

# Decreasing body dissatisfaction using a brief conditioning intervention

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## Shorter communication

## Decreasing body dissatisfaction using a brief conditioning intervention



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## ABSTRACT

**Objective:** Body dissatisfaction in females is common and a risk factor for the development of an eating disorder. This study tested whether body dissatisfaction could be improved using a brief conditioning intervention in which photographs of participants' bodies were selectively paired with positive social stimuli (smiling faces) and photographs of other bodies were paired with neutral or negative social stimuli (neutral and frowning faces).

**Method:** 39 women (mean age = 22.46; 64.1% Caucasian) with high body dissatisfaction were randomized to either the evaluative conditioning intervention ( $n = 22$ ) or to a delayed waitlist control condition ( $n = 17$ ). Body dissatisfaction (specifically, shape and weight concern), restraint, eating concern, and self-esteem were assessed at baseline, post treatment and again after four and 12 weeks.

**Results:** Compared to women in the delayed waitlist control condition, women in the treatment condition demonstrated a significant decrease in shape and weight concern, and a significant increase in self-esteem. Similar trends were found for the control condition after they completed the intervention. Changes at post treatment related to body dissatisfaction were maintained at 12-week follow-up.

**Conclusions:** Repeatedly pairing photographs of an individual's body with positive social feedback may lead to improved body image and self-esteem.

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Body dissatisfaction (BD), generally defined as dissatisfaction with one's weight and shape, is pervasive amongst the general population especially in women (Cash, Morrow, Hrabosky, & Perry, 2004; Tiggemann, 2004). This widespread phenomenon is cause for serious concern given that BD is associated with depression, anxiety (Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006; Stice & Shaw, 2002) and an increased risk of developing and maintaining an eating disorder [ED; (Jacobi, Hayward, De Zwaan, Kraemer, & Agras, 2004; Johnson & Wardle, 2005; Stice & Shaw, 2002)].

Several authors have suggested that "automatic processes" help to perpetuate body dissatisfaction (e.g., Henderson-King, Henderson-King, & Hoffmann, 2001). For example, individuals with body dissatisfaction automatically compare their bodies to

others in generally unfavorable ways (Want, 2009). Likewise, Watts and Cranney (2010) observed that women automatically associate thin bodies with "good" and larger bodies with "bad" and have argued that these evaluations are often hard to change (Watts, Cranney, & Gleitzman, 2008). Jansen, Nederkoorn, and Mulken (2005) found that women with body dissatisfaction automatically attend to their self-defined unfavorable body parts and to what they considered the most beautiful parts in other women; non-BD women showed the exact opposite selective attention pattern.

Other evidence suggests that women's evaluations of their bodies are highly influenced by how they think others might judge them (Crocker & Wolfe, 2001; Tantleff-Dunn & Gokee, 2002). These and other data suggest that women with body dissatisfaction may engage in biased cognitive processing that reinforce body dissatisfaction (Martijn, Alleva, & Jansen, 2015). Cognitive psychologists have argued that changing evaluations and attitudes, such as an evaluation of one's body, can be accomplished through two different systems; a reflective system that learns via logic and

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conscious reasoning, and an automatic system that learns via the gradual accumulation of associations (Smith and DeCoster, 2000; Strack & Deutsch, 2004).

Martijn, Vanderlinden, Roefs, Huijding, and Jansen (2010) developed a strategy to alter some aspects of these automatic evaluative processes. The aim of their study was to test whether a simple conditioning procedure could teach women to associate their bodies with positive social feedback and to see whether this learned association increased body satisfaction. Twenty-six women with low and high body concerns completed a conditioning procedure in which pictures of their bodies were selectively linked to positive social stimuli (pictures of smiling faces). Even after one conditioning session, women with high body concerns demonstrated an increase in body satisfaction and global self-esteem.

Given these encouraging findings, we were interested in evaluating the efficacy of Martijn et al.'s (2010) intervention using a sample of women at high risk for developing an ED. Furthermore, we also wanted to investigate whether the effects could be maintained. We hypothesized that: (1) women who received the evaluative conditioning intervention would experience an improvement in body image and in self-esteem; and (2) the changes achieved by the evaluative conditioning intervention would be maintained at four- and 12-week follow-up.

