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Associations between Retrospective versus Ecological Momentary Assessment Measures of Emotion and Eating Disorder Symptoms in Anorexia Nervosa

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Abstract

This study examined the unique associations between eating disorder symptoms and two emotion-related constructs (affective lability and anxiousness) assessed via distinct methodologies in anorexia nervosa (AN). Women (N=116) with full or subthreshold AN completed baseline emotion and eating disorder assessments, followed by two weeks of ecological momentary assessment (EMA). Hierarchical regressions were used to examine unique contributions of baseline and EMA measures of affective lability and anxiousness in accounting for variance in baseline eating disorder symptoms and EMA dietary restriction, controlling for age, body mass index, depression, and AN diagnostic subtype. Only EMA affective lability was uniquely associated with baseline eating disorder symptoms and EMA dietary restriction. Anxiousness was uniquely associated with baseline eating disorder symptoms regardless of assessment method; neither of the anxiousness measures was uniquely associated with EMA dietary restriction. Affective lability and anxiousness account for variance in global eating disorder symptomatology; AN treatments targeting these emotion-related constructs may prove useful.

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Contributors Drs. Lavender, De Young, and Anestis led the manuscript development. Dr. Crosby assisted with statistical analyses and managed the databases. Drs. Wonderlich, Crosby, Engel, Mitchell, Crow, Peterson, and Le Grange designed the study. All authors contributed to and approved the final manuscript.

Keywords

eating disorders; ecological momentary assessment; emotion; affective lability; anxiety; assessment

1. Introduction

Anorexia nervosa (AN) is characterized by low body weight, fear of fatness, body image disturbance, and maladaptive eating behaviors (e.g., dietary restriction; American Psychiatric Association, 1994). Emotions have long been implicated in the etiology and maintenance of AN, and continue to receive attention in treatment development (Wildes and Marcus, 2011), theoretical (Haynos and Fruzzetti, 2011), and mechanistic (Kaye et al., 2003) research. Several emotion-related constructs have been theorized to play an important role in AN. For instance, emotional avoidance has been posited to be a core feature of AN (Wildes and Marcus, 2011; Wildes et al., 2010), suggesting that eating disorder (ED) behaviors in AN function to limit the experience of distressing emotions, which commonly manifest as anxious or depressive states. Similarly, Haynos and Fruzzetti (2011) have described a model of AN as a disorder of emotion dysregulation. Among the most widely studied emotion-related constructs implicated in the theoretical and empirical literature on AN and other EDs are affective lability and anxiety.

Affective lability, or the tendency to experience frequent fluctuations in affective states, has been posited to increase one's vulnerability to engaging in maladaptive behaviors that may function as strategies to regulate aversive emotional states (Anestis et al., 2009). Anestis and colleagues (2010) found that greater affective lability was associated with greater ED symptom severity and binge eating frequency in a sample of women diagnosed with bulimia nervosa (BN). Further, a growing literature highlights the link between negative affective states and ED symptoms in AN (Engel et al., in press; Wildes et al., 2012); however, comparatively less research has been conducted on affective lability in women with AN. A substantial literature also has addressed the role of anxiety in AN, which shares features of anxiety disorders including an intense fear response to specific stimuli (e.g., fear of fatness; Strober, 2004) and avoidance of fear-eliciting stimuli (e.g., avoidance of "unsafe" foods; Steinglass et al., 2011). Anxiety disorders are among the most commonly co-occurring disorders in those with AN, and evidence suggests that they may precede the onset of AN (Bulik et al., 1997; Kaye et al., 2004). Further, findings from laboratory studies also suggest that dietary restriction in women with AN may have anxiolytic effects through its effects on the bioavailability of tryptophan, the precursor to serotonin (Kaye et al., 2003), and evidence suggests that eating and anxiety disorders may have a shared genetic transmission (Keel et al., 2005). Taken together, the sum of this evidence converges to indicate the potential significance of both affective lability and anxiety as important emotion-related factors in AN.

