Published in final edited form as:

Int J Eat Disord. 2012 November ; 45(7): 876–882. doi:10.1002/eat.22020.

Emotion and Eating Disorder Symptoms in Patients with Anorexia Nervosa: An Experimental Study

Jennifer E. Wildes, Ph.D.¹, Marsha D. Marcus, Ph.D.¹, Ashley C. Bright, B.A.², and Marcela Marin Dapelo² [Magister Clin. Psychol.]

¹Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh, PA

²Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center, Pittsburgh, PA

Abstract

Objective—To evaluate the effect of negative emotion on self-reported eating disorder symptoms and objectively-measured eating behavior in patients with anorexia nervosa (AN).

Method—Twenty-eight females with AN were randomized to a negative or neutral mood induction followed by a test meal. Participants completed assessments one week before the experimental session, before (pretest) and after (posttest) the mood induction, and after the test meal.

Results—Participants in the negative emotion condition had an increase in negative affect from pretest to posttest that was accompanied by significantly greater increases in self-reported eating disorder symptoms than were exhibited by participants in the neutral emotion condition, who had no increase in negative affect. There was no effect of emotion condition on eating behavior.

Discussion—Results suggest that negative emotions influence the expression of cognitive eating disorder symptoms in individuals with AN, which may have implications for the identification of treatment targets.

An accumulating body of research has documented that negative emotions influence the expression of disordered eating symptoms. Much of this work has focused specifically on the role of negative affect (viz., anxiety, depression, anger, distress) in the onset and maintenance of bulimic syndromes. For example, prospective longitudinal data have demonstrated that increases in negative affect predict the onset of bulimic symptoms in adolescent females (1, 2). Similarly, studies using ecological momentary assessment (EMA) to examine state-specific associations between mood and bulimic symptoms have shown that increases in negative affect precede episodes of binge eating and purging [for review, see (3); also see (4)], and that the highest rates of binge eating and purging occur on days characterized by stable levels of high negative affect or increasing negative affect over the course of the day (5). Finally, experimental studies have found that exposure to a negative mood induction leads to increases in urges to binge (6) and feelings of loss of control over eating (7, 8) in women with binge eating problems [but see, (9)].

Less is known about the effect of emotion on eating disorder symptoms in individuals with anorexia nervosa (AN). One pilot study using EMA found a positive association between daily mood lability and restrictive eating behaviors in females with AN, suggesting that

Correspondence to: Jennifer E. Wildes, Ph.D., Western Psychiatric Institute and Clinic, 3811 O'Hara Street, Pittsburgh, PA 15213. wildesje@upmc.edu.

Financial Disclosure

The authors have no financial conflicts of interest.

fluctuations in emotion may be related to disordered eating symptoms in this group (10). Indeed, Engel and colleagues (10) postulate that increases in negative emotion may lead to restrictive eating behaviors in individuals with AN, which are followed by a decrease in negative affect. However, no research to our knowledge has used experimental or longitudinal methodology to evaluate the impact of emotions on eating disorder symptoms in AN patients.

There are compelling reasons to hypothesize that increases in negative affect might precipitate the expression of dietary restriction and other symptoms of disordered eating in individuals with AN. For example, clinical observers long have noted that individuals with AN have difficulty construing or tolerating emotions (11, 12). Moreover, descriptive studies have documented a range of emotional difficulties in AN patients, including deficits in emotion recognition (13, 14), high levels of alexithymia (15, 16), and comorbidity with mood and anxiety disorders (17). Several theoretical models of AN psychopathology have emphasized the role of anorexic symptoms in facilitating avoidance of aversive emotions (18–21). Furthermore, data from quantitative and qualitative research studies provide support for the notion that emotion avoidance is salient to individuals with AN (22–26). Finally, treatments designed to increase the willingness of AN patients to tolerate negative emotional states without engaging in disordered eating behaviors have shown promising initial results (21, 27).