## 1. Method

### 1.1. Participants

Thirty-nine college women ages 18–30 (average age 22.46) deemed at high risk for developing an ED and with a body mass index (BMI) ranging from 19 to 30 were recruited by email and through flyers posted on the Stanford University campus. The participants were 64.1% Caucasian, 12.8% other (mixed race most commonly endorsed), 7.7% Asian Indian, 5.1% African American, and 2.6% Latino/Hispanic, 2.6% Filipino, 2.6% Japanese and 2.6% Chinese. The majority of the sample had at least one parent with a graduate degree (66.7%). Participants were undergraduates or graduate students at Stanford University and were ineligible if they were deemed low risk for developing an ED (see below for details) or were receiving ongoing therapy related to body image or eating issues. This study was approved by the human subjects committee at Stanford University.

### 1.2. Procedure

A participant was considered eligible for the study if they were at high risk for developing an ED (i.e., >47 on the Weight Concerns Scale; see measures for details). Women interested in the study completed a screening (via email or telephone) and if eligible were scheduled for a pre-intervention assessment. Height and weight were measured to ensure that all participants were within a 19–30 BMI range. A trained assessor administered the SCID and all other measures (self-esteem and body dissatisfaction) were completed by the participant using an online program. Afterward, the participants were asked to change into standard fitted clothing (black t-shirt and pants) and three full body photos (front; right profile; left profile) were taken. Participants were then randomized into the treatment ( $n = 22$ ) or waitlist control condition ( $n = 17$ ); randomization was predetermined for each subsequent participant using an online program. If randomized into the treatment condition, the assessor scheduled the participants for four weekly sessions. If randomized to the waitlist control condition, participants were scheduled to complete a second pre-intervention measurement in four weeks from that date and

then to complete their four weekly sessions. Research assistants met the participants on campus each week at a convenient location (e.g. library) to minimize participant burden. Four weeks and 12 weeks after their last treatment sessions, participants again completed the self-esteem and body satisfaction measurements using an online survey. Participants were given five dollar gift cards for completing each follow-up. In total, six participants dropped out and we were unable to get follow-up data for an additional four women. Information about recruitment, retention and follow-up assessments, and the experimental design (i.e., cross over) is summarized in Fig. 1.

### 1.3. Measures

#### 1.3.1. Rosenberg Self-Esteem scale (RSES)

The RSES (Rosenberg, 1965) consists of ten items rated on 4-point Likert scales (1 = *strongly agree* to 4 = *strongly disagree*). After recoding the reverse-scored items, the items were summed to create a global self-esteem measure. In our sample, Cronbach's  $\alpha$  (internal consistency) of the RSES at pre-test, post-test, four-week follow-up and 12-week follow-up varied between .88 and .93.

#### 1.3.2. Eating Disorder Examination Questionnaire (EDE-Q)

The Eating Disorder Examination – Questionnaire (EDE-Q) is a 39-item, self-report version of the EDE used to assess ED psychopathology in the last 28 days, yielding a global score and four subscale scores (restraint, eating concern, weight concern, and shape concern; Fairburn & Beglin, 1994). The EDE-Q has demonstrated good internal consistency, temporal stability, and reliability (Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999). Scores from the weight and shape concern subscales were used to indicate level of BD. At pre-test, post-test, four-week follow-up and 12-week follow-up,  $\alpha$ 's for our sample were as follows: weight concern subscale .74–.78; the shape concern subscale .80–.90; the restraint subscale .71–.79; and the eating concern subscale .55–.76.

#### 1.3.3. Weight Concerns Scale (WCS)

The WCS (Killen et al., 1994), a 5-item self-report questionnaire measuring weight and shape concerns, fear of weight gain, dieting frequency, importance of weight, and feelings of fatness. The WCS has demonstrated good test-retest reliability and good predictive validity of identifying individuals who will develop partial or full syndrome EDs and (Killen et al., 1994, 1996). Scores >47 are associated with increased risk for developing an eating disorder (Jacobi et al., 2011; Taylor et al., 2006). In our sample, the internal consistency of the WCS was low and varied between .33 and .58 across measurements.

#### 1.3.4. Structured clinical interview for DSM IV (SCID)<sup>1</sup>

The eating disorder module of the SCID (First, Spitzer, Gibbon, & Williams, 2002) was administered at baseline to determine whether participants met criteria for an eating disorder.

### 1.4. Evaluative conditioning intervention

Each participant was informed that pictures of her own body and of other women's bodies would appear randomly in one of four quadrants of the computer screen. She was instructed to click on each picture as quickly as possible and was told that after doing so

<sup>1</sup> While the SCID is often considered a gold standard diagnostic tool a recent study suggests that it may underestimate the actual prevalence of EDs (Swanson, Brown, Crosby, & Keel, 2014).

