

Emotion Regulation Difficulties in Anorexia Nervosa Before and After Inpatient Weight Restoration

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ABSTRACT

Objective: This study examined: (1) changes in emotion regulation difficulties in underweight inpatients with anorexia nervosa (AN) following weight restoration, (2) differences in emotion regulation between AN subtypes at acute and weight-restored stages of illness.

Method: Repeated measure analyses of variance examined changes in scores on the Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer, *J Psychopathol Behav Assess*, 26, 41–54, 2004) and other clinical variables in a group of inpatients with AN from hospital admission ($N = 65$) to weight restoration ($N = 51$). Correlations between BMI and DERS scores at both time points were examined. Emotion regulation difficulties were compared between individuals with AN, restricting type (AN-R) and AN, binge/purge type (AN-BP) at both time points using multivariate analysis of covariance.

Results: All clinical variables, except for the DERS, significantly improved with weight restoration ($p < .001$). There were no associations between BMI and DERS prior to or after weight restoration and AN subtypes did not significantly differ in emotion regulation difficulties.

Discussion: Unlike other clinical variables, emotion regulation difficulties in AN did not improve with weight restoration. In addition, both subtypes of AN appear to have similar difficulties with emotion regulation. The treatment of AN might be enhanced by focusing on improving emotion regulation abilities. © 2014 Wiley Periodicals, Inc.

Keywords: anorexia nervosa; emotion regulation; inpatient treatment

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Introduction

It has been hypothesized that emotion regulation difficulties play a key role in the etiology of anorexia nervosa (AN).¹ Studies have found that underweight individuals with AN have more emotion regulation difficulties than healthy controls^{2–6} and comparable emotion regulation problems as individuals with bulimia nervosa, binge eating disorder, mood and anxiety disorders, and borderline personality disorder (BPD).^{2–6}

However, it remains unclear how starvation and nutritional rehabilitation impact emotion regulation difficulties in individuals with AN. Two studies have found no association between body mass index (BMI) and emotion regulation deficits for individuals with AN,^{3,7} but one study found that individuals with AN at higher BMIs experienced more emotion regulation difficulties during acute stages of illness.⁶ Further, while one cross sectional study did not detect differences in emotion regulation between underweight and recovered individuals with AN,² other cross sectional studies have reported greater emotion regulation difficulties for underweight individuals with AN compared to those in recovery.^{4,8} However, no studies have prospectively examined changes in emotion regulation within the same individuals over the course of weight restoration, making it difficult to determine whether differences in emotion regulation between acute and recovered groups with AN are due to nutritional differences, treatment effects, or dissimilarities between cross sectional groups (e.g., severity). This is an important question given studies showing that depression and anxiety improve with weight gain.^{9,10}

Further, although it is often hypothesized that individuals with AN binge-purge subtype (AN-BP)

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have poorer emotion regulation relative to those with AN restricting subtype (AN-R),¹¹ few studies have examined subtype differences in emotion regulation. One study found that individuals with AN-BP demonstrated elevated emotion regulation difficulties compared to AN-R only in the domain of emotional impulsivity.⁷ However, this finding has not been replicated and was only detected during acute stages of illness.

To address these two gaps in the literature, we examined: (1) The influence of weight restoration on emotion regulation abilities of inpatients with AN; and (2) differences in emotion regulation between AN subtypes when underweight and weight restored. We hypothesized that (1) although other clinical variables would improve in a statistically and clinically significant manner with weight gain, emotion regulation difficulties would persist and BMI would not be associated with emotion regulation at either time point, and (2) individuals with AN-BP (versus AN-R) would have greater difficulty with impulsivity, but not other emotion regulation domains, at both time points.

Method

Participants

Participants were individuals aged 18 through 45 years with a diagnosis of AN consecutively admitted to a structured inpatient treatment program aimed at normalizing eating and weight (the standard of care for AN¹²). Patients received caloric prescriptions to support weight gain of 3–5 lbs/week until reaching 90% of ideal body weight¹³ and meals were supervised. Psychological treatment consisted of individual and group therapy without specific emotion regulation focus. All participants completed questionnaires at admission ($N = 65$). A subset of patients ($N = 51$) completed the same questionnaires after weight restoration. An institutional review board approved all methods and participants consented to study participation.

