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Implicit and explicit affect toward food and weight stimuli in anorexia nervosa

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ABSTRACT

We know strikingly little about the core affective processes that drive the development and maintenance of, and recovery from anorexia nervosa (AN). To partially address this knowledge gap, we measured implicit and explicit affect toward pleasant, neutral, unpleasant, food-relevant, and weight-relevant images in three groups: in patients with acute AN, individuals recovered from AN, and healthy controls with no history of AN. Compared with the other two groups, acutely ill AN participants displayed significantly greater implicit positive affect toward pleasant images and significantly greater implicit negative affect toward unpleasant, high-calorie food, and overweight body type images. Recovered participants did not differ significantly from controls on any implicit affect measure. Explicit affective patterns were similar to implicit, but explicit measures yielded much smaller effect sizes and failed to detect certain group differences. Overall, negative implicit affect toward high-calorie foods and overweight body types may represent core affective processes that are operative during acute AN.

1. Introduction

Affective processes such as fear of fat and drive for thinness are motivating features of anorexia nervosa (AN) (Habermas, 1996; Steinglass, Eisen, Attia, Mayer, & Walsh, 2007), and are typically measured via explicit self-report which is vulnerable to biases such as lack of insight, motivation to conceal, and adherence to social norms (Konstantakopoulos, Tchanturia, Surguladze, & David, 2011; Nisbett & Wilson, 1977).

Implicit measures that avoid these complications (Gawronski & Bodenhausen, 2006) reveal a bias against overweight- and toward underweight-related stimuli in AN patients; however, most studies yield only small to moderate effect sizes, fail to provide information about underlying affective processes, and rely on reaction time (Cserjesi et al., 2010; Woud, Anschutz, Van Strien, & Becker, 2011), which may be compromised by executive functioning deficits in AN (Green, Ellimon, Wakeling, & Rogers, 1996; Zakzanis, Campbell, & Polsinelli, 2010).

The Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005), a computer-based measure of implicit affect, is reliable (Cronbach's alphas .8–.9), powerful (Cohen's $d > 1.0$), and specific to affective valence (Payne et al., 2005). The AMP indexes automatic affective reactions (i.e., implicit affect) to stimuli that are minimally impacted by explicit self-report processes (c.f. Gawronski & Bodenhausen, 2006). Social pressure and motivation to conceal do not affect performance (Payne, Govorun, & Arbuckle, 2008).

We used AMP to examine affective processes in AN toward emotionally-valenced and AN-specific stimuli. We hypothesized that AN patients would display significantly more negative responses to overweight and high-calorie stimuli, and significantly more positive responses to underweight and low-calorie stimuli.

2. Material and methods

2.1. Participants

Fifty-two females ages 18 to 44 ($M = 21.4$, *Median* $= 19$, $SD = 5.79$) participated. Nine had current DSM-IV AN; 14 were recovered from AN (i.e., healthy BMI for at least one year and not meeting diagnostic criteria for AN) recruited from university listservs; and 29 were healthy controls with no history of eating disorders, recruited from Introductory Psychology courses. 84.6% of participants were white. This study was approved by the Behavioral Institutional Review Board at UNC Chapel Hill; written informed consent was obtained; and recovered patients were reimbursed $10.

2.2. Measures

2.2.1. Assessments

The Structured Clinical Interview for DSM IV—Research Edition (SCID-I/P) Module H (First, Spitzer, Gibbon, & Williams, 2002) and the Eating Disorders Examination Questionnaire (Lang, Bradley, &

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Cuthbert, 2008) were administered to establish diagnosis and recovery status.

2.2.2. Affect Misattribution Procedure

The AMP was administered according to Payne et al. (2005). Trial sequence was: (1) pleasant, neutral, unpleasant, high-calorie, low-calorie, thinness-related, or fat-related image for 75 ms; (2) blank, black screen for 125 ms; (3) Chinese character for 100 ms; and (4) a grey screen that was presented until participants pressed a button. Participants pressed a button indicating that the Chinese character was either (a) more pleasant or (b) less pleasant than the average character. They were told not to let the preceding images influence their assessment of the Chinese character, but to judge the character on its own merit. Each of 84 images was repeated twice (Cronbach's Alpha = .90) resulting in 168 randomly-presented trials.

Images from the International Affective Picture System (IAPS; Lang et al., 2008) were: 1) neutral (household objects or fungi); 2) unpleasant (guns, spiders, and violence); and 3) food-related [high-calorie (e.g., cake, fries, burgers) and low-calorie (e.g., celery, lettuce, apples)] images. Weight-related stimuli were from thinspiration and fat-positivity websites. Images were matched for complexity, intensity of valence, and arousal levels.