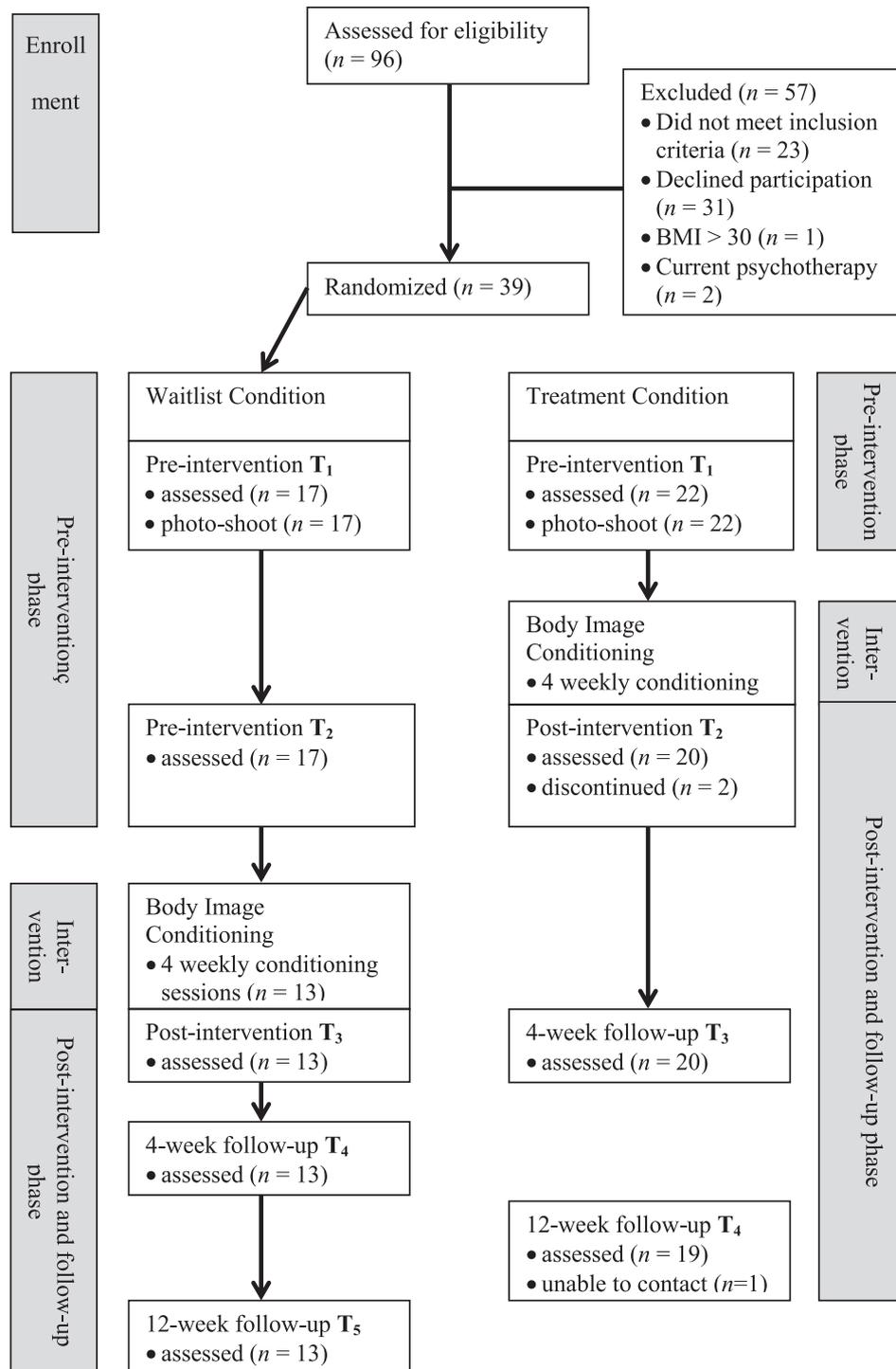


Fig. 1. Participant flow chart.

