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Personality-Based Subtypes of Anorexia Nervosa: Examining Validity and Utility Using Baseline Clinical Variables and Ecological Momentary Assessment

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Abstract

Objective—This study sought to empirically derive and validate clinically relevant personality-based subtypes of anorexia nervosa (AN).

Methods—Women ($N=116$) with full or subthreshold AN completed baseline measures of personality, clinical variables, and eating disorder (ED) symptoms, followed by two weeks of ecological momentary assessment (EMA). A latent profile analysis was conducted to identify personality subtypes, which were compared on baseline clinical variables and EMA variables.

Results—The best-fitting model supported three subtypes: underregulated, overregulated, and low psychopathology. The underregulated subtype (characterized by high stimulus seeking, self-harm, and oppositionality) displayed greater baseline ED symptoms, as well as lower positive affect and greater negative affect, self-discrepancy, and binge eating in the natural environment. The overregulated subtype (characterized by high compulsivity and low stimulus seeking) was more likely to have a lifetime obsessive-compulsive disorder diagnosis and exhibited greater perfectionism; levels of negative affect, positive affect, and self-discrepancy in this group were intermediate between the other subtypes. The low psychopathology subtype (characterized by normative personality) displayed the lowest levels of baseline ED symptoms, co-occurring disorders, and ED behaviors measured via EMA.

Conclusions—Findings support the validity of these personality-based subtypes, suggesting the potential utility of addressing within-diagnosis heterogeneity in the treatment of AN.

Keywords

eating disorders; personality; ecological momentary assessment; affect; empirical classification; latent profile analysis

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Anorexia nervosa (AN) and other eating disorders (EDs) are characterized by substantial within-diagnosis heterogeneity, such that different individuals with the same disorder may exhibit varying personality traits, co-occurring psychopathology, and symptom presentations (e.g., Bardone-Cone et al., 2008; Duncan et al., 2005; Jordan et al., 2008; Westen & Harnden-Fischer, 2001; Wonderlich, Joiner, Keel, Williamson, & Crosby, 2007). Such heterogeneity has several important clinical implications, including complicating research on etiology (e.g., if risk factors vary across unidentified AN subgroups) and treatment (e.g., if subgroups display differential responses to a given intervention). The two diagnostic subtypes of AN, restricting (ANr) and binge eating/purging (ANbp), are differentiated on the absence or presence of regular episodes of binge eating or purging (American Psychiatric Association, 1994), but evidence suggests that this subtype framework has limited predictive validity (Peat, Mitchell, Hoek, & Wonderlich, 2009; Wonderlich, Joiner, et al., 2007). An alternative approach to characterizing within-diagnosis heterogeneity is to identify clinically relevant AN subtypes based on conceptually important dimensions such as personality variables (Cassin & von Ranson, 2005; Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006). Identifying personality-based subtypes would theoretically better characterize the heterogeneity in AN, providing a stronger foundation for research on etiology, pathophysiology, and treatment.

Numerous empirical classification studies in bulimia nervosa (BN) and mixed ED samples (Claes et al., 2006; Espelage, Mazzeo, Sherman, & Thompson, 2002; Goldner, Srikameswaran, Schroeder, Livesley, & Birmingham, 1999; Westen & Harnden-Fischer, 2001; Wonderlich, Crosby, et al., 2005; Wonderlich, Crosby, et al., 2007) have identified three subtypes based on personality features: underregulated (i.e., impulsive and emotionally/behaviorally dysregulated), overregulated (i.e., compulsive and inhibited), and normative (i.e., low levels of personality pathology). Evidence from these studies supports the clinical validity of the three subtypes. For example, the underregulated subtype has been shown to exhibit poorer psychosocial functioning, substance use problems, and symptoms of Cluster B personality disorders, whereas the overregulated subtype is characterized high levels of perfectionism and obsessive-compulsive symptoms. Given evidence supporting the relevance of personality factors in AN (Wonderlich, Lilenfeld, Riso, Engel, & Mitchell, 2005), recent studies have also sought to identify subtypes of AN based on personality. Empirical findings suggest the presence of similar subtypes in both adults (Holliday, Landau, Collier, & Treasure, 2006) and adolescents (Gazzillo et al., in press) with AN, and evidence supports the clinical utility of the subtypes in predicting AN treatment outcomes (Wildes et al., 2011). However, although preliminary evidence supports the presence of personality subtypes in AN similar to those found in other ED samples, additional research is needed to further evaluate the validity and potential utility of these subtypes.