There were two overall aims of the current study: (a) to examine the degree to which the emotion-related constructs of affective lability and anxiousness were each independently associated with ED symptoms, and (b) to examine the extent to which ecological momentary assessment (EMA; momentary, naturalistic) versus baseline (global, retrospective) measures of the two emotion constructs were uniquely associated with ED symptoms. As noted above, evidence suggests that each of these emotion-related constructs may play a role in ED symptoms, but it remains unclear whether they may differ in the magnitude of their associations with ED psychopathology. Further, compared to standard interviews or self-report measures, which are typically based on retrospective recall requiring an individual to report on his/her global or typical experiences (e.g., tendency to experience mood

fluctuations), an EMA approach may provide numerous potential benefits. Specifically, the use of EMA reduces a number of factors that contribute to measurement error, including recall biases, and also allows researchers to obtain multiple, repeated measures of particular experiences (e.g., emotion-related variables) in the natural environment when they occur (Stone and Shiffman, 1994). EMA is thus particularly useful for examining emotion-behavior associations.

In the current study, EMA affective lability represented the degree to which an individual experienced frequent shifts in emotional states (e.g., levels of negative affect) throughout the EMA protocol, whereas EMA anxiousness represented the mean level of anxiousness across all EMA reports provided by the participants. These two variables were chosen to reflect two mechanisms (variability versus intensity of negative affect) thought to serve as potential etiological/maintenance factors in AN. First, it was hypothesized that when examined independently and controlling for relevant covariates, measures of affective lability and measures of anxiety would both account for a significant proportion of variance in two ED measures (i.e., a global and retrospective measure of ED symptoms, and an EMA measure of dietary restriction). Second, with regard to the two distinct assessment formats utilized in the current study, it was hypothesized that (when controlling for relevant covariates) EMA measures of affective lability and anxiousness would account for more unique variance in the ED symptom measures than the baseline assessments of the emotion-related constructs.

2. Methods

2.1. Participants

Participants were 116 females who met Diagnostic and Statistical Manual of Mental Disorders (4th Edition: *DSM-IV*; APA, 1994) for full ($n = 58$) or subthreshold ($n = 58$) AN. Seventy-one (61.2%) participants were diagnosed with AN restricting type and 45 (38.8%) were diagnosed with AN binge eating-purging type. Participants were eligible for the study if they were female, at least 18 years of age, and met full DSM-IV criteria for AN or met criteria for subthreshold AN. There were three possible symptom constellations of subthreshold AN: (a) amenorrhea, cognitive symptoms, and BMI of 17.6 to 18.5 kg/m^2 ;(b) amenorrhea, no cognitive symptoms, and BMI < 17.5 kg/m^2; and (c) no amenorrhea, cognitive symptoms, and BMI < 17.5 kg/m^2. The full and subthreshold AN groups did not significantly differ on various interview and traditional self-report measures of affect, ED symptoms, and personality (see Le Grange et al., 2013 for further details). Out of 601 potential participants screened for eligibility by phone, 166 received further eligibility evaluations at the research sites. In total, 121 participants were eligible, agreed to participate, and were enrolled in the study. Three participants with EMA compliance rates of less than 50% and two participants who were missing data for the baseline emotion-related measures were excluded from analyses, resulting in a final total of 116 participants. The final sample in this study had a mean age of 25.4 years ($SD = 8.4$) and a mean BMI of 17.2 kg/m^2 ($SD = 1.0$) at baseline.

2.2. Measures

2.2.1 Structured Clinical Interview for DSM-IV Axis I Disorders, Patient Edition (SCID-I/P; First et al., 1995)—The SCID was administered at baseline to assess DSM-IV diagnostic criteria for full and subthreshold AN. SCID interviews were recorded and a second independent assessor rated current ED diagnoses in a random sample of 25% (n = 30) of these interviews, with an interrater reliability based on a kappa coefficient of .93 for current AN diagnosis.

2.2.2. Eating Disorders Examination (EDE; Fairburn and Cooper, 1993)—The EDE, a semi-structured interview with well-established validity and reliability (Berg et al., 2012; Fairburn, 2008; Fairburn and Cooper, 1993), served as the primary measure of baseline ED symptoms. The EDE provides a global score and four subscale scores (Restraint, Eating Concern, Weight Concern, and Shape Concern). In the present study, the global score of the EDE was used as one of the primary outcome measures. EDE interviews were recorded and 25% (n = 31) were rated by a second independent assessor. Interrater reliability based upon intraclass correlations coefficients for the EDE scales ranged from .89 (Shape Concerns) to .997 (Restraint).