another picture would be presented briefly (for 400 ms) in that same quadrant. This procedure was repeated for 270 trials and took 3–5 min to complete. The displayed body pictures were the three pictures that were taken of the participant at pretest and six standard pictures of two other women. Pictures of the participant's body were always (100%) followed by a smiling face (90 trials). Pictures of the other women's bodies were followed by pictures of neutral (50%, 90 trials) or frowning (50%, 90 trials) faces. The faces

were selected from the NimStim Facial Stimuli Set<sup>2</sup> (Tottenham et al., 2009) and consisted of 25 female and 25 male faces (see Martijn et al., 2010; for an illustration of the evaluative conditioning

<sup>2</sup> Development of the MacBrain Face Stimulus Set was overseen by Nim Tottenham and supported by the John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development. Please contact Nim Tottenham at [tott0006@tc.umn.edu](mailto:tott0006@tc.umn.edu) for more information concerning the stimulus set.

intervention). The pictures of the two other women (a graduate student and lab member both with BMI within the 18–30 range) were full body pictures of average height and weight, wearing the same top and pants as the participant, each photographed from the front, left and right lateral.

## 2. Results

### 2.1. Analytic plan

Data were analyzed using SPSS. Six dependent variables (RSES, WCS, and EDE-Q weight, shape, eating and restraint subscales) were examined in both the short term and longer-term analyses. To correct for multiple testing, the alpha criterion was set at .008 ( $p = .05/6$ ). The short-term effect of the intervention was tested by entering the scores at  $T_2$  of the six dependent variables (RSES, WCS, and the four EDE-Q subscales) into six, separate 2 between (Condition: treatment vs. waitlist control) ANCOVAs with  $T_1$  scores as covariates. Additionally, we tested whether the effect of conditioning was replicated in the waitlist control condition once participants had received the treatment. We entered the post-intervention scores ( $T_2$ ) of the six dependent variables of the treatment condition and compared those to post-intervention scores ( $T_3$ ) scores of the waitlist control condition in six separate ANCOVAs with Condition (treatment vs. waitlist control) as a between subjects factor and the pre-test scores as covariates. To keep the assessment time before the intervention consistent across conditions we entered pre-intervention scores at  $T_1$  for the treatment condition and pre-intervention scores at  $T_2$  for the waitlist control condition (see Fig. 1 for an overview of the design). Thus, for each condition, we included pre-intervention scores that were obtained one week before the start of the intervention.

To test the longer-term effects of the intervention for the treatment and the waitlist group, the RSES, WCS, and the four EDE-Q subscales were entered in six separate four within (Time: pre-intervention, post-intervention, four-week follow-up, 12-week follow-up) repeated measurement ANOVAs. For the waitlist-control condition, we again used scores at  $T_2$  to keep the time of assessment before the intervention consistent with the treatment condition. Polynomial trend analyses were used to examine the development of the scores on the dependent measures over time.

For each set of analyses, we first report the results of the completers (participants who completed all assessments) followed by the non-completers (participants who dropped out) where we used intention-to-treat (ITT) analyses with the last-observation-carried-forward approach.

### 2.2. Short-term intervention effect

Our first hypothesis was that women in the treatment condition would show an increase in body satisfaction and self-esteem from pre-intervention  $T_1$  to post-intervention  $T_2$  (see Fig. 1) whereas body image satisfaction and self-esteem at  $T_1$  and  $T_2$  for women in the waitlist control condition would remain the same.

#### 2.2.1. Completers

In all six analyses, the scores at pre-intervention  $T_1$  (the covariates) were significantly related to scores at  $T_2$ , all  $F_s > 7.67$ ,  $p_s < .008$ ,  $r_s > .43$ . For RSES, there was an effect of Condition,  $F(1, 30) = 14.36$ ,  $p < .001$ ,  $r = .57$ . For the EDE-Q subscales, we obtained an effect of Condition for weight concern,  $F(1, 31) = 10.29$ ,  $p = .003$ ,  $r = .50$ , shape concern,  $F(1, 31) = 10.18$ ,  $p = .003$ ,  $r = .50$ , and restraint,  $F(1, 31) = 8.61$ ,  $p < .001$ ,  $r = .47$ . We found no effect of Condition for WCS,  $F(1, 26) = 6.13$ ,  $p < .02$ ,  $r = .44$  or for the eating concern EDE-Q subscale,  $F(1, 31) = 3.94$ ,  $p = .06$ ,  $r = .34$ .