In summary, several lines of research provide support for the idea that negative emotions may influence disordered eating symptoms in individuals with AN, but no study to our knowledge has used experimental methodology to examine the effect of emotion on eating disorder symptoms in this group. Thus, the overall aim of the current investigation was to evaluate the effect of experimentally-induced negative emotion on self-reported eating disorder symptoms and objectively-measured eating behavior in women with AN. We hypothesized that AN patients randomized to a negative emotion condition would report greater increases in subjective eating disorder symptoms and consume fewer calories during a standardized meal session than AN patients randomized to a neutral emotion condition.

Method

Participants

Participants were recruited from consecutive, unique admissions to an inpatient eating disorders program between May 2010 and August 2011. Study inclusion criteria were: 1) Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) (28) diagnosis of AN (the amenorrhea criterion was not required), 2) female, 3) age ≥ 18 years, and 4) medically stable. Males were excluded to decrease heterogeneity in the sample and because of the female preponderance in AN. Patients less than 18 years of age were excluded because of the adult content presented in the film stimulus used to induce negative emotion.

Fifty-eight patients were invited to participate. After the study was described, 36 patients (62.07%) provided written informed consent. Eight participants (22.22%) withdrew consent prior to completing the study procedures.¹ There were no differences between participants who completed the study ($n = 28$) and those who dropped out ($n = 8$) with respect to age, body mass index (BMI) on admission, AN subtype, or duration of eating disorder symptoms (p 's > 0.10). Demographic and clinical characteristics of the final sample ($N = 28$) are presented in Table 1.

¹The eight participants who dropped out withdrew consent before initiating the session 2 procedures, and were unaware of the emotion condition to which they had been randomized.

Procedure

Study procedures were reviewed and approved by the University of Pittsburgh Institutional Review Board prior to data collection. Participants completed two research sessions scheduled during the same inpatient admission. During the first session, which took place an average of 16.46 ($SD = 20.21$) days after admission, participants were interviewed to diagnose AN, and completed a self-report questionnaire to document demographics and treatment history.

The second session took place an average of 8.46 ($SD = 8.38$) days after the first session. In order to minimize potential effects of treatment stage on study outcomes, session 2 appointments were scheduled approximately two weeks before the participant's planned discharge. Participants remained symptomatic at session 2 (see Table 1), but were medically stable. Participants were required to be eating a minimum of 2,000 kcal and could not be using nasogastric tube feedings. Session 2 appointments were conducted individually, and began approximately three hours after the participant completed her prescribed breakfast as part of the standard treatment protocol. Participants did not consume any food or liquid, besides water, between breakfast and the beginning of session 2.

Once in the laboratory, participants were seated at a table and told that they would be completing a series of tasks designed to help investigators learn about "the effect of eating on responses to emotional stimuli in patients with AN." Then, participants completed a packet of questionnaires ("pretest assessment"). Following this, participants viewed one of two film clips designed to evoke a negative or neutral emotional state. Film clips are a reliable, valid, and widely-used method of eliciting emotion in experimental research [for review see, (29)]. Previous studies have demonstrated that even very brief film clips lasting 2–5 minutes can elicit strong feelings of sadness, anger, fear, and amusement in healthy populations (29) and individuals with psychiatric disorders (30, 31).

Participants in the *negative emotion* condition watched a 168-second scene from the movie *Fatal Attraction* during which a husband confesses to his wife that he has had an extramarital affair and that the woman is pregnant as a result. The wife becomes agitated, and a shouting match and scuffle ensue. The scene is witnessed by the couple's young child, who begins to cry. This film clip has been shown to elicit feelings of sadness, anger, and anxiety (30, 32). Participants assigned to the *neutral emotion* condition watched a 162-second scene from the nature documentary *Yellowstone* that depicts changing leaf colors during the transition from summer to autumn. Nature films have been used effectively to elicit neutral emotional states in several previous reports (33–35). A randomization list for assigning consecutively enrolled participants to the negative or neutral film conditions was generated prior to initiation of subject recruitment using "Research Randomizer" (available at <http://www.randomizer.org/form.htm>). Participants were not informed about the emotion condition to which they had been randomized prior to viewing the film clip.