2.2.3. Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ; Livesley & Jackson, 2009)—The DAPP-BQ is a 290-item self-report questionnaire that contains 18 scales assessing personality traits thought to be associated with personality disorders. Items are rated on a 5-point scale ranging from (1) *very unlike me* to (5) *very like me.* Scores on the scales are reported as *T*-scores, with a mean of 50 and a standard deviation of 10. In the current study, two DAPP-BQ subscales were used to assess the emotion-related constructs of interest at baseline: Affective Lability (e.g., "My moods change suddenly"; $\alpha = .92$) and Anxiousness (e.g., "All my life I have been a worrier"; $\alpha = .94$).

2.2.4. Beck Depression Inventory (BDI; Beck et al., 1961)—The BDI is a 21-item self-report questionnaire assessing symptoms of depression. This measure was included as a covariate in the primary analyses, in order to control for baseline levels of mood disturbance. The psychometric properties of the BDI have been well established (Beck et al., 1988), and in the current study the alpha coefficient was .92.

2.2.5. EMA Measures—Momentary negative affect was assessed using eight items from the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) that were selected based on high factor loadings and theoretical relevance to AN: afraid, angry at self, ashamed, nervous, disgusted, dissatisfied with self, distressed, and sad ($\alpha = .94$). Similarly, momentary anxiety was assessed using 8 items from the tension-anxiety scale of the Profile of Mood States (POMS; Lorr and McNair, 1971): relaxed (reverse coded), on edge, restless, tense, anxious, uneasy, shaky, panicky ($\alpha = .92$). Participants rated PANAS and POMS items on a 5-point scale ranging from (1) *not at all* to (5) *extremely*. Finally, as part of the end-of-day rating that participants were asked to complete on each day of the EMA protocol, dietary restriction was assessed via an item that asked participants if they had consumed less than 1200 calories during that day. Participants also reported on a number of other ED behaviors not included in the current analyses.

2.3. Procedure

Participants were recruited at three sites (Fargo, Minneapolis, Chicago) from ED treatment facilities, mailings to ED treatment professionals, on-line postings, advertisements in community and campus newspapers, and flyers posted in clinical, community, and campus settings. After completing an initial phone screen and attending an informational meeting, participants were scheduled for two assessment visits during which: (a) participants provided written informed consent, (b) laboratory tests and a screening physical examination were conducted to ensure medical stability, and (c) structured interviews and self-report measures were administered. The study was approved by the institutional review board at each site.

Research personnel reviewed the study goals and provided training to the participants in the use of the palmtop computer during the first assessment visit. Participants were asked to

delay providing a rating if safety was a concern (e.g., signal occurred while driving) or they felt unable to reply (e.g., signal occurred during class). Participants provided data for 2 practice days (not used in analyses) to establish familiarity with the EMA measures and to minimize reactivity (although there is little evidence of reactivity in ED patients; Stein and Corte, 2003). Subsequently, participants were given the palmtop computer to complete EMA measures for 2 weeks, during which attempts were made to schedule each participant for 2-3 visits to obtain recorded data to minimize loss in the event of technical difficulties. During these visits, participants were given feedback about their compliance rates. Compensation for study participation included $100 per week for completing EMA measures, and a $50 bonus for a random signal compliance rate of at least 80%.

2.4. Statistical analyses

A series of hierarchical multiple linear regression analyses were conducted to examine the extent to which the measures of affective lability and anxiousness was uniquely associated with the two ED symptom measures (baseline EDE Global score and EMA dietary restriction), controlling for the covariates of age, BMI, and baseline depression symptoms. These particular covariates were selected because they represent constructs theoretically relevant to ED symptom measures, thus controlling for these variables provides a stronger test of the unique contributions for the emotion-related variables. An additional covariate, current AN diagnostic subtype (i.e., restricting versus binge eating-purging) was also included, given the potential for the subtypes to differ in degree of affective lability (Fairburn et al., 2003).