#### 2.2.2. Intention-to-treat

We obtained the same pattern of results for ITT as for the completers. In all analyses, the covariate scores at pre-intervention  $T_1$ , were significantly related to scores at  $T_2$ , all  $F_s > 24.02$ ,  $p_s < .001$ ,  $r_s > .38$ . The effects of Condition were significant for RSES, and the weight concern, shape concern and restraint subscales of the EDE-Q (all  $F_s > 9.87$ ,  $p_s < .005$ ,  $r_s$  varied between .46 and .56) but not for WCS or the EDE-Q eating concern subscale ( $F_s < 5.24$ ,  $p_s > .03$ ,  $r_s < .36$ ).

In sum, when correcting for baseline differences at  $T_1$ , completers and ITT analyses revealed significant differences at  $T_2$  between the treatment and the waitlist control condition for RSES, the weight concern, shape concern and restraint subscales of the EDE-Q. These findings were associated with medium to large effect sizes.

For completers in the waitlist control crossed over to the intervention, in all six analyses the scores at pre-intervention were significantly related to the scores at post-intervention, all  $F_s > 12.77$ ,  $p_s < .001$ ,  $r_s > .54$ . The effects of Condition were non-significant for all of the six dependent variables at  $p = .008$ , all  $F_s < 5.08$ ,  $ns$ . The absence of a Condition effect indicated that there was no difference between the scores of the two conditions once the waitlist control condition had received the conditioning intervention (see Table 1). For ITT in this same group, all scores at pre-intervention were related to scores at post-intervention as well,  $F_s > 24.02$ ,  $p_s < .001$ ,  $r_s > .63$ . Similarly, there were no effects of Condition at post-intervention for any of the six independent variables, at  $p = .008$ , all  $F_s < 8.23$ ,  $ns$ . Although the effect of the intervention appeared larger in the treatment condition than in the waitlist control condition for EDE-Q weight and EDE-Q shape concern (see Table 1), the difference was not significant at  $p = .008$ . Thus, the improvement observed in the treatment group with regard to scores on the RSES, shape concern, weight concern and restraint subscales of the EDE-Q was replicated in the waitlist control condition for both completers and ITT. All in all, the first hypothesis was confirmed for self-esteem and the weight concern, shape concern and restraint subscales of the EDE-Q.

### 2.3. Longer-term intervention effect

The second hypothesis predicted that changes observed in the short-term would be maintained at four- and 12-week follow-up. We obtained overall main effects of Time for RSES and the EDE-Q weight, shape and restraint subscales but there was no main effect of Time for the WCS and the EDE-Q eating subscale (see Table 2 for a summary of the test results). Table 1 provides an overview of the scores for the six outcome measures for completers and ITT at all assessment points.

#### 2.3.1. Completers

For the RSES, subsequent polynomial contrasts revealed significant quadratic and cubic trends. These trends indicate that the RSES increased from pre- to post-intervention, then decreased from post-intervention to four-week follow-up and stabilized at 12-week follow-up. Pairwise comparisons (using Bonferroni adjustments for multiple comparisons) showed that post-intervention and four-week follow-up RSES scores differed significantly from pre-intervention ( $p < .001$  and  $p < .05$  resp.); 12-week follow-up scores did not differ from pre-intervention ( $p = .28$ ). Trend analysis of the EDE-Q weight concern scale resulted in significant linear and quadratic trends. Weight concern decreased from pre- to post-intervention, then slightly increased at four-week follow-up, but decreased again at 12-week follow-up. The EDE-Q weight concern subscale at post-intervention and follow-up assessments were significantly lower than at pre-intervention (all  $p_s < .02$ ). Development over time of the EDE-Q shape concern subscale was