There were two primary objectives in the current study. First, we sought to identify personality-based AN subtypes using an empirical classification approach. Second, we sought to provide evidence for the validity of the subtypes using (a) baseline measures of clinical constructs and (b) ecological momentary assessment (EMA) measures of clinically relevant affective and behavioral variables. The use of EMA, which involves momentary data collection in a participant's natural environment (Stone & Shiffman, 1994), provided a unique and clinically informative method for examining the extent to which the trait-based personality subtypes were associated with meaningful differences in clinical variables in day-to-day life. These clinical validators included ED behaviors, variables implicated in the etiology or maintenance of ED psychopathology (e.g., positive and negative affect, self-discrepancy, perfectionism), and co-occurring psychopathology (e.g., any mood disorders, any anxiety disorders, and obsessive-compulsive disorder [OCD], which is of particular relevance to the theorized overregulated presentation). We hypothesized a three-class

solution consistent with the underregulated, overregulated, and low psychopathology subtypes. Further, we hypothesized that (a) the overregulated subtype would display the highest levels of perfectionism, the highest rate of lifetime OCD, and greatest frequency of exercise; (b) the underregulated subtype would display the highest levels of baseline ED psychopathology, as well as the highest rate of binge eating and self-induced vomiting in the natural environment; and (c) both the overregulated and underregulated subtypes would exhibit elevated negative affect (NA), lower positive affect (PA), and greater self-discrepancy than the low psychopathology group.

Method

Participants

Participants in this multi-site study were 116 females who met Diagnostic and Statistical Manual of Mental Disorders (4th Edition: DSM-IV; APA, 1994) for full ($n = 57$) or subthreshold ($n = 59$) AN. Seventy-two (62.1%) participants were diagnosed with AN restricting type and 44 (37.9%) 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. In the current study, subthreshold AN was 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. As such, there were three possible symptom constellations of subthreshold AN: (a) amenorrhea, cognitive symptoms, and BMI of 17.6 to 18.5 kg/m² (this category accounted for the majority of subthreshold participants); (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). Out of a total of 601 potential participants who were 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 baseline data for the primary personality measure in the current study were excluded from analyses, resulting in a final total of 116 participants. Participants were primarily Caucasian (96.6%), with a mean age of 25.3 years ($SD = 8.4$) and a mean body mass index (BMI) of 17.2 kg/m² ($SD = 1.00$).

Measures

Baseline Measures—Diagnostic criteria for AN and baseline ED symptoms were assessed using the Structured Clinical Interview for DSM-IV Axis I Disorders, Patient Edition (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1995) and the Eating Disorders Examination (EDE; Fairburn & Cooper, 1993), respectively. The SCID was used to establish current AN diagnosis (full or subthreshold) and subtype (restricting or binge eating/purging), as well as to diagnose co-occurring Axis I disorders. SCID interviews were recorded and a second independent assessor rated current ED diagnoses in a random sample of 25% ($n = 30$) of these interviews. Interrater reliability for current AN diagnosis based upon a kappa coefficient was .93. The EDE, a semi-structured interview with well-established validity and reliability (Berg, Peterson, Frazier, & Crow, 2012; Fairburn & Cooper, 1993), served as the measure of baseline ED psychopathology. 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).

Self-discrepancy was measured using the clinician-administered Selves Interview (Higgins et al., 1986). Participants generated lists of characteristics to describe the kind of person they believe they actually are (i.e., actual self), the type of person they would ideally like to be

(i.e., ideal self), and the kind of person they believe they must/ought to be (i.e., ought self). Participants then ranked the ideal and ought characteristics they believed to be the most discrepant compared to their actual self (i.e., those attributes with the greatest actual-ideal and actual-ought self-discrepancies). These rankings were used to select idiosyncratic momentary self-discrepancy items that were included in the EMA protocol. Past research has supported the reliability of this interview (Strauman & Higgins, 1987).