In the current study, EMA affective lability was defined by the MSSD statistic from the PANAS negative affect scale, calculated as the squared difference across successive time points in relation to the distance between the measured time points (Witte et al., 2005; Woyshville et al., 1999). This variable is a measure of lability/variability of negative affect, and represents the extent to which, on average, each participant's level of negative affect differs from the preceding level. EMA anxiousness was defined as the average of all momentary anxiety ratings (POMS tension-anxiety scale) a participant provided during the EMA protocol. Finally, the dietary restriction variable (defined as consuming fewer than 1200 calories in a day) was represented by a proportion, calculated as the number of days each participant indicated engaging in dietary restriction divided by the total number of days that participant provided an end-of-day rating.

3. Results

3.1. EMA Results

The 116 participants included in the analyses provided 14,713 separate EMA recordings. Across all participants, end-of-day ratings were provided on an average of 12.5 days (range: 4-17). Compliance with semi-random signals averaged 87% (range: 58-100%), while compliance with end-of-day ratings averaged 90% (range: 24-100%).

3.2. Preliminary Analyses

All variables included in the hierarchical regression analyses were examined for normality. Several variables were found to be significantly skewed, including two of the covariates (age and BMI), two of the independent variables (EMA affective lability and EMA anxiousness), and one of the outcome variables (EMA dietary restriction). All of these variables were positively skewed except for BMI, which was negatively skewed. Therefore, these variables were transformed using a square root transformation prior to inclusion in the subsequent regression analyses. Additionally, Pearson correlations were computed to examine the bivariate associations between the primary emotion independent variables, the

two ED outcome variables, and the covariates (see Table 1). Finally, independent samples *t*-tests were used to compare the two AN diagnostic subtypes on the four emotion-related measures (see Table 2).

3.3. EMA and DAPP-BQ Affective Lability

A series of hierarchical linear regression analyses were conducted to examine the extent to which baseline and EMA measures of affective lability were associated with (a) EDE global scores and (b) EMA dietary restriction, controlling for depression symptoms, age, BMI, and AN subtype (see Table 3). For each analysis, the four covariates were entered in Step 1, DAPP-BQ affective lability was entered in Step 2, and EMA affective lability was entered in Step 3. Results from the analysis with the EDE global score as the dependent variable indicated that the addition of DAPP-BQ affective lability did not contribute significant additional variance to the model in Step 2 ($\Delta R^2 = .017$, $p = .072$), and that the addition of EMA affective lability contributed significant additional variance to the model in Step 3 ($R^2 = .082$, $p < .001$). Thus, of the two affective lability measures, only EMA affective lability accounted for unique variance in EDE global scores in the final model ($R^2_{adj} = .484$). Similarly, results from the analysis with EMA dietary restriction as the dependent variable indicated that the addition of DAPP-BQ affective lability did not contribute significant additional variance to the model in Step 2 ($\Delta R^2 = .00$, $p = .826$), whereas the addition of EMA affective lability did contribute significant additional variance in Step 3 ($\Delta R^2 = .042$, $p = .019$). Thus, of the two affective lability measures, only EMA affective lability accounted for unique variance in EMA dietary restriction in the final model ($R^2_{adj} = .138$).

3.4. EMA and DAPP-BQ Anxiousness

A second series of hierarchical regression analyses were conducted to examine the degree to which baseline and EMA measures of anxiousness were associated with (a) EDE global scores and (b) EMA dietary restriction, controlling for depression symptoms, age, BMI, and AN subtype (see Table 4). Variables were entered in the same steps as described above. Results from the analysis with the EDE global score as the dependent variable indicated that the addition of DAPP-BQ anxiousness contributed significant additional variance to the model in Step 2 ($\Delta R^2 = .076$, $p < .001$), and that the addition of EMA anxiousness contributed significant additional variance to the model in Step 3 ($\Delta R^2 = .022$, $p = .030$). Both anxiousness measures accounted for unique variance in EDE global scores in the final model ($R^2_{adj} = .482$). In contrast, results from the analysis with EMA dietary restriction as the dependent variable indicated that neither the addition of DAPP-BQ anxiousness ($\Delta R^2 = .002$, $p = .655$) or EMA anxiousness ($\Delta R^2 = .001$, $p = .667$) contributed to predicting variance in EMA dietary restriction. Thus, neither of the variables was uniquely associated with EMA dietary restriction in the final model ($R^2_{adj} = .097$).