2.2.3. Explicit ratings

Following the AMP, participants completed explicit ratings of the pleasantness and unpleasantness of each image on a Likert scale ranging from 1 (very unpleasant) to 9 (very pleasant).

2.3. Data analytic plan

Primary hypotheses focused on eating disorder-relevant stimulus categories. As a manipulation check, mean scores on pleasant, neutral, and unpleasant images were calculated. Mixed (group × category) Analyses of Variance (ANOVAs) were calculated for implicit and explicit measures. Pending significant effects, one-way ANOVAs examined group differences within specific levels of these categories (e.g., high- vs. low-calorie food). If significant, post-hoc comparisons were conducted.

3. Results

3.1. Pleasant, neutral, and unpleasant images

3.1.1. Implicit

A significant group × category interaction was observed on valenced stimuli, $F(4, 98) = 6.39$, $p < 0.001$, and between-group ANOVAs revealed a main effect of group for pleasant, $F(2, 49) = 5.74$, $p = 0.01$, and unpleasant, $F(2, 49) = 4.14$, $p = 0.02$, stimuli. The proportion of positive judgments decreased from pleasant to neutral to unpleasant categories in all groups (Fig. 1). Controls and recovered participants did not differ significantly in any category. Patients with acute AN had significantly more extreme reactions within the pleasant and unpleasant categories (Fig. 1) with differences due to extreme scores in the patient group on pleasant ($p < 0.01$; vs. control group $d = 1.65$; vs. recovered group, $d = 1.76$) and unpleasant stimuli ($p < 0.05$; vs. control group, $d = 1.28$; vs. recovered group, $d = 0.96$).

3.1.2. Explicit

On explicit ratings of the pleasant, neutral, and unpleasant stimuli, there was no significant interaction ($p = 0.24$), or main effect of group ($p = 0.96$), but there was a significant main effect of valence $F(2, 98) = 655.21$, $p < 0.001$. The patient group was not more extreme than the other groups on explicit affect and there were no other between-group differences (Fig. 2).

3.2. Food stimuli

3.2.1. Implicit

There was a significant group by category interaction on food stimuli, $F(2, 49) = 6.97$, $p < 0.001$. A follow-up ANOVA revealed a significant main effect of group on high-, $F(2, 49) = 15.88$, $p < 0.001$, but not low-calorie food stimuli ($p = 0.25$). Post-hoc analyses revealed significant differences on high-calorie foods between the control and patient groups ($p < 0.001$; $d = 2.13$) and the recovered and patient groups ($p < 0.001$; $d = 1.88$): the patient group displayed more negative implicit affect toward this category (Fig. 1). The difference between controls and recovered participants for high-calorie food was not significant ($p = 0.05$; $d = 0.69$), but should be pursued with a larger sample size.

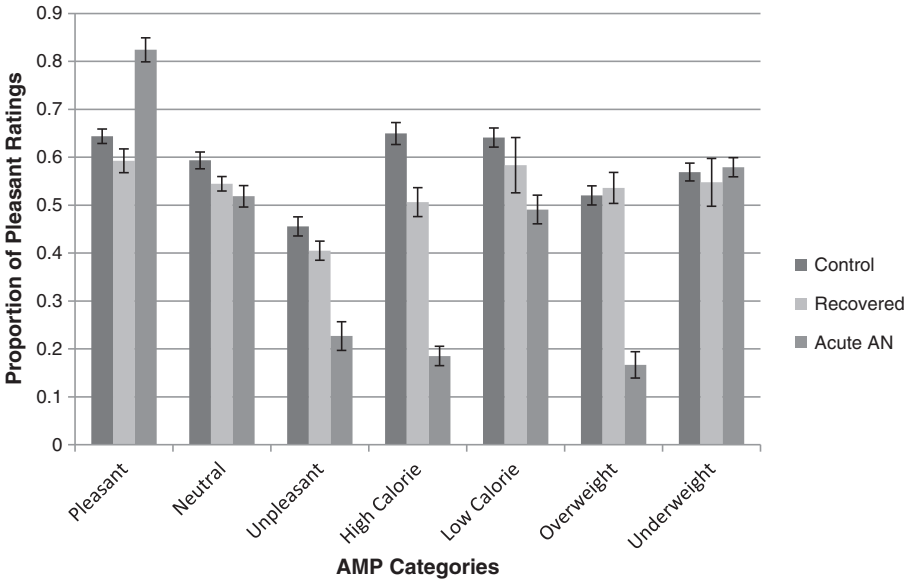

Fig. 1. Implicit affect toward image categories. Implicit judgments toward all AMP image categories (i.e., pleasant, neutral, and unpleasant images; images of high and low calorie foods; and images of overweight and underweight individuals). Note: Error bars represent +/− 1 standard error.