Traits of personality psychopathology were assessed using the Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ; Livesley & Jackson, 2009), a 290-item self-report measure that contains 18 scales assessing traits of personality pathology. Items are rated on a 5-point scale ranging from (1) very unlike me to (5) very like me. Scale scores are reported as *T*-scores, with a mean of 50 and a standard deviation of 10. In the current study, four DAPP-BQ subscales were used: Stimulus Seeking ($\alpha = .90$), Self-Harm ($\alpha = .95$), Compulsivity ($\alpha = .93$), and Oppositionality ($\alpha = .92$).

Perfectionism was measured using the Frost Multidimensional Perfectionism Scale (Frost-MPS; Frost, Marten, Hahart, & Rosenblate, 1990), a 35-item self-report measure designed to assess major dimensions of perfectionism. Items are rated on a 5-point scale ranging from (1) strongly disagree to (5) strongly agree. The measure provides scores on six subscales and an overall perfectionism score, and has demonstrated high internal consistency and good convergent validity (Frost et al., 1990). Alpha coefficients for the total score and the four subscales used in the current study were: Concern over Mistakes = .93; Doubts about Action = .81; Personal Standards = .87; Organization = .94; and Total Score = .94.

EMA Measures—Momentary positive and negative affect was assessed using sixteen items from the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1994; Watson, Clark, & Tellegen, 1988) that were selected based on high factor loadings and theoretical relevance to AN. Negative affect items included: afraid, angry at self, ashamed, nervous, disgusted, dissatisfied with self, distressed, and sad ($\alpha = .94$). Positive affect items included: strong, enthusiastic, proud, attentive, happy, energetic, confident, and cheerful ($\alpha = .92$). Participants provided a momentary rating of each item on a 5-point scale ranging from (1) not at all to (5) extremely.

Momentary self-discrepancy was measured as part of the momentary mood assessment and included 8 idiosyncratic words derived from the Selves Interview (Higgins et al., 1986), with 4 words selected to assess momentary actual-ideal self-discrepancy ($\alpha = .86$) and 4 words selected to assess momentary actual-ought self-discrepancy ($\alpha = .83$). Participants rated each item (e.g., “At this moment, to what extent are you smart?”) on a 5-point scale ranging from (1) not at all to (5) extremely, such that *higher* scores reflect *lower* momentary self-discrepancy.

Finally, the EMA protocol included an assessment of several ED behaviors. Participants were asked to report all eating episodes and to specify whether the episode was a snack, a meal, or an eating binge. Participants also reported each time they engaged in certain behaviors including self-induced vomiting and exercise.

Procedure

Participants were recruited at three sites (Fargo, Minneapolis, Chicago) from various clinical (e.g., ED treatment facilities, mailings to ED treatment professionals) and community (e.g., online posts, advertisement, flyers) settings. Participants were first phone screened and then attended an informational meeting. Participants were then scheduled for two assessment visits during which: (a) laboratory tests and a physical examination were conducted to

ensure medical stability, and (b) structured interviews and self-report measures were administered. The study was approved by local Institutional Review Boards at each site.

Participants were trained in the use of the palmtop computer and provided data for 2 practice days (not used in analyses) to ensure that they were familiar and comfortable with the EMA measures and to minimize reactivity (although there is little evidence of reactivity; e.g., Stein & Corte, 2003). Participants were then given the palmtop computer to complete EMA measures for 2 weeks, during which efforts were made to schedule each participant for 2–3 visits to obtain recorded data. At each visit, participants were given feedback about their compliance rates. Participants received \$100 per week for completing EMA measures and were provided with a \$50 bonus for a compliance rate of at least 80% for random signals.

As part of the EMA protocol, participants were signaled at six semi-random times throughout the waking hours of the day, with signal times determined by randomly selecting times around six “anchor points” across the day. Signal times were randomly distributed around these anchors in a normal distribution with a standard deviation of 30 minutes. When signaled, participants were asked to rate their mood and self-discrepancy, as well as to report any recent behaviors that were not previously recorded. Participants were also asked to initiate a report following the occurrence of an ED behavior (e.g., binge eating, self-induced vomiting, exercise).