4. Discussion

The primary goals of this study were to examine associations between emotion-related constructs (i.e., affective lability and anxiousness) and ED psychopathology (i.e., global ED symptoms and dietary restriction), as well as to examine whether these associations would differ based on the method of assessment (i.e., retrospective data collected at baseline versus momentary data collected in the natural environment via EMA). Regarding the extent to which each of the emotion-related constructs was associated with ED symptoms, results revealed that the addition of affective lability measures to the regression models contributed to predicting variance in both baseline EDE global score and EMA dietary restriction after accounting for the covariates. Similarly, the addition of anxiousness measures to the regression model contributed to predicting variance in the baseline EDE global score when controlling for the covariates, although the measures did not significantly contribute to the

model predicting EMA dietary restriction. These findings were thus mostly consistent with the hypotheses. Specifically, the affective lability and anxiousness models both predicted nearly identical proportions of the variance in EDE global scores, although the proportion of variance accounted for in EMA dietary restriction was slightly higher in the affective lability model versus anxiousness model. Further, after accounting for the covariates, neither of the anxiousness variables contributed unique variance to predicting EMA dietary restriction. This finding may be due in part to the extensive overlap between the anxiety and depression constructs, the latter of which was included as a covariate and was found to be significant. In particular, anxiety likely contributes to numerous ED symptoms, which were represented by the baseline global ED measure, and it may be that the overlap between anxiety and depression resulted in a non-significant unique association between the anxiousness measures and the specific symptom of dietary restriction.

These results are consistent with previous research on women with BN, which has shown that affective lability is associated with dysregulated behaviors and ED symptom severity (Anestis et al., 2009; Anestis et al., 2010), and that days on which bulimic behaviors occur tend to be characterized by higher levels of affective lability (Selby et al., 2012). The current findings suggest that greater variability in mood states is associated with (a) greater eating pathology in general and with (b) dietary restriction specifically. Given evidence that negative affective states are salient momentary antecedents of ED behaviors (Haedt-Matt and Keel, 2011), those who display greater fluctuations in negative affect may be more likely to engage in certain behaviors (e.g., binge eating, purging, dietary restriction) in an effort to reduce or escape from aversive emotional states. Additionally, the current findings are also consistent with conceptual accounts (e.g., Steinglass et al., 2011; Wildes et al., 2010) and empirical research (Frank et al., 2012; Kaye et al., 2004; Yackobovitch-Gavan et al., 2009) that provide support for the salience of anxiety in AN.

In examining differences across the assessment formats, hypotheses were again mostly supported, with results revealing that three of four unique associations between the EMA measures of the emotion-related constructs and the two ED measures were significant. Specifically, EMA anxiousness was uniquely associated with baseline EDE global score, and EMA affective lability was uniquely associated with both baseline EDE global score and EMA dietary restriction. The only nonsignificant finding for the EMA measures was for the unique association between EMA anxiousness and EMA dietary restriction. In contrast, only one of the baseline emotion-related measures exhibited a unique association with an ED measure. Specifically, there was a significant unique association between the baseline measure of anxiousness and the EDE global score, whereas the baseline measures exhibited no other unique associations with either of the ED measures. Taken together, these findings provide support of assessing these emotion-related constructs in a momentary and naturalistic fashion. This may be particularly relevant for assessing *variability* in negative affective states versus *intensity* of negative affective states. From a methodological standpoint, individuals may be better able to accurately recall and report stable aspects of affective experience (e.g., consistently elevated negative affect), while the recollection of fluctuations in negative mood may be more subject to recall biases. As such, a measure of affective lability based on actual differences across momentary affect ratings may more accurately represent the construct.