After viewing the film clip, participants completed a second packet of questionnaires ("posttest assessment") followed by a supervised test meal procedure adapted from previous research with AN patients (36, 37). Specifically, participants were provided with a single-item meal consisting of 907 grams (32 fluid ounces) of Carnation Instant Breakfast made with whole milk (1.23 calories per gram, or approximately 1,120 calories) presented in a covered opaque container with a straw. A research assistant read scripted instructions informing the participant that the beverage in the container was Carnation Instant Breakfast, and would serve as her lunch for the day. Participants were instructed to drink as much of the meal as they liked, and were told to avoid touching or manipulating the container. No encouragement or feedback regarding intake were given, and participants were not informed about the quantity of Carnation Instant Breakfast provided. The test meal lasted 30 minutes,

after which the research assistant removed the container. Intake (in grams) was measured by calculating the change in the weight of the container before and after the test meal.

Following the meal session, participants completed a final packet of questionnaires (“final assessment”) that were included for the purpose of blinding participants to the study hypotheses. The study concluded with debriefing.

Measures

Session 1 measures—Participants were interviewed using the Eating Disorders Module from the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-I) (38), and completed an investigator-designed questionnaire to document demographics and treatment history. The SCID-I is a widely-used diagnostic instrument with established psychometric properties (39). Our research group has found excellent inter-rater reliability for eating disorder diagnoses ($\kappa = 1.00$) in previous work using the SCID-I with AN patients (40). Information about height, weight, current medications, and prescribed calories was collected by chart review.

Session 2 measures—Emotional state was measured at the pretest, posttest, and final assessments using the Positive and Negative Affect Schedule (PANAS) (41), a 20-item self-report questionnaire designed to assess levels of positive affect (e.g., enthusiasm, excitement) and negative affect (e.g., distress, fear). Items are rated on a five-point Likert scale from “very slightly or not at all” to “extremely.” One advantage of the PANAS is that it can be used to assess emotion during a specified period of time; in the present study, participants were instructed to rate how they were feeling “right now.” The psychometric properties of the PANAS are well-documented (41); internal consistencies at the pretest and posttest assessments ranged from $\alpha = 0.85$ to $\alpha = 0.92$ for positive affect and from $\alpha = 0.91$ to $\alpha = 0.94$ for negative affect in the current sample.

Self-reported eating disorder symptoms were evaluated at the pretest, posttest, and final assessments using an investigator-designed questionnaire created specifically for this study. Consistent with research using EMA to examine state-related changes in disordered eating symptoms [see, e.g., (4, 5, 10)], participants were instructed to rate the degree to which they agreed “right now” with 14 statements designed to measure maladaptive thoughts about eating, weight, and shape (e.g., “I feel fat”) and urges to engage in eating disorder behaviors (e.g., “I want to restrict”). Items were rated on a 5-point Likert scale from 1 = “disagree strongly” to 5 = “agree strongly.” The measure demonstrated excellent internal consistency at the pretest ($\alpha = 0.93$) and posttest ($\alpha = 0.94$) assessments. Moreover, there was an inverse relationship between self-reported eating disorder symptoms at posttest (independent of emotion condition) and intake during the test meal ($r[26] = -0.62, p < 0.001$), indicating that the measure had validity for predicting eating behavior.

Finally, two investigator-designed questionnaires were administered as validity checks in the current study. First, participants were queried about whether they had ever seen the film clip they watched before (and if so, how many times), the extent to which they were paying attention to the film clip while they were watching it, and their emotional reaction to the film clip. Second, participants were asked to report their opinions about the test meal session (e.g., how much did they like the food provided), and the purpose of the study.

Statistical Analysis

We used descriptive statistics to characterize the sample with respect to demographic and clinical features, and independent samples t-tests or Fisher’s exact tests to compare participants in the negative emotion and neutral emotion conditions on these variables. Next,

we conducted two sets of analyses using repeated measures analysis of variance (ANOVA) to evaluate whether the film clips were effective at inducing negative and neutral emotional states. Time (pretest, posttest) and emotion condition (negative, neutral) served as the independent variables in both models, and positive or negative affect scores from the PANAS served as the dependent variable.