Statistical Analyses

Subtype Identification and Description—Latent Profile Analysis (LPA) is an extension of latent class analysis for categorical, ordinal, or continuous “indicator” variables that classifies individuals into unobserved (i.e., latent) categorical groups based on the principal of conditional independence (i.e., within each identified class, indicator variables should be uncorrelated; Vermunt & Magidson, 2005). Four DAPP-BQ subscales (Stimulus Seeking, Self-Harm, Compulsivity, and Oppositionality) served as the indicator variables in the current study and were chosen based on previous research on personality factors in ED samples, their theoretical utility in distinguishing between the hypothesized underregulated and overregulated subtypes, and the goal of addressing multiple dimensions of personality (see Widiger, Livesley, & Clark, 2009).

Using Latent Gold version 4.5 (Statistical Innovations, Inc., Belmont, MA), 1- to 10-class models were fit in the analysis, and identification of the best fitting model was based on minimization of the Consistent Akaike Information Criterion (cAIC; Bozdogan, 1987) and the Bayesian Information Criterion (BIC; Schwarz, 1978). Class membership assignments were based on posterior Bayesian probabilities. A bootstrapping technique developed to evaluate the reliability of LPA results in smaller samples was also conducted (Wonderlich, Crosby, et al., 2005). Specifically, separate LPAs were performed using 100 random samples (with replacement) consisting of 95% of the original sample, and the reliability of the results was evaluated based on: (a) the number of identified classes, and (b) concordance of individual class membership between the original and bootstrapped samples. Finally, a one-way analysis of variance (ANOVA) with Tukey’s honestly significant difference post-hoc comparisons was used to compare the subtypes on patterns of personality pathology represented by the four indicators.

Subtype Validation—A series of X^2 analyses and one-way ANOVAs were conducted to compare the subtypes on demographic variables (i.e., age and BMI), clinical variables (i.e., perfectionism, presence or absence of any lifetime mood disorder, any lifetime anxiety disorder, or OCD) and baseline ED psychopathology (i.e., full versus subthreshold AN, AN restricting versus binge eating/purging type, and EDE global score). Further validity tests of the personality-based subtypes were conducted using general estimating equations (GEE;

Liang & Zeger, 1986) and mixed-effects models to evaluate subtypes differences in the EMA affect and behavior variables. Specifically, GEE models (with negative binomial or binary logit link functions for count data and dichotomous data, respectively) were used to compare the subtypes on the mean daily frequency of binge eating, self-induced vomiting, and exercise. All GEE models controlled for BMI (selected as a marker of illness severity). Mixed-effects models were used to compare the subtypes on levels of NA and PA, as well as actual-ideal and actual-ought self-discrepancies. Models included a random intercept and fixed effects for subtype, BMI, and cumulative hours of recording over the two-week period (to control for possible changes over time).

Results

Subtype Identification and Description

The original LPA and the results of the bootstrapping procedure supported a 3-class solution as hypothesized (see Table 1). The three identified profiles broadly conformed to the hypothesized underregulated (Class 1; $n = 55$; 47.4%), overregulated (Class 2; $n = 17$; 14.7%), and low psychopathology (Class 3; $n = 44$; 37.9%) subtypes, and the classes significantly differed on the DAPP-BQ personality indicator variables (see Table 2). The underregulated subtype was characterized by higher scores on Self-Harm and Oppositionality compared to the other two subtypes, and higher scores on Stimulus Seeking compared to the overregulated subtype. The overregulated subtype exhibited a higher score on Compulsivity compared to the other two subtypes, as well as a particularly low Stimulus Seeking score. Finally, the mean scores for the four DAPP-BQ subscales were all within the normative range (i.e., less than 0.5 standard deviations from the norm) for the low psychopathology subtype.