Certain limitations should be considered with respect to the current findings. First, although the large sample of women with full or subthreshold AN is a strength of the study, the nature of the sample (i.e., a single diagnostic group, only women) limits the generalizability of the results, and future research will need to replicate these findings in other samples. Second, the effect sizes for the unique associations between the emotion-related measures and ED measures were generally small. Thus, although the emotion-related measures (particularly

affective lability measures) contributed unique variance in most of the models, much of the variance in the ED outcome variables remained unexplained, indicating that there are other important variables to consider. Third, findings regarding the anxiousness variables in the current study may have been influenced by the anxious nature of the sample (i.e., the mean of the DAPP-BQ anxiousness scale was more than a standard deviation above the norm), such that the potentially limited range could have reduced the ability to detect unique associations with this variable. Also, we cannot rule out that shared method variance contributed to results in which EMA methods accounted for more unique variance in EMA outcomes than did the baseline retrospective assessment methods (although the result indicating greater variance in baseline ED symptoms accounted for by EMA affective lability mitigates this concern). In addition, the aggregation procedure by which the EMA anxiousness variable was calculated may have introduced additional error that affected the results (Watson and Tellegen, 2002). Fourth, the primary measure of EMA dietary restriction was based on a self-report question regarding caloric consumption during the day. This variable is limited by nature of its reliance on participants accurately recalling the caloric content of the food they consumed, and it is also possible that emotion-related factors, including affective lability and anxiousness, impacted this recollection. Future research with more detailed food records may be useful in addressing this issue. Finally, the nature of the findings precludes the ability to determine the causal role of these emotion-related variables in the etiology and/or maintenance of AN. It may be that higher levels of affective lability and a tendency to be anxious are risk factors for developing AN. Alternatively, these variables may contribute to the maintenance of AN behaviors (e.g., dietary restriction), or may be exacerbated by the AN behaviors. Prospective studies are needed to clarify the nature of the associations between these emotion-related constructs and ED symptoms in AN.

Despite the limitations noted above, the results of the current study contribute to the existing literature on affective lability and anxiety among women with AN by demonstrating their unique associations with ED symptoms. The use of EMA can provide several advantages over standard retrospective methods of assessment that are subject to various recall biases, and the current findings reveal that assessments of the construct of affective lability in particular among those with AN may benefit from momentary methods as opposed to global, retrospective measures. Specifically, assessing affective lability via EMA provides a naturalistic measure of fluctuations/variability in momentary affective states, as opposed to retrospective measures that rely on an individual's perception of the tendency to experience changes in affective states. Further, the current findings indicate that in considering overall ED psychopathology, both affective lability and anxiety are important variables that are uniquely associated with ED symptoms, even after accounting for age, BMI, and depression symptoms. These findings are therefore consistent with recent theoretical and empirical accounts of the role of emotion dysregulation (Harrison et al., 2010; Haynos and Fruzzetti, 2011) and anxiety (Frank et al., 2012; Steinglass et al., 2011; Yackobovitch-Gavan et al., 2009) in AN.

The current findings also provide preliminary evidence suggesting that ED interventions targeting emotion-related constructs may prove useful in the treatment of women with AN, particularly among those who exhibit high levels of affective lability and/or anxiety. Further, findings revealed a similar pattern across the four emotion-related variables, in which those individuals with the binge eating-purging subtype of AN displayed higher scores than those with the restricting subtype. This finding may suggest that emotion-based treatments may be particularly useful for those patients with AN who present with regularly occurring binge eating or purging behaviors. These emotion-related constructs may play a functional role in the maintenance of ED symptoms (Fairburn et al., 2003; Haynos and Fruzzetti, 2011), and thus may prove to be useful targets for treatment. Among the psychotherapeutic approaches

that have been applied to EDs and that address or focus on emotion-related constructs are Dialectical Behavior Therapy (DBT; Safer et al., 2009), Emotion Acceptance Behavior Therapy (EABT; Wildes and Marcus, 2011), Integrative Cognitive Affective Therapy (ICAT; Wonderlich et al., 2008; Wonderlich et al., in press), and Enhanced Cognitive Behavior Therapy for Eating Disorders (CBT-E; Fairburn, 2008).