To test the hypothesis that AN patients randomized to the negative emotion condition would report greater increases in self-reported eating disorder symptoms than AN patients randomized to the neutral emotion condition, repeated measures ANOVA was performed with time (pretest, posttest) and emotion condition (negative, neutral) as the independent variables, and score on the measure of self-reported eating disorder symptoms as the dependent variable. An independent samples t-test was conducted to test the hypothesis that participants in the negative emotion condition would consume fewer calories during the standardized meal session. Analyses were conducted using IBM SPSS Statistics 19. Two-tailed alpha was set at 0.05. Because this was a preliminary study with a small sample, we also calculated effect sizes (Cohen's *d*) for each result to facilitate interpretation of clinical significance; per Cohen (42), $d = 0.20$ is small, $d = 0.50$ is medium, and $d = 0.80$ is large.

Results

Preliminary Analyses

There were no differences between participants randomized to the negative emotion ($n = 13$; 46.43%) and neutral emotion ($n = 15$; 53.57%) conditions with respect to age, duration of illness, history of repeated (≥ 2) hospitalizations for eating disorder, BMI at admission, BMI at session 2, number of prescribed calories, number of days on the inpatient unit, or use of antidepressant, antipsychotic, or benzodiazepine medications (p 's > 0.25). At a trend level, participants randomized to the negative emotion condition were more likely than those randomized to the neutral emotion condition to meet criteria for the binge-eating/purging subtype of AN (76.92% vs. 40.0%; $\chi^2 [1] = 3.88, p = 0.07$). Individuals in the negative emotion condition also were more likely to report that they had seen the film clip previously (46.15% vs. 0; $\chi^2 [1] = 8.81, p < 0.01$). There were no associations of AN subtype or previous exposure to the study film clips with change in eating disorder symptoms or intake during the supervised test meal (p 's > 0.10); thus, these variables were not included as covariates in the main analyses.² Finally, there were significant time by emotion condition interactions for positive affect ($F[1, 26] = 10.82, p = 0.003$) and negative affect ($F[1, 26] = 23.09, p < 0.001$). As shown in Table 2, simple effects tests revealed that participants randomized to the negative emotion condition showed an increase in negative affect and a decrease in positive affect from pretest to posttest, while participants randomized to the neutral emotion condition showed no change in positive affect and a decrease in negative affect.³

Effect of Emotion Induction on Eating Disorder Symptoms

A significant time by emotion condition interaction was observed for self-reported eating disorder symptoms ($F[1, 26] = 8.01, p = 0.009$), indicating that there was a differential effect

²Results were the same when we controlled for AN subtype in analyses predicting change in eating disorder symptoms and test meal intake (data available upon request). Previous exposure to the film clip was strongly associated with emotion condition, and could not be used as a covariate. However, the pattern of results for participants in the negative emotion condition who had and had not seen the film clip was the same (data available upon request). Additional non-significant predictors of the study outcomes included age, duration of illness, BMI at session 2, days in treatment at session 2, number of prescribed calories at session 2, and use of antidepressant, antipsychotic, or benzodiazepine medications (p 's > 0.15).

³Previous research also has documented that neutral film clips produce modest reductions in negative affect and little change in positive affect [e.g., (33, 35)].

of mood induction (negative versus neutral) on change in self-reported eating disorder symptoms from pretest to posttest. As illustrated in Figure 1, individuals randomized to the negative emotion condition exhibited significantly greater increases in self-reported eating disorder symptoms than individuals randomized to the neutral emotion condition ($M[SD]$ symptom change = 2.77[4.73] versus -1.87[3.94]); the effect size for this comparison was large ($d = 1.07$). There were no main effects of time or emotion condition on self-reported eating disorder symptoms (p 's > 0.50). Finally, contrary to the study hypotheses, there was no effect of emotion condition on intake during the test meal ($t[26] = 0.64$, $p = 0.53$). Individuals in the negative emotion condition consumed an average of 383.46 ($SD = 324.03$) grams (471.66 [$SD = 398.55$] kcal) of Carnation Instant Breakfast compared to 462.13 ($SD = 323.56$) grams (568.42 [$SD = 397.98$] kcal) in the neutral emotion condition. The effect size for this comparison was small ($d = 0.24$).⁴