Measures

The Difficulties in Emotion Regulation Scale¹⁴ (DERS) was used to assess facets of emotion regulation, including the following subscales: (1) *Acceptance subscale* (ability to accept emotions), (2) *Awareness subscale* (ability to identify emotions), (3) *Clarity subscale* (ability to understand emotions), (4) *Goals subscale* (ability to engage in goal-directed behavior while distressed), (5) *Impulsivity subscale* (ability to refrain from impulsive behavior while distressed), and (6) *Strategies subscale* (use of effective emotion modulation strategies). The DERS has been

demonstrated to have high internal consistency, test–retest reliability, and good construct and predictive validity.¹⁴

Depression and anxiety were assessed with the Beck Depression Inventory-II (BDI-II)¹⁵ and Beck Anxiety Inventory (BAI).¹⁶ The Eating Disorder Examination (EDE)¹⁷ was used to assess eating disorder symptoms and the Clinical Impairment Assessment (CIA)¹⁸ measured functional impairment related to the eating disorder. Height and weight data were measured upon inpatient admission. Weight was captured again following weight restoration.

Data Analysis

Repeated measures ANOVAs examined changes in BMI and DERS, BDI-II, BAI, CIA, and EDE scores from admission to weight restoration. In addition to examining statistically significant change, we examined “clinically significant” change on clinical variables using the approach outlined by Jacobson and Traux.¹⁹ In this approach, clinically significant improvement following weight restoration was calculated individually for each participant and reported as percentage of the sample achieving clinically significant improvement. Clinically significant improvement on the clinical variables measured was operationalized as: (a) falling within the range of normal functioning on the specific measure based on established norms, (b) being closer to the mean of a normative sample rather than the mean of a sample with psychopathology, and (c) demonstrating a statistically reliable change from admission (according to the formula outlined by Jacobson and Traux).¹⁹ Pearson’s correlations were conducted to examine associations between BMI and DERS total and subscale scores at admission and weight restoration.

To examine differences in emotion regulation difficulties between AN subtypes, multivariate analyses of covariance (MANCOVA) were conducted separately for admission and weight restoration data at each time point. These models included subtype as an independent variable, age as a covariate (the AN-BP group was significantly older than the AN-R group, $p = .001$), and DERS total and subscale scores as dependent variables. We controlled for multiple comparisons (20 total) for main analyses by using a Bonferroni corrected alpha level of $p < .003$; $p < .05$ was used for *post hoc* analyses.

Results

As summarized in **Table 1**, BMI, and BDI-II, BAI, EDE, and CIA scores improved significantly with weight restoration; however, DERS scores did not significantly improve. Larger effect sizes and greater percentages of clinically significant improvement were observed for changes in all of

TABLE 1. Changes in Difficulties in Emotion Regulation Scale (DERS) scores and other clinical variables from inpatient admission to weight restoration for individuals with anorexia nervosa

	Admission (N = 65)	Weight Restoration (N = 51)	Df	F	p	η_p^2	Percentage of Clinically Improved ^a
BMI	16.06 (1.38)	20.04 (0.88)	(1, 49)	458.68	<.001	0.90	100.0%
BDI	27.22 (10.91)	17.52 (12.11)	(1, 47)	46.61	<.001	0.50	39.6%
BAI	22.84 (11.79)	17.16 (12.62)	(1, 49)	19.98	<.001	0.29	14.0%
EDE	3.29 (1.34)	2.13 (1.25)	(1, 44)	48.93	<.001	0.53	22.2%
CIA	37.26 (7.58)	23.07 (11.99)	(1, 45)	88.09	<.001	0.66	—
DERS total	111.24 (28.66)	101.57 (31.41)	(1, 41)	7.36	.01	0.15	9.5%
DERS Acceptance subscale	19.67 (6.10)	18.19 (6.63)	(1, 42)	2.30	.14	0.05	7.0%
DERS Awareness subscale	19.93 (5.12)	17.91 (6.23)	(1, 42)	8.88	.005	0.17	4.7%
DERS Clarity subscale	15.77 (5.21)	13.81 (5.36)	(1, 42)	8.09	.007	0.16	11.6%
DERS Goals subscale	16.98 (5.56)	15.70 (4.91)	(1, 42)	5.65	.02	0.12	9.3%
DERS Impulsivity subscale	14.74 (5.63)	14.07 (5.68)	(1, 42)	0.93	.34	0.02	0.0%
DERS Strategies subscale	24.05 (8.10)	21.84 (7.99)	(1, 42)	5.24	.03	0.11	9.3%