**Table 1**  
Means (SD) of treatment and waitlist control condition at all assessments.

	Completers		Intention-to-treat	
	Treatment m (SD)	Waitlist-control m (SD)	Treatment m (SD)	Waitlist-control m (SD)
<b>RSES</b>				
Pre-intervention 1	19.89 (4.98)	19.57 (3.59)	19.27 (5.02)	18.94 (3.58)
Pre-intervention 2 <sup>a</sup>	–	19.79 (5.98)	–	19.12 (5.62)
Post-intervention	24.89 (4.41)	25.75 (3.49)	23.59 (5.14)	22.41 (6.13)
4 week follow-up	21.74 (5.15)	21.88 (5.17)	21.09 (5.38)	19.88 (6.25)
12 week follow-up	21.63 (4.73)	21.37 (5.50)	21.00 (5.02)	19.11 (6.23)
<b>WCS</b>				
Pre-intervention 1	54.44 (11.25)*	67.72 (12.96)*	54.44 (12.92)*	64.90 (15.42)*
Pre-intervention 2 <sup>a</sup>	–	71.82 (12.15)	–	67.71 (15.65)
Post-intervention	49.16 (15.70)	61.90 (15.14)	50.23 (16.41)	62.39 (16.43)
4 week follow-up	52.77 (15.84)	61.66 (18.41)	52.42 (16.11)	62.29 (16.79)
12 week follow-up	47.59 (13.16)	66.19 (20.72)	48.18 (14.06)	64.16 (17.87)
<b>EDE-Q Weight Concern</b>				
Pre-intervention 1	3.25 (1.16)*	2.64 (1.08)*	3.16 (1.15)*	3.04 (1.31)*
Pre-intervention 2 <sup>a</sup>	–	2.77 (1.03)	–	3.14 (1.25)
Post-intervention	1.90 (1.09)	2.18 (1.33)	1.94 (1.06)	2.85 (1.59)
4 week follow-up	2.25 (1.29)	2.21 (.97)	2.18 (1.25)	2.75 (1.24)
12 week follow-up	2.05 (1.15)	2.42 (.94)	2.01 (1.11)	2.84 (1.21)
<b>EDE-Q Shape Concern</b>				
Pre-intervention 1	3.36 (.96)	3.11 (1.25)	3.30 (.97)	3.55 (1.35)
Pre-intervention 2 <sup>a</sup>	–	2.94 (1.08)	–	3.77 (1.39)
Post-intervention	2.14 (.93)	2.44 (1.40)	2.19 (.93)	3.07 (1.65)
4 week follow-up	2.25 (1.29)	2.65 (1.05)	2.26 (1.17)	3.17 (1.29)
12 week follow-up	2.05 (1.15)	2.57 (.96)	2.14 (1.08)	3.09 (1.29)
<b>EDE-Q Restraint</b>				
Pre-intervention 1	2.06 (1.23)*	2.67 (1.31)*	2.07 (1.18)*	2.84 (1.19)*
Pre-intervention 2 <sup>a</sup>	–	2.50 (1.30)	–	2.72 (1.23)
Post-intervention	1.44 (.88)	2.25 (1.32)	1.44 (.90)	2.34 (1.31)
4 week follow-up	1.41 (.93)	2.15 (1.23)	1.37 (.87)	2.32 (1.20)
12 week follow-up	1.27 (.94)	2.04 (1.41)	1.25 (.89)	2.36 (1.34)
<b>EDE-Q Eating Concern</b>				
Pre-intervention 1	1.35 (.75)	1.62 (.86)	1.30 (.74)	2.08 (1.44)
Pre-intervention 2 <sup>a</sup>	–	1.44 (.81)	–	1.94 (1.46)
Post-intervention	.91 (.65)	1.21 (.99)	.90 (.62)	1.85 (1.47)
4 week follow-up	.89 (.76)	1.20 (1.00)	.92 (.71)	1.68 (1.42)
12 week follow-up	.77 (.56)	1.21 (.99)	.80 (.54)	1.76 (1.44)

Note RSES = Rosenberg Self-Esteem scale (scores may vary from 10–40, higher scores indicate higher self-esteem), WCS = Weight and Shape Concern Scale (scores may vary from 0 to 100, higher scores indicate high concern), EDE-Q = Eating Disorder Examination Questionnaire, subscripts refer to the weight concern, shape concern, restraint and eating concern subscales respectively (scores may vary from 0 to 6, higher scores indicate higher concern).

\*Pre-intervention 1 scores of treatment and waitlist-control condition differ significantly ( $p < .05$ ).

<sup>a</sup> The second measurement before the start of the intervention (pre-intervention 2) was assessed only in the waitlist-control condition.

**Table 2**  
Summary of Longer-term Effects of Time (Pre-Intervention, Post-Intervention, four and 12 Week Follow-Up) and Polynomial Trends in Treatment Condition for Completers and Intention-to-Treat.