Discussion

Several theoretical models have postulated that AN symptoms function, in part, to help individuals cope with or avoid aversive emotion states (18–21), but no research to our knowledge has used experimental methodology to evaluate whether negative emotions promote the expression of disordered eating symptoms in AN patients. The results of the current investigation provide support for the notion that experiencing negative emotions leads to increases in cognitive eating disorder symptoms among acutely ill individuals with AN. Specifically, AN patients randomized to a negative mood induction showed significantly greater increases in eating disorder thoughts and urges to engage in disordered eating behaviors after watching the film clip than individuals randomized to a neutral mood induction. These findings converge with previous experimental research that has shown that negative emotional states lead to increases in subjective eating disorder symptoms including urges to binge (6) and feelings of loss of control over eating (7, 8).

Contrary to the study hypotheses, there were no differences between participants randomized to the negative and neutral emotion conditions with respect to intake during the supervised test meal session. Moreover, the effect size for this comparison was small, indicating that limited power likely was not the primary reason that we did not obtain a significant effect. One explanation for this finding might be that experimental studies have limited external validity for detecting associations between emotion and eating behavior in individuals with eating disorders. Indeed, previous experimental research focusing on individuals with binge eating syndromes also has failed to document effects of negative mood inductions on eating behavior, despite increases in self-reported eating disorder symptoms (6–8). Although associations between negative affect and disordered eating behaviors have been documented using other methodologies such as EMA [e.g., (5, 10)] and prospective longitudinal designs [e.g., (1)], experimental paradigms may be more appropriate for examining mood-related changes in cognitive eating disorder symptoms, which may not translate into changes in overt eating behavior.

The use of experimental methodology to test hypotheses about the effects of emotion on anorexic symptoms that are salient to several models of AN psychopathology [e.g., (18, 20, 21)] is a strength of the current investigation. Nevertheless, several limitations must be considered when interpreting the findings. First, the sample size was small, and the rate of study enrollment was lower than in our previous work using the same patient population

⁴To rule out the possibility that non-significant differences in test meal intake were due to the presence of two forms of aberrant eating in the negative emotion condition (i.e., binge eating, as well as dietary restriction), we conducted exploratory analyses to determine whether extreme intake (defined as intake > 1 standard deviation above or below the sample mean) was more common in the negative emotion condition than in the neutral emotion condition. There was no evidence that this was the case ($p > 0.50$; data available upon request).

(40). Thus, it is possible that selection biases resulted in a sample that was not representative of acutely ill individuals with AN. Similarly, because participants were females aged 18 years receiving inpatient treatment at an academic medical center, findings may not generalize to other groups. Second, an investigator-designed questionnaire was used to document changes in self-reported eating disorder symptoms. Although our measure was similar to instruments used in other studies examining state-specific changes in eating-related psychopathology [e.g., (4, 5, 10)], and had excellent internal consistency and validity for predicting eating behavior, these properties need to be replicated in future research. Third, given the constraints on research in our clinical setting, it was not possible to provide a standardized breakfast to study participants. However, participants were required to eat all of their prescribed breakfast calories, and there was no relation between prescribed calories and test meal intake ($r = -0.09$, $p = 0.64$). Finally, the sample size was too small to examine variables that might affect the relation between negative emotion and disordered eating symptoms in individuals with AN. Future studies using larger samples of AN patients are needed to replicate the current findings, and to identify factors that may moderate or drive the relation between emotion and disordered eating symptoms in AN.

In conclusion, the results of the current study provide support for the idea that negative emotions influence the expression of disordered eating symptoms in individuals with AN. These findings may have important implications for treatment. In particular, the current data suggest that interventions that address the relation between emotion and disordered eating symptoms and help individuals to develop more effective strategies for coping with negative emotional states may be particularly useful for AN patients. Several psychotherapeutic interventions of this type have been developed or adapted for eating disorder patients [e.g., (21, 27, 43–45)]; however, controlled studies evaluating their efficacy in the treatment of AN are scant. Given the limited evidence base regarding effective treatments for AN (46), controlled studies to examine the efficacy of psychotherapies that emphasize the relation between emotion and AN symptoms may be a promising direction for future research.