BMI: Body mass index; BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory; EDE: Eating Disorder Examination; and CIA: Clinical impairment Assessment.

^aAccording to the criteria outlined by Jacobson and Traux¹⁹; clinically significant improvement is not included for CIA due to lack of existing norms for individuals without an eating disorder on this variable.

TABLE 2. Correlations between body mass index (BMI) and Difficulties in Emotion Regulation Scale (DERS) total and subscale scores for inpatients with anorexia nervosa

	DERS Total	Acceptance Subscale	Awareness Subscale	Clarity Subscale	Goals Subscale	Impulsivity Subscale	Strategies Subscale
Admission BMI	-.09	.00	-.03	-.11	-.16	.08	-.07
Weight restoration BMI	-.02	-.04	.04	-.09	-.04	-.02	.02

the clinical variables as compared to DERS scores. There were no significant correlations between BMI and DERS scores (see **Table 2**).

MANCOVA results suggested no significant differences DERS scores between subtypes at admission, $F(6,54) = 1.41$, $p = .23$, $\eta_p^2 = 0.14$, and following weight restoration, $F(6,35) = 0.32$, $p = .92$, $\eta_p^2 = 0.05$. An exploratory examination of *post hoc* tests revealed that the AN-BP group had higher DERS impulsivity scores at admission $F(1,59) = 6.66$, $p = .01$, $d = 0.66$, suggesting further research on subtype differences in emotion regulation is warranted.

Discussion

For inpatients with AN, BMI, depression, anxiety, eating disorder symptoms, and clinical impairment improved significantly following weight restoration, but there were no statistical and few clinically significant improvements in emotion regulation. These findings provide evidence that although standard inpatient treatment for weight restoration results in many clinical improvements for individuals with AN, it is insufficient to improve emotion regulation deficits. There are two potential explanations for this finding. First, emotion regulation

difficulties may not result from starvation, but may instead reflect long-standing behavioral patterns for individuals with AN that are unlikely to change without direct treatment targeting. This hypothesis is partially supported by nonsignificant correlations between BMI and DERS scores. Another explanation is that prolonged starvation profoundly alters emotion regulation abilities such that short-term weight restoration is insufficient to restore normative function. Improvement in emotion regulation with long-term recovery^{4,8} lends support to this hypothesis. Future research investigating premorbid emotion regulation abilities in individuals who develop AN may provide further information regarding the effects of starvation on emotion regulation.

Study findings also suggest that individuals with AN-R and AN-BP are more similar than different with respect to emotion regulation. No significant differences were noted in emotion regulation difficulties between subtypes at admission or following weight restoration, and effect sizes for subtype differences were very small, suggesting that emotion regulation difficulties are not subtype-specific. There was suggestion of greater emotional impulsivity for underweight AN-BP individuals, consistent with previous research,⁷ and this difference was of a moderate effect size. However, this finding

should be interpreted cautiously due to a nonsignificant omnibus test. This study is the first to examine subtype differences in emotion regulation following weight restoration; however, our between-subtype analyses at weight restoration are limited because of small sample sizes. Although the small effect sizes corresponding to these comparisons suggests that nonsignificant results were unlikely due to small sample sizes, replication of subtype findings is needed. Another study limitation was lack of formal assessment for comorbid diagnoses specifically related to emotion regulation (e.g., BPD), which might have influenced the results. Major strengths of this research are the larger sample size than previously published work on emotion regulation in AN and use of within-subjects design, which enabled us to control for potential differential treatment effects and sampling bias.