Variable	Polynomials trends									
	Effect of time			Linear		Quadratic		Cubic		
Completers	<i>F</i> ( <i>df</i> ) (3, 93)	<i>p</i>	$\eta_p^2$	<i>F</i> ( <i>df</i> ) (1,31)	<i>p</i>	<i>F</i> ( <i>df</i> ) (1,31)	<i>p</i>	<i>F</i> ( <i>df</i> ) (1,31)	<i>p</i>	
RSES	26.43	.001	.51	.06	.81	36.48	.001	72.59	.001	
WCS	3.88	.01	.13	4.36	.05	1.55	.22	7.80	.01	
EDE-Q <sub>W</sub>	10.17	.001	.26	8.59	.007	16.70	.001	7.55	.01	
EDE-Q <sub>S</sub>	10.17	.001	.26	10.43	.003	15.13	.001	5.94	.02	
EDE-Q <sub>R</sub>	4.77	.004	.14	5.34	.03	4.77	.04	2.91	.10	
EDE-Q <sub>E</sub>	4.28	.01	.12	5.97	.02	2.90	.01	1.28	.27	
Intention-to-treat	<i>F</i> ( <i>df</i> ) (3, 114)	<i>p</i>	$\eta_p^2$	<i>F</i> ( <i>df</i> ) (1,38)	<i>p</i>	<i>F</i> ( <i>df</i> ) (1,38)	<i>p</i>	<i>F</i> ( <i>df</i> ) (1,38)	<i>p</i>	
RSES	24.13	.001	.39	.07	.80	38.83	.001	38.00	.001	
WCS	4.04	.01	.09	6.06	.02	1.57	.22	4.39	.04	
EDE-Q <sub>W</sub>	11.83	.001	.24	12.70	.001	16.13	.001	5.98	.02	
EDE-Q <sub>S</sub>	11.61	.001	.23	14.60	.001	15.57	.001	3.01	.09	
EDE-Q <sub>R</sub>	8.31	.001	.18	10.41	.003	8.48	.006	1.99	.07	
EDE-Q <sub>E</sub>	3.94	.01	.09	5.47	.03	3.94	.05	.27	.09	

Note RSES = Rosenberg Self-Esteem scale, WCS = Weight and Shape Concern Scale, EDE-Q = Eating Disorder Examination Questionnaire, subscripts refer to the weight concern, shape concern, restraint and eating concern subscales respectively. Alpha criteria were set at .008 (=  $p .05/6$ ) to correct for multiple testing.

approximately the same as the EDE-Q weight concern (significant linear and quadratic trends). Shape concern markedly diminished from pre- to post-intervention and the effect was maintained at the

two follow-up assessments. Pairwise comparisons indicated that EDE-Q shape concern at post-intervention, four-week and 12-week follow-up were significantly lower than at pre-intervention (all

$ps < .007$ ). Although the overall Time effect was significant, we obtained no linear, quadratic or cubic trend for the EDE-Q restraint subscale.

### 2.3.2. Intention-to-treat

As shown in Table 2, the intention-to-treat analyses showed a pattern of results that was similar to the analyses of completers, except for the EDE-Q restraint subscale. For restraint, we obtained next to a significant effect of Time, and a quadratic trend. The decrease at post-intervention was still present at four-week follow-up and maintained at 12-week follow-up (post-intervention and follow-up scores all differed from pre-intervention scores,  $ps < .01$ ).

## 3. Discussion

The purpose of this study was to test the efficacy of an evaluative conditioning paradigm in a sample of women with high body dissatisfaction who may be at high risk for developing an ED. Immediately after the four-week evaluative conditioning program, women showed a significant increase in self-esteem, and a significant decrease in weight and shape concern and self-reported restrictive eating, as measured by the EDE-Q. One advantage of a cross over design is that it enabled us to test the intervention a second time with the waitlist control participants; when doing this we found a similar pattern of results further strengthening the contention that the evaluative program was responsible for the observed symptom changes in self-esteem, weight and shape concern, and dietary restraint. We followed participants for four and 12 weeks after the completing the intervention to evaluate whether the changes at post treatment could be maintained. At 12-week follow-up, all improvements found at post treatment were maintained except for self-esteem and dietary restraint,<sup>3</sup> which returned to pre-treatment levels.

Our findings are consistent with those of Martijn et al. (2010) who found a significant increase in body satisfaction and self-esteem in the group with high body concerns at baseline. Martijn et al. measured body image with a two-item visual analog scale; in this study we used standard measures of weight and shape concern. Like Martijn and colleagues, we also found an increase in self-esteem using the same instrument in both studies. Our findings thus both replicate and extend Martijn and colleagues study to a high risk eating disorder population. Moreover, we were able to demonstrate that the conditioning intervention had a longer-term effect. The improvement in body satisfaction was still present three months after the intervention. Gains in self-esteem decreased over time, but were still significantly higher at the 4-week follow-up than before the intervention.