Acknowledgments

Research supported by National Institute of Mental Health grants R01 MH082685 and K01 MH080020. We thank Lauren Carlson, RD for assistance in designing the test meal, Jill Gaskill, CRNP and Paula Reed, MSN for help with participant recruitment, and Juliana Bandi and James McGowan for their contributions to data collection.

References

1. Stice E. A prospective test of the dual-pathway model of bulimic pathology: mediating effects of dieting and negative affect. *J Abnorm Psychol.* 2001; 110:124–135. [PubMed: 11261386]
2. Stice E, Burton EM, Shaw H. Prospective relations between bulimic pathology, depression, and substance abuse: unpacking comorbidity in adolescent girls. *J Consult Clin Psychol.* 2004; 72:62–71. [PubMed: 14756615]
3. Haedt-Matt AA, Keel PK. Revisiting the affect regulation model of binge eating: a meta-analysis of studies using ecological momentary assessment. *Psychol Bull.* 2011; 137:660–681. [PubMed: 21574678]
4. Smyth JM, Wonderlich SA, Heron KE, Sliwinski MJ, Crosby RD, Mitchell JE, Engel SG. Daily and momentary mood and stress are associated with binge eating and vomiting in bulimia nervosa patients in the natural environment. *J Consult Clin Psychol.* 2007; 75:629–638. [PubMed: 17663616]
5. Crosby RD, Wonderlich SA, Engel SG, Simonich H, Smyth J, Mitchell JE. Daily mood patterns and bulimic behaviors in the natural environment. *Behav Res Ther.* 2009; 47:181–188. [PubMed: 19152874]
6. Cattanach L, Malley R, Rodin J. Psychologic and physiologic reactivity to stressors in eating disordered individuals. *Psychosom Med.* 1988; 50:591–599. [PubMed: 3237948]