In summary, this paper provides evidence that emotion regulation difficulties in AN are relevant to both subtypes and do not clearly improve with weight restoration. Given qualitative reports suggesting that emotion regulation difficulties contribute to posthospitalization relapse,²⁰ these findings suggest that treatment for AN may be enhanced by more deliberate focus on emotion regulation.

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References

- Haynos AF, Fruzzetti AE. Anorexia nervosa as a disorder of emotion dysregulation: Theory, evidence, and treatment implications. *Clin Psychol Sci Pract* 2011;18:183–202.
- Brockmeyer T, Holtforth MG, Bents H, Kämmerer A, Herzog W, Friederich HC. Starvation and emotion regulation in anorexia nervosa. *Comp Psychiatry* 2012;53:496–501.
- Harrison A, Sullivan S, Tchanturia K, Treasure J. Emotional functioning in eating disorders: Attentional bias, emotion recognition and emotion regulation. *Psychol Med* 2010;40:887–897.
- Harrison A, Tchanturia K, Treasure J. Attentional bias, emotion recognition, and emotion regulation in anorexia: State or trait? *Biol Psychiatry* 2010;68:755–761.
- Svaldi J, Griepenstroh J, Tuschen-Caffier B, Ehring T. Emotion regulation deficits in eating disorders: A marker of eating pathology or general psychopathology? *Psychiatry Res* 2012;197:103–111.
- Brockmeyer T, Bents H, Holtforth MG, Pfeiffer N, Herzog W, Friederich HC. Specific emotion regulation impairments in major depression and anorexia nervosa. *Psychiatry Res* 2012;200:550–553.
- Racine SE, Wildes JE. Emotion dysregulation and symptoms of anorexia nervosa: The unique roles of lack of emotional awareness and impulse control difficulties when upset. *Int J Eat Disord* 2013;46:713–720.
- Merwin RM, Moskovich AA, Wagner HR, Ritschel LA, Craighead LW, Zucker NL. Emotion regulation difficulties in anorexia nervosa: Relationship to self-perceived sensory sensitivity. *Cogn Emot* 2013;27:441–452.
- Keys A, Brozek J, Henschel A, Mickelsen O, Taylor HL. *The biology of human starvation* (Volume 1). Minneapolis: University of Minnesota Press, 1950.
- Meehan KG, Loeb KL, Roberto CA, Attia E. Mood change during weight restoration in patients with anorexia nervosa. *Int J Eat Disord* 2006;39:587–589.
- Fairburn C, Cooper Z, Shafran R. Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behav Res Ther* 2003;41:509–528.
- American Psychiatric Association. *Treatment of patients with eating disorders*, third edition. *Am J Psychiatry* 2006;163:4–54.
- Metropolitan Life Insurance Company. *New weight standards for men and women*. *Stat Bull* 1959;40:1–4.
- Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *J Psychopathol Behav Assess* 2004;26:41–54.
- Beck AT, Steer RA, Brown GK. *Beck Depression Inventory-II manual*. New York: Harcourt Brace Jovanovich, 1996.
- Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: Psychometric properties. *J Consult Clin Psychol* 1988;56:893–897.
- Fairburn CG, Cooper Z, O'Connor M. *The Eating Disorder Examination*, 16th edition. In: Fairburn CG, editor. *Cognitive Behavior Therapy and Eating Disorders*. New York: Guilford Press, 2008.
- Bohn K, Doll HA, Cooper Z, O'Connor M, Palmer RL, Fairburn CG. The measurement of impairment due to eating disorder psychopathology. *Behav Res Ther* 2008;46:1105–1110.
- Jacobson NS, Truax P. Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *J Consult Clin Psychol* 1991;59:12–19.
- Federici A, Kaplan A. The patient's account of relapse and recovery in anorexia nervosa: A qualitative study. *Eur Eat Disord Rev* 2008;16:1–10.