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Table 1

Means, standard deviations, and intercorrelations for all variables utilized in these analyses

	1	2	3	4	5	6	7	8	9
1. EMA Affective Lability	-								
2. DAPP-BQ Affective Lability	.34***	-							
3. EMA Anxiousness	.37***	.45***	-						
4. DAPP-BQ Anxiousness	.38***	.68***	.42**	-					
5. EMA Dietary Restriction Proportion	.28**	.16	.22*	.24*	-				
6. EDE Global Score	.49***	.43***	.47**	.58***	.56***	-			
7. Baseline BDI	.27**	.51***	.45**	.60***	.35***	.61**	-		
8. Baseline Age	−.14	.02	.19*	.03	.15	.16	.23*	-	
9. Baseline BMI	.27**	.04	−.08	.04	.06	.18	.12	−.14	-
Mean	22.26	54.59	20.14	61.03	0.32	2.78	22.15	25.38	17.17
Standard Deviation	16.99	9.92	6.31	8.93	0.39	1.28	13.69	8.40	1.00

Note. EMA = Ecological Momentary Assessment; DAPP-BQ = Dimensional Assessment of Personality Pathology – Basic Questionnaire; EDE = Eating Disorder Examination; BDI = Beck Depression Inventory; BMI = Body Mass Index. Means and standard deviations for variables transformed prior to regression analyses are reported as the raw (untransformed) values.

*** $p < .001$,

** $p < .01$,

* $p < .05$

Table 2

Comparison of affective lability and anxiousness measures across anorexia nervosa subtypes

	Restricting Subtype (*n* = 71)		Binge Eating-Purging Subtype (*n* = 45)		*t*	*p*
	M	***SD***	***M***	***SD***		
EMA Affective Lability	20.42	17.42	25.17	16.07	−1.90	=.061
DAPP-BQ Affective Lability	53.00	10.11	57.09	9.18	−2.20	=**.030**
EMA Anxiousness	18.67	5.61	22.44	6.71	−3.27	=**.001**
DAPP-BQ Anxiousness	59.85	9.42	62.91	7.84	−1.82	=.071

Note. EMA = Ecological Momentary Assessment; DAPP-BQ = Dimensional Assessment of Personality Pathology – Basic Questionnaire. Means and standard deviations are reported as the raw (untransformed) values.

Table 3

Unique associations of EMA affective lability and DAPP-BQ affective lability with EDE global score and EMA dietary restriction, controlling for depression, age, BMI, and AN subtype

					Correlations		
		β	*t*	*p*	**Zero-order**	**Partial**	**Semi-Partial**
	EDE Global Score						
1	Depression (BDI)	.54	6.95	<**.001**	.61	.55	.51
	Age	.03	0.35	=.729	.16	.03	.03
	BMI	.13	1.73	=.087	.18	.16	.13
	AN Diagnostic Subtype	.17	2.27	=**.025**	.31	.21	.17
2	Depression (BDI)	.47	5.24	<**.001**	.61	.45	.38
	Age	.04	0.57	=.571	.16	.05	.04
	BMI	.13	1.80	=.075	.18	.17	.13
	AN Diagnostic Subtype	.16	2.12	=**.036**	.31	.20	.15
	DAPP-BQ Affective Lability	.15	1.82	=.072	.43	.17	.13
3	Depression (BDI)	.43	5.17	<**.001**	.61	.44	.35
	Age	.10	1.33	=.187	.16	.13	.09
	BMI	.06	0.82	=.413	.18	.08	.06
	AN Diagnostic Subtype	.12	1.63	=.106	.31	.15	.11
	DAPP-BQ Affective Lability	.07	0.91	=.363	.43	.09	.06
	EMA Affective Lability	.33	4.28	<**.001**	.49	.38	.29
	EMA Dietary Restriction						
1	Depression (BDI)	.30	3.21	=**.002**	.35	.29	.28
	Age	.07	0.81	=.420	.15	.08	.07
	BMI	.04	0.49	=.628	.06	.05	.04
	AN Diagnostic Subtype	.10	1.13	=.262	.19	.11	.10
2	Depression (BDI)	.32	2.90	=**.005**	.35	.27	.26
	Age	.07	0.77	=.441	.15	.07	.07
	BMI	.04	0.48	=.634	.06	.05	.04
	AN Diagnostic Subtype	.11	1.14	=.258	.19	.11	.10
	DAPP-BQ Affective Lability	−.02	−0.22	=.826	.16	−.02	−.02
3	Depression (BDI)	.29	2.69	=**.008**	.35	.25	.23
	Age	.11	1.18	=.241	.15	.11	.10
	BMI	−.01	−0.11	=.909	.06	−.01	−.01
	AN Diagnostic Subtype	.07	0.80	=.426	.19	.08	.07
	DAPP-BQ Affective Lability	−.08	−0.77	=.445	.16	−.07	−.07
	EMA Affective Lability	.23	2.38	=**.019**	.28	.22	.21