Subtype Validation

The three subtypes did not differ in terms of age, BMI, or full versus subthreshold AN diagnosis (see Table 3). In contrast, the underregulated and overregulated subtypes were characterized by greater EDE Global scores compared to the low psychopathology subtype, with the underregulated subtype displaying the highest score of the three groups. Further, the rate of ANbp was highest in the underregulated subtype and lowest in the low psychopathology subtype. Both the overregulated and underregulated subtypes displayed greater rates of lifetime mood and anxiety disorders compared to the low psychopathology subtype, with the presence of a lifetime OCD diagnosis being particularly high in the overregulated subtype. Finally, the overregulated subtype was found to display the highest perfectionism scores.

The participants included in the current analyses provided 14,690 separate EMA recordings, and compliance rates for the semi-random signals averaged 87% (range = 58–100%) across participants. Significant subtype differences were found for all of the EMA affect and self-discrepancy variables (see Table 4). Compared to the low psychopathology subtype, the underregulated subtype exhibited lower PA, higher NA, and higher actual-ideal and actual-ought self-discrepancies. Significant subtype differences also were found for the mean daily rates of binge eating, with the underregulated subtype displaying significantly higher rates than the low psychopathology subtype. Although the mean daily rate of self-induced vomiting was highest in the underregulated subtype, the subtype differences did not reach significance ($p = .109$). Similarly, although rates of exercise were highest in the overregulated subtype, the subtype differences were not statistically significant ($p = .165$).

Discussion

This study identified personality-based AN subtypes and provided evidence of their validity using baseline clinical variables and clinically relevant naturalistic data collected via EMA. Consistent with hypotheses based on previous research in ED samples (e.g., Wildes et al., 2011; Westen & Harnden-Fischer, 2001; Wonderlich, Joiner, et al., 2007), the LPA supported three subtypes: underregulated, overregulated, and low psychopathology. The greater stimulus seeking, self-harm, and oppositionality of the underregulated subtype supports the previously described impulsive/dysregulated presentation, while the low stimulus seeking and high compulsivity of the overregulated subtype supports the compulsive/inhibited characterization. Further, as expected, the low psychopathology subtype exhibited normative scores on the personality measures, despite their ED psychopathology.

Overall, the results of the external validation of the three subtypes using both the baseline clinical and EMA variables further supported the subtype differentiation. In particular, the underregulated subtype was characterized by greater rates of ANbp, as well as the lowest levels of PA, highest levels of NA, and highest frequency of binge eating in the natural environment. Further, the overregulated subtype displayed the highest perfectionism scores and the highest rate of a lifetime mood disorder and lifetime OCD, as well as the greatest frequency of exercise, although the latter was not significant in the overall subtype comparison. Finally, the low psychopathology subtype had the highest levels of PA and lowest levels of NA and self-discrepancy, as well as the lowest rates of lifetime mood and anxiety disorders. This subtype also displayed the lowest frequency of binge eating and self-induced vomiting, although this should be considered in light of the fact that this group also had a smaller percentage of individuals with the ANbp subtype. Taken together, these findings support the validity of the three identified subtypes, with the differing clinical presentations suggesting the potential utility of considering the subtypes in the treatment of AN.

The findings of the current study should be considered in the context of certain limitations. First, although the sample was large for a study of AN, it was somewhat small for an LPA study; however, the results of the bootstrapping procedure provide additional evidence for the reliability of the identified subtypes. Second, the overregulated subtype contained a smaller number of participants, potentially limiting the power to detect differences between this subtype and the others. The size of this group is somewhat smaller than in previous similar studies (e.g., Wildes et al., 2011), perhaps due the comparatively less severe nature of the ED psychopathology in the current sample (i.e., mostly outpatient vs. inpatient). Third, the limited diversity (e.g., gender, ethnicity) of the sample may limit the generalizability of the results. Finally, many of the variables included in the EMA protocol were those that would theoretically be higher in the underregulated subtype, while comparatively few would theoretically be higher in the overregulated subtype. Future studies should include additional variables in order to better characterize the overregulated subtype.

