258–272. [PubMed: 24661176]
- Schmidt U, Treasure J. Anorexia nervosa: Valued and visible. A cognitive interpersonal maintenance model and its implications for research and practice. *Br. J. Clin. Psychol.* 2006; 45:343–366. [PubMed: 17147101]
- Smyth J, Wonderlich SA, Heron K, Sliwinski M, Crosby RD, Mitchell JE, Engel SG. Daily and momentary mood and stress predict binge eating and vomiting in bulimia nervosa patients in the natural environment. *J. Consult. Clin. Psychol.* 2007; 75:629–638. [PubMed: 17663616]
- Spoor ST, Stice E, Bekker MH, Van Strien T, Croon MA, Van Heck GL. Relations between dietary restraint, depressive symptoms, and binge eating: A longitudinal study. *Int. J. Eat. Disord.* 2006; 39:700–707. [PubMed: 16941629]
- Stice E. Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychol. Bull.* 2002; 128:825–848. [PubMed: 12206196]
- Stoeber J, Otto K. Positive conceptions of perfectionism: approaches, evidence, challenges. *Pers. Soc. Psychol. Rev.* 2006; 10:295–319. [PubMed: 17201590]
- Sunday SR, Halmi KA, Einhorn A. The Yale-Brown-Cornell Eating Disorder Scale: A new scale to assess eating disorder symptomatology. *Int. J. Eat. Disord.* 1995; 18:237–245. [PubMed: 8556019]
- Vansteelandt K, Probst M, Pieters G. Assessing affective variability in eating disorders: affect spins less in anorexia nervosa of the restrictive type. *Eat. Behav.* 2013; 14:263–268. [PubMed: 23910763]
- Watson, D.; Clark, LA. The PANAS-X: Manual for the Positive and Negative Affect Schedule – Expanded form. The University of Iowa; 1994.
- Wildes JE, Ringham RM, Marcus MD. Emotion avoidance in patients with anorexia nervosa: Initial test of a functional model. *Int. J. Eat. Disord.* 2010; 43:398–404. [PubMed: 19670226]
- Wonderlich JA, Lavender JM, Wonderlich SA, Peterson CB, Crow SJ, Engel SG, Le Grange D, Mitchell JE, Crosby RD. Examining convergence of retrospective and ecological momentary assessment measures of negative affect and eating disorder behaviors. *Int. J. Eat. Disord.* 2015; 48:305–311. [PubMed: 25195932]
- Wonderlich SA, Joiner TE, Keel PK, Williamson DA, Crosby RD. Eating disorder diagnoses: Empirical approaches to classification. *Am. Psychol.* 2007; 62:167–180. [PubMed: 17469896]
- Woyshville MJ, Lackamp JM, Eisengart JA, Gilliland JAM. On the meaning and measurement of affective instability: Clues from chaos theory. *Biol. Psychiatry.* 1999; 45:261–269. [PubMed: 10023499]

Highlights

- Affect and personality variables are salient to eating disorders (EDs)
- Affective variables and perfectionism were examined in anorexia nervosa (AN)
- Data was collected with traditional self-report and ecological momentary assessment
- Predictor variables were differentially related to various ED symptoms in AN
- Findings support targeting these variables in the treatment of AN

Table 1

Hierarchical Regression Analyses Predicting EMA Binge Eating and EMA Self-Induced Vomiting

	R^2	t	β	p
EMA Binge Eating				
Step 1	0.268			
Age		−0.362	−0.030	=.718
Body Mass Index		−0.937	−0.076	=.351
Diagnostic Subtype		6.312	0.511	<.001
Step 2	0.329			
Age		−0.124	−0.010	=.902
Body Mass Index		−1.855	−0.154	=.066
Diagnostic Subtype		5.662	0.463	<.001
Maladaptive Perfectionism		−0.157	−0.015	=.876
Depressive Symptoms		0.355	0.036	=.723
EMA Affect Lability		2.985	0.259	=.003
EMA Self-Induced Vomiting				
Step 1	0.443			
Age		0.254	0.018	=.800
Body Mass Index		0.991	0.070	=.324
Diagnostic Subtype		9.407	0.664	<.001
Step 2	0.489			
Age		−0.246	−0.018	=.806
Body Mass Index		0.357	0.026	=.722
Diagnostic Subtype		8.545	0.610	<.001
Maladaptive Perfectionism		0.622	0.054	=.536
Depressive Symptoms		2.018	0.179	=.046
EMA Affect Lability		0.487	0.037	=.627

Note. EMA = Ecological Momentary Assessment. Diagnostic subtype was coded as: ANr = 0, ANbp = 1.

Table 2

Hierarchical Regression Analyses Predicting Eating Disorder Rituals, Eating Disorder Preoccupations, and Dietary Restraint

	R^2	t	β	p
Eating Disorder Rituals				
Step 1	0.173			
Age		1.318	0.115	=.190
Body Mass Index		1.557	0.134	=.122
Diagnostic Subtype		4.329	0.374	<. .001
Step 2	0.380			
Age		0.504	0.040	=.615
Body Mass Index		0.531	0.042	=.597
Diagnostic Subtype		3.402	0.268	<. .001
Maladaptive Perfectionism		1.656	0.159	=.101
Depressive Symptoms		3.634	0.357	<. .001
EMA Affect Lability		0.510	0.043	=.611
Eating Disorder Preoccupations				
Step 1	0.135			
Age		2.059	0.183	=. .042
Body Mass Index		0.538	0.047	=.592
Diagnostic Subtype		3.384	0.298	=. .001
Step 2	0.435			
Age		1.482	0.112	=.141
Body Mass Index		-1.097	-0.083	=.275
Diagnostic Subtype		2.222	0.167	=. .028
Maladaptive Perfectionism		2.313	0.209	=. .023
Depressive Symptoms		3.989	0.372	<. .001
EMA Affect Lability		1.806	0.144	=.074
Dietary Restraint				
Step 1	0.181			
Age		1.632	0.141	=.105
Body Mass Index		2.032	0.174	=. .045
Diagnostic Subtype		4.227	0.362	<. .001
Step 2	0.411			=.911
Age		1.804	0.139	=.074
Body Mass Index		0.411	0.032	=.682
Diagnostic Subtype		3.638	0.279	<. .001
Maladaptive Perfectionism		3.606	0.333	<. .001
Depressive Symptoms		0.748	0.071	=.456
EMA Affect Lability		2.888	0.234	=. .005

Note. EMA = Ecological Momentary Assessment. Diagnostic subtype was coded as: ANr = 0, ANbp = 1.