One theory on why women with high body dissatisfaction may be particularly responsive to the conditioning intervention is because the evaluation of their bodies is highly influenced by how they think that other people judge their appearance. Repeated exposure to their own bodies followed by smiling faces may signal acceptance and approval by others. A recent study by Alleva, Lange, Jansen, and Martijn (2014) showed that women with high body dissatisfaction overestimated the amount of negative social feedback (frowning faces) for their bodies as compared to body-satisfied women who made realistic estimates. It could be that the present conditioning intervention replaced the negative association between one's appearance and social disapproval into more positive associations. Learning to relate positive, accepting social feedback to one's appearance may result in decreased body

dissatisfaction and increased self-esteem, especially for those whose self-evaluations heavily rely on the judgments of others (see Crocker & Wolfe, 2001).

The type of conditioning used in the intervention can be best described as a form of evaluative conditioning. Evaluative condition is a type of associative learning in which participants do not have to be aware of the contingency between the unconditioned stimulus, their body, and the conditioned stimulus, a smiling face (for a detailed discussion see De Houwer, Thomas, & Bayens, 2001). Although we did not check for contingency awareness in the present study, Martijn et al. (2010) found that their participants were not aware of the contingency between their bodies and smiling faces and still showed improvement. It could be that evaluative conditioning is especially useful to target maladaptive associations that are beyond conscious awareness and intentional control. Moreover, the effects of evaluative conditioning are believed to be generalizable and resistant to extinction (De Houwer et al., 2001). This may explain why the decrease in body dissatisfaction was still present at 12-week follow-up.

We did not find a significant reduction in disordered eating behaviors (as measured by the EDE-Q eating subscale) at post-treatment. While we did not expect to see an effect here, we hypothesize that if the decrease in BD persists over time it could indirectly lead to a decrease in disordered eating behaviors and perhaps decrease risk for ED onset (Stice, 1994; Taylor et al., 2006). Finally, the effects of the program on self-esteem at post treatment were remarkable. However, the improvement diminished quickly during the follow-up phase suggesting that self-esteem may be more state dependent than body image. It also suggests that feeling positive about oneself may be strongly linked to perceived social acceptance.

This study has some limitations that are worth noting. First, not all participants were able to complete the program once each week for the four weeks. In some cases, participants may have missed a week or completed the program twice in the same week. Often this was due to exams, sickness or some similar scheduling issue. However, only three participants failed to complete all sessions of the intervention. Also, participants receiving the intervention had regular contact each week with the assessor which introduces a potential confound. In addition, because of the cross over study design we have no control comparison for the four- and 12-week follow-up. Our measure of body dissatisfaction was different than that used by Martijn et al. (2010). We choose to use weight and shape concern because it is strongly related to body dissatisfaction and predicts onset of EDs, however body dissatisfaction is a broader concept that encompasses more than just these EDE-Q subscales. Lastly, our sample was relatively small which can lead to low power. However, we obtained moderate to large effect sizes on our primary analyses indicating that our findings are meaningful regardless of size. These effect sizes are quite a bit larger than those reported in Martijn and colleagues' 2010 paper and may be due to the effect of a body image intervention in a high-risk sample as compared with the low risk sample (Stice, Shaw, & Marti, 2007). Another reason for the larger effect sizes may be that the present intervention was more intense (i.e., participants performed the conditioning task four times in four weeks instead of only once).

In terms of strengths, this is the first study to test the utility of the evaluative conditioning paradigm in a high-risk sample. We collected follow-up data and the cross over design enabled us to observe the effects of the program in two samples and over time. Our findings are consistent with Martijn and colleagues' 2010 study and taken together suggest that repeatedly pairing positive social feedback with photographs of women's bodies may be an effective way to help women with BD feel better about themselves. Our study also provides the first evidence that this brief intervention

<sup>3</sup> We found a significant effect for the EDE-Q Restraint subscale at 12 week follow up but only using ITT.

can have lasting effects 3 months later. These results are particularly exciting given the cost and time investment in traditional therapy. Future research is needed to test the efficacy of this program in women with EDs and to begin to explore the question of frequency and dose. Finally, to understand its' potential utility in clinical practice, the evaluative program should be compared both against, and as an adjunct to, traditional CBT.

### Conflict of interest

The authors declared that there is no conflict of interest.

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