7. Agras WS, Telch CF. The effects of caloric deprivation and negative affect on binge eating in obese binge-eating disordered women. *Behav Ther.* 1998; 29:491–503.
8. Telch CF, Agras WS. Do emotional states influence binge eating in the obese? *Int J Eat Disord.* 1996; 20:271–279. [PubMed: 8912039]
9. Levine MD, Marcus MD. Eating behavior following stress in women with and without bulimic symptoms. *Ann Behav Med.* 1997; 19:132–138. [PubMed: 9603688]
10. Engel SG, Wonderlich SA, Crosby RD, Wright TL, Mitchell JE, Crow SJ, Venegoni EE. A study of patients with anorexia nervosa using ecologic momentary assessment. *Int J Eat Disord.* 2005; 38:335–339. [PubMed: 16261606]
11. Bruch, H. *Conversations with anorexics.* New York: Basic Books, Inc; 1988.
12. Slade P. Towards a functional analysis of anorexia nervosa and bulimia nervosa. *Br J Clin Psychol.* 1982; 21:167–179. [PubMed: 6957251]
13. Kucharska-Pietura K, Nikolaou V, Masiak M, Treasure J. The recognition of emotion in the faces and voice of anorexia nervosa. *Int J Eat Disord.* 2004; 35:42–47. [PubMed: 14705156]
14. Zonnevylle-Bender MJ, van Goozen SH, Cohen-Kettenis PT, van Elburg TA, van Engeland H. Emotional functioning in adolescent anorexia nervosa patients: a controlled study. *Eur Child Adolesc Psychiatry.* 2004; 13:28–34. [PubMed: 14991429]
15. Bydlowski S, Corcos M, Jeammet P, Paterniti S, Berthoz S, Laurier C, et al. Emotion-processing deficits in eating disorders. *Int J Eat Disord.* 2005; 37:321–329. [PubMed: 15856501]
16. Kessler H, Schwarze M, Filipic S, Traue HC, von Wietersheim J. Alexithymia and facial emotion recognition in patients with eating disorders. *Int J Eat Disord.* 2006; 39:245–251. [PubMed: 16485269]
17. O'Brien KM, Vincent NK. Psychiatric comorbidity in anorexia and bulimia nervosa: nature, prevalence, and causal relationships. *Clin Psychol Rev.* 2003; 23:57–74. [PubMed: 12559994]
18. 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]
19. Kaye W. Neurobiology of anorexia and bulimia nervosa. *Physiol Behav.* 2008; 94:121–135. [PubMed: 18164737]
20. Strober M. Pathologic fear conditioning and anorexia nervosa: on the search for novel paradigms. *Int J Eat Disord.* 2004; 35:504–508. [PubMed: 15101066]
21. Wildes JE, Marcus MD. Development of emotion acceptance behavior therapy for anorexia nervosa: a case series. *Int J Eat Disord.* 2011; 44:421–427. [PubMed: 20721894]
22. Cockell SJ, Geller J, Linden W. The development of a decisional balance scale for anorexia nervosa. *Eur Eat Disord Rev.* 2002; 10:359–375.
23. Nordbø RH, Espeset EM, Gulliksen KS, Skarderud F, Holte A. The meaning of self-starvation: qualitative study of patients' perception of anorexia nervosa. *Int J Eat Disord.* 2006; 39:556–564. [PubMed: 16845678]
24. Serpell L, Treasure J, Teasdale J, Sullivan V. Anorexia nervosa: friend or foe? *Int J Eat Disord.* 1999; 25:177–186. [PubMed: 10065395]
25. 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]
26. Kyriacou O, Easter A, Tchanturia K. Comparing views of patients, parents, and clinicians on emotions in anorexia: a qualitative study. *J Health Psychol.* 2009; 14:843–854. [PubMed: 19786510]
27. Wade TD, Treasure J, Schmidt U. A case series evaluation of the Maudsley Model for treatment of adults with anorexia nervosa. *Eur Eat Disorders Rev.* 2011; 19:382–389.
28. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* 4. Washington, DC: Author; 1994.
29. Gross JJ, Levenson RW. Emotion elicitation using films. *Cognition and Emotion.* 1995; 9:87–108.
30. Tull MT, Roemer L. Emotion regulation difficulties associated with the experience of uncued panic attacks: evidence of experiential avoidance, emotional nonacceptance, and decreased emotional clarity. *Behav Ther.* 2007; 38:378–391. [PubMed: 18021952]