Note. EMA = Ecological Momentary Assessment; DAPP-BQ = Dimensional Assessment of Personality Pathology – Basic Questionnaire; EDE = Eating Disorder Examination; BDI = Beck Depression Inventory; BMI = Body Mass Index. Bolded p-values denote significance at p<.05.

Table 4

Unique associations of EMA anxiousness and DAPP-BQ anxiousness with EDE global score and EMA dietary restriction, controlling for depression, age, BMI, and AN subtype

					Correlations		
		β	*t*	*p*	**Zero-order**	**Partial**	**Semi-Partial**
	EDE Global Score						
1	Depression (BDI)	.54	6.95	<**.001**	.61	.55	.51
	Age	.03	0.35	=.729	.16	.03	.03
	BMI	.13	1.73	=.087	.18	.16	.13
	AN Diagnostic Subtype	.17	2.27	=**.025**	.31	.21	.17
2	Depression (BDI)	.32	3.53	<**.001**	.61	.32	.24
	Age	.07	0.94	=.347	.16	.09	.06
	BMI	.15	2.08	=**.040**	.18	.19	.14
	AN Diagnostic Subtype	.17	2.35	=**.021**	.31	.22	.16
	DAPP-BQ Anxiousness	.35	4.03	<**.001**	.58	.36	.28
3	Depression (BDI)	.28	3.01	=**.003**	.61	.28	.20
	Age	.05	0.73	=.465	.16	.07	.05
	BMI	.16	2.33	=**.022**	.18	.22	.16
	AN Diagnostic Subtype	.14	1.95	=.054	.31	.18	.13
	DAPP-BQ Anxiousness	.31	3.53	<**.001**	.58	.32	.24
	EMA Anxiousness	.18	2.20	=**.030**	.47	.21	.15
	EMA Dietary Restriction						
1	Depression (BDI)	.30	3.21	=**.002**	.35	.29	.28
	Age	.07	0.81	=.420	.15	.08	.07
	BMI	.04	0.49	=.628	.06	.05	.04
	AN Diagnostic Subtype	.10	1.13	=.262	.19	.11	.10
2	Depression (BDI)	.27	2.29	=**.024**	.35	.21	.20
	Age	.08	0.86	=.391	.15	.08	.08
	BMI	.05	0.51	=.611	.06	.05	.05
	AN Diagnostic Subtype	.10	1.12	=.267	.19	.11	.10
	DAPP-BQ Anxiousness	.05	0.45	=.655	.24	.04	.04
3	Depression (BDI)	.26	2.13	=**.035**	.35	.20	.19
	Age	.08	0.81	=.419	.15	.08	.07
	BMI	.05	0.55	=.583	.06	.05	.05
	AN Diagnostic Subtype	.10	1.01	=.314	.19	.10	.09
	DAPP-BQ Anxiousness	.04	0.34	=.732	.24	.03	.03
	EMA Anxiousness	.05	0.43	=.667	.22	.04	.04

Note. EMA = Ecological Momentary Assessment; DAPP-BQ = Dimensional Assessment of Personality Pathology – Basic Questionnaire; EDE = Eating Disorder Examination; BDI = Beck Depression Inventory; BMI = Body Mass Index. Bolded p-values denote significance at p<.05.