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## Dissonance and Healthy Weight Eating Disorder Prevention Programs: A Randomized Efficacy Trial

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### Abstract

In this trial adolescent girls with body dissatisfaction ( $N=481$ ;  $M$  age=17) were randomized to an eating disorder prevention program involving dissonance-inducing activities that reduce thin-ideal internalization, a prevention program promoting healthy weight management, an expressive writing control condition, or an assessment-only control condition. Dissonance participants showed significantly greater reductions in eating disorder risk factors and bulimic symptoms than healthy weight, expressive writing, and assessment-only participants and healthy weight participants showed significantly greater reductions in risk factors and symptoms than expressive writing and assessment-only participants from pretest to posttest. Although these effects faded over 6-month and 12-month follow-up, dissonance and healthy weight participants showed significantly lower binge eating and obesity onset and reduced service utilization through 12-month follow-up, suggesting both interventions have public health potential.

### Keywords

prevention; body dissatisfaction; dieting; negative affect; eating disorders; obesity

## Dissonance and Healthy Weight Eating Disorder Prevention Programs: A Randomized Efficacy Trial

One in ten adolescent females experience threshold or subthreshold bulimia nervosa (Lewinsohn, Stiegel-Moore, & Seeley, 2000; Stice, Killen, Hayward, & Taylor, 1998). This disorder is characterized by a chronic course, medical complications, and functional impairment, and increases risk for future onset of obesity, depression, suicide attempts, anxiety disorders, substance abuse, and health problems (Johnson, Cohen, Kasen, & Brook, 2002; Stice, Cameron, Killen, Hayward, & Taylor, 1999; Wilson, Becker, & Heffernan, 2003). Unfortunately, less than 25% of individuals with this disorder receive treatment (Johnson et al., 2002) and only 30% of patients assigned to the treatment of choice show symptom remission that persists for at least 4-weeks (Agras, Walsh, Fairburn, Wilson, & Kraemer, 2000). Thus, much effort has been devoted to developing prevention programs for this eating disturbance. Although numerous programs have been evaluated in controlled trials, only a few have produced intervention effects for eating disorder symptoms. A meta-analysis found that only 6 of the 38 eating disorder prevention programs that have been evaluated produced reductions

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in current or future symptoms that persisted over follow-up, which ranged from 1–24 months (Stice & Shaw, 2004).

Neumark-Sztainer, Butler, and Palti (1995) evaluated a 10-hour universal intervention, which was offered to all female students in participating schools, which presented information on healthy weight control behaviors, body image, eating disorders, causes of eating disorders, and social pressure resistance skills. It produced significant improvements in eating disorder symptoms at 1-month follow-up; in dieting and binge eating at 6-month follow-up; and in binge eating at 24-month follow-up relative to assessment-only controls. Stewart, Carter, Drinkwater, Hainsworth, and Fairburn (2001) evaluated a 5-hour universal program that focused on resisting cultural pressures for thinness, body weight determinants, body acceptance, effects of cognitions on emotions, nature and consequences of eating disorders, self-esteem enhancement, stress management, and healthy weight control behaviors. It produced significant improvements in dieting and eating disorder symptoms at termination and 6-month follow-up, and decreases in body dissatisfaction at termination, relative to assessment-only controls. Bearman, Stice, and Chase (2003) evaluated a 4-hour targeted cognitive-behavioral intervention designed to promote body satisfaction among high-risk women with body image concerns by replacing negative appearance self-statements with positive statements and by using systematic desensitization to reduce body image anxiety. It produced significant reductions in body dissatisfaction, negative affect, and bulimic symptoms at termination and 3-month follow-up, and in body dissatisfaction at 6-month follow-up relative to waitlist controls. McVey, Lieberman, Voorberg, Wardrobe, and Blackmore (2003) evaluated a 10-hour targeted program that promoted critical media use, body acceptance, healthy weight control behaviors, and stress management skills, and provided information regarding body mass determinants. It produced significantly greater decreases in body dissatisfaction, dieting, and bulimic symptoms than observed in assessment-only controls at both termination and 3-month follow-up. However, these effects did not replicate in a second trial (McVey, Lieberman, Voorberg, Wardrobe, Blackmore, & Tweed, 2003).

We evaluated a 3-hour targeted dissonance-based eating disorder prevention program, wherein at-risk girls with body image concerns who have internalized the culturally sanctioned thin-ideal voluntarily engage in verbal, written, and behavioral exercises in which they critiqued this ideal. These counter-attitudinal activities putatively result in reduced endorsement of the thin-ideal because inconsistent cognitions create psychological discomfort that motivates people to alter their cognitions to restore consistency (Festinger, 1957). We focused on reducing thin-ideal internalization because it is an established risk factor for future bulimic symptoms and because reducing internalization should produce decreases in body dissatisfaction, negative affect, dieting, and bulimic pathology as suggested by the dual pathway model (Stice, 2002). Two trials found that participants in the dissonance intervention showed significantly greater reductions in thin-ideal internalization, body dissatisfaction, negative affect, and bulimic symptoms than waitlist controls, with most effects persisting through 6-month follow-up (Stice, Mazotti, Weibel, & Agras, 2000; Stice, Trost, & Chase, 2003). Another trial found that the dissonance intervention produced significantly greater reductions in thin-ideal internalization and body dissatisfaction than a healthy weight intervention, which promotes lasting decreases in caloric intake and increases in exercise as a way of achieving a healthier body weight and body satisfaction (Stice, Chase, Storer, & Appel, 2001). Controlled trials conducted by independent labs have replicated the positive effects for the dissonance intervention (Becker, Smith, & Ciao, in press; Becker, Jilka, & Polvere, 2002; Matusek, Wendt, & Wiseman, 2004). In support of the supposition that intervention effects are a product of dissonance, an experiment found that a high dissonance-induction version of this intervention resulted in lower eating disorder symptoms than a low dissonance-induction version of the same intervention (Green, Scott, Diyankova, Gasser, & Pederson, 2005).

Although we originally considered the healthy weight intervention (discussed above) a placebo control group, we now view it as an alternative intervention because it appears to represent an efficacious eating disorder