31. Campbell-Sills L, Barlow DH, Brown TA, Hofmann SG. Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behav Res Ther.* 2006; 44:1251–1263. [PubMed: 16300723]
32. Richards JM, Gross JJ. Emotion regulation and memory: the cognitive costs of keeping one's cool. *J Pers Soc Psychol.* 2000; 79:410–424. [PubMed: 10981843]
33. Cools J, Schotte DE, McNally RJ. Emotional arousal and overeating in restrained eaters. *J Abnorm Psychol.* 1992; 101:348–351. [PubMed: 1583231]
34. Kreibig SD, Wilhelm FH, Roth WT, Gross JJ. Cardiovascular, electrodermal, and respiratory response patterns to fear- and sadness-inducing films. *Psychophysiology.* 2007; 44:787–806. [PubMed: 17598878]
35. Sheppard-Sawyer CL, McNally RJ, Fischer JH. Film-induced sadness as a trigger for disinhibited eating. *Int J Eat Disord.* 2000; 28:215–220. [PubMed: 10897084]
36. Steinglass J, Sysko R, Schebendach J, Broft A, Strober M, Walsh BT. The application of exposure therapy and d-cycloserine to the treatment of anorexia nervosa: A preliminary trial. *J Psychiatr Pract.* 2007; 13:238–245. [PubMed: 17667736]
37. Sysko R, Walsh BT, Schebendach J, Wilson GT. Eating behavior among women with anorexia nervosa. *Am J Clin Nutr.* 2005; 82:296–301. [PubMed: 16087971]
38. First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV-TR Axis I Disorders - Patient Edition (With Psychotic Screen) (SCID-I/P (W/PSYCHOTIC SCREEN)). New York: Biometrics Research Department; 2007.
39. First, MB.; Gibbon, M.; Spitzer, RL.; Williams, JBW. User's Guide for the Structured Clinical Interview for DSM-IV-TR Axis I Disorders - Research Version. New York: Biometrics Research Department; 2002.
40. Wildes JE, Marcus MD, Crosby RD, Ringham RM, Dapelo MM, Gaskill JA, Forbush KT. The clinical utility of personality subtypes in patients with anorexia nervosa. *J Consult Clin Psychol.* 2011; 79:665–674. [PubMed: 21767000]
41. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol.* 1988; 54:1063–1070. [PubMed: 3397865]
42. Cohen J. A power primer. *Psychol Bull.* 1992; 112:155–159. [PubMed: 19565683]
43. Corstorphine E. Cognitive-Emotional-Behavioural Therapy for eating disorders: working with beliefs about emotions. *Eur Eat Disorders Rev.* 2006; 14:448–461.
44. Fairburn CG, Cooper Z, Shafran R. Cognitive behaviour therapy for eating disorders: a “transdiagnostic” theory and treatment. *Behav Res Ther.* 2003; 41:509–528. [PubMed: 12711261]
45. Chen EY, Matthews L, Allen C, Kuo JR, Linehan MM. Dialectical behavior therapy for clients with binge-eating disorder or bulimia nervosa and borderline personality disorder. *Int J Eat Disord.* 2008; 41:505–512. [PubMed: 18348281]
46. Bulik CM, Berkman ND, Brownley KA, Sedway JA, Lohr KN. Anorexia nervosa treatment: a systematic review of randomized controlled trials. *Int J Eat Disord.* 2007; 40:310–320. [PubMed: 17370290]
47. Morris SB, DeShon RP. Combining effect size estimates in meta-analysis with repeated measures and independent-groups designs. *Psychol Methods.* 2002; 7:105–125. [PubMed: 11928886]

Figure 1. Mean ($\pm$ SE) self-reported eating disorder symptoms from pretest to posttest in participants randomized to the negative emotion and neutral emotion conditions

Table 1Demographic and Clinical Characteristics of the Sample ($N = 28$)

Characteristic	<i>M</i>	<i>SD</i>	<i>n</i>	%
Age (years)	32.36	11.39		
Non-white race			1	3.57
Any college education			19	67.86
Occupation				
Student/employed/homemaker			15	53.57
Unemployed			13	46.43
Body mass index at admission	15.70	1.77		
Body mass index at session 2	17.44	0.89		
Anorexia nervosa subtype				
Restricting			12	42.86
Binge-eating/purging			16	57.14
Duration of illness (years)	14.81	10.84		
2 hospitalizations for eating disorder			18	64.29

Changes in Positive and Negative Affect from Pretest to Posttest in Participants Randomized to the Negative Emotion and Neutral Emotion Conditions

Table 2

	Negative Emotion (n = 13)			Neutral Emotion (n = 15)		
	Pretest	Posttest		Pretest	Posttest	
	M (SD)	M (SD)	t(12)	M (SD)	M (SD)	t(14)
PANAS-P	28.46 (9.77)	21.92 (7.54)	3.63**	24.87 (9.61)	24.47 (8.81)	0.52
PANAS-N	23.38 (9.39)	29.46 (11.38)	3.75**	22.67 (9.80)	20.53 (10.03)	2.83*
						d
						0.14
						0.73

Note: PANAS-P = Positive and Negative Affect Schedule-Positive Affect; PANAS-N = Positive and Negative Affect Schedule-Negative Affect

* $p < 0.05$.

** $p < 0.01$

$\dagger$ d = Cohen's d calculated using Morris and DeShon's (47) formula for repeated measures designs. Per Cohen (42), $d = 0.20$ is small, $d = 0.50$ is medium, and $d = 0.80$ is large.