Clinical Implications

These findings contribute to the limited existing literature on AN personality subtypes (e.g., Holliday et al., 2006; Wildes et al., 2011), with the current study representing the first investigation to link trait-based personality subtypes of AN with both baseline clinical variables and naturalistic data collected via EMA. This study is also the first to report on self-discrepancy assessed as a momentary construct. Of particular clinical relevance are the results indicating subtype differences in affective and behavioral variables that are theoretically important to the etiology and maintenance of AN. Consistent with the findings

of Wildes et al. (2011), the underregulated subtype in the current study exhibited several characteristics of emotional and behavioral dysregulation that could be associated with poorer treatment response. This is further supported by the underregulated subtype being characterized by the highest levels of self-discrepancy, a variable theorized to play a role in the etiology and/or maintenance of ED psychopathology (e.g., Engel et al., 2005; Wonderlich et al., 2008), particularly as a precipitant of the negative affective states that have been identified as triggers for ED behaviors such as binge eating (e.g., Haedt-Matt & Keel, 2011). These results therefore support the validity of the personality-based subtypes, and provide additional evidence of their potential clinical utility.

Conclusion

The current study identified three personality-based subtypes in AN (underregulated, low psychopathology, and overregulate) that were characterized by unique patterns of personality. These personality subtypes are consistent with those identified in previous studies with varying ED samples, suggesting that they may be present across the range of ED psychopathology. The inclusion of both baseline and EMA variables as validators offered several advantages, providing evidence for meaningful differences both in clinically relevant baseline variables and in affect and behavior in the natural environment. These findings further suggest that there may be utility in addressing heterogeneous subgroups in the treatment of AN, and that subtyping EDs by personality dimensions may provide a valid and clinically meaningful strategy for classification.

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Highlights

- Anorexia nervosa (AN) is characterized by within-diagnosis heterogeneity.
- Personality subtypes of AN were identified using latent profile analysis.
- AN personality subtypes were: underregulated, overregulated, low psychopathology.
- Subtypes differed on baseline and ecological momentary assessment (EMA) variables.

Table 1

Fit Indices for 1- to 10-Class Latent Profile Analysis Models

Number of Classes	Number of Parameters	LL	BIC	cAIC
1	8	-1726.82	3491.67	3499.67
2	17	-1667.68	3416.18	3433.18
3	26	-1639.18	3401.95	3427.95
4	35	-1622.36	3411.09	3446.09
5	44	-1610.04	3429.23	3473.23
6	53	-1599.59	3451.12	3504.12
7	62	-1596.16	3487.04	3549.04
8	71	-1585.32	3508.15	3579.15
9	80	-1574.53	3529.35	3609.35
10	89	-1571.35	3565.76	3654.76

Note. LL = Log-likelihood; BIC = Bayesian Information Criterion; cAIC = Consistent Akaike Information Criterion. Bolded text denotes the best-fitting model. Examination of the 3-class model bivariate residuals (range = 0.29–2.77) supported the assumption of conditional independence. Results of the bootstrapping procedure also supported the stability of the three classes, with the BIC suggesting three classes in all 100 of the bootstrap samples, and both the BIC and cAIC suggesting three classes in 83 of the bootstrap samples. The overall classification agreement rate between the original LPA and the bootstrap samples was 88.5%.

Table 2

Latent Profile Analysis Indicators across Personality Subtypes

Baseline Indicator Variable [†]	Underregulated (<i>n</i> = 55)		Overregulated (<i>n</i> = 17)		Low Psychopathology (<i>n</i> = 44)		Test Statistic	<i>p</i>	Effect Size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
DAPP-BQ Stimulus Seeking	51.218 ^a	12.058	40.882 ^b	9.440	46.227 ^{ab}	9.599	6.679	=.002	.106
DAPP-BQ Self-Harm	63.982 ^a	6.699	59.176 ^b	2.604	52.227 ^c	0.424	75.210	<.001	.571
DAPP-BQ Compulsivity	49.855 ^a	8.820	70.235 ^b	3.492	54.364 ^a	12.106	28.501	<.001	.335
DAPP-BQ Oppositionality	59.145 ^a	8.416	51.471 ^b	8.704	46.977 ^b	9.782	22.804	<.001	.288

Note. *M* = Mean; *SD* = Standard Deviation; DAPP = Dimensional Assessment of Personality Pathology-Basic Questionnaire. Different superscripts denote differences between the subtypes at $p < .05$.

[†] Scores presented are *T*-Scores.

Table 3

Baseline Validators across Personality Subtypes

Baseline Validator Variables	Underregulated (n = 55)		Overregulated (n = 17)		Low Psychopathology (n = 44)		Test Statistic	Effect Size	
	M	SD	M	SD	M	SD			
Age (in years)	27.164	9.624	24.647	6.422	23.159	6.998	2.909	$F_{(2,113)}$ =.059	.049
Body Mass Index (kg/m ²)	17.294	0.989	17.192	1.049	17.049	0.987	0.743	=.478	.013
EDE Global Score	3.378 ^a	1.054	2.910 ^a	1.132	1.966 ^b	1.201	19.454	<.001	.256
F-MPS Concern Over Mistakes	33.436 ^a	6.283	37.824 ^a	6.502	27.477 ^b	9.021	14.210	<.001	.201
F-MPS Doubts About Action	13.273 ^a	3.618	14.765 ^a	3.364	11.159 ^b	3.660	7.525	<.001	.118
F-MPS Personal Standards	24.909 ^a	5.495	32.235 ^b	2.047	26.500 ^a	6.348	11.488	<.001	.169
F-MPS Organization	22.182 ^a	5.309	28.941 ^b	2.135	24.636 ^c	5.257	12.453	<.001	.181
F-MPS Total	122.109 ^a	20.107	142.235 ^b	16.991	113.159 ^a	24.242	1.135	<.001	.167

	n	%	n	%	n	%	$\chi^2_{(2)}$	p	ϕ
Full Threshold AN	28	50.909	9	52.941	22	50.000	0.043	=.979	.019
AN Binge Eating-Purging Type	28	50.909	7	41.176	9	20.455	9.719	=.008	.289
Any Lifetime Mood Disorder	42	76.364	15	88.235	17	38.636	20.216	<.001	.417
Any Lifetime Anxiety Disorder	33	60.000	10	58.824	13	29.545	9.967	=.007	.293
Lifetime OCD	10	18.182	7	41.176	1	2.272	14.723	<.001	.356

Note. M = Mean; SD = Standard Deviation; AN = Anorexia Nervosa; EDE = Eating Disorder Examination; F-MPS = Frost Multidimensional Perfectionism Scale; OCD = Obsessive-Compulsive Disorder. Different superscripts denote differences between the subtypes at $p < .05$.

Table 4
Ecological Momentary Assessment (EMA) Validators across Personality Subtypes

EMA Validator Variables	Underregulated (n = 55)		Overregulated (n = 17)		Low Psychopathology (n = 44)		Test Statistic	p
	M	SE	M	SE	M	SE		
PANAS Negative Affect	21.180 ^a	0.964	17.380 ^{ab}	1.724	15.669 ^b	1.073	$F_{(2,112.00)} = 7.514$	<.001
PANAS Positive Affect	16.516 ^a	0.650	17.492 ^{ab}	1.162	20.814 ^b	0.723	$F_{(2,112.05)} = 9.987$	<.001
A-I Self-Discrepancy [†]	7.839 ^a	0.402	8.785 ^{ab}	0.721	10.501 ^b	0.446	$F_{(2,111.99)} = 9.722$	<.001
A-O Self-Discrepancy [‡]	9.124 ^a	0.409	10.199 ^{ab}	0.732	11.881 ^b	0.457	$F_{(2,112.02)} = 10.077$	<.001
Binge Eating per day	0.220 ^a	0.048	0.209 ^{ab}	0.086	0.070 ^b	0.026	Wald $\chi^2_{(2)} = 7.733$	=.021
Vomiting per day	0.405	0.091	0.322	0.145	0.124	0.063	Wald $\chi^2_{(2)} = 4.442$	=.109
Exercise per day	0.311	0.066	0.543	0.146	0.495	0.073	Wald $\chi^2_{(2)} = 3.598$	=.165

Note. M = Mean; SE = Standard Error; PANAS = Positive and Negative Affect Schedule; POMS = Profile of Mood States; A-I = Actual-Ideal; A-O = Actual-Ought. Different superscripts denote differences between the personality-based subtypes at $p < .05$.

[†]Higher scores reflect lower momentary self-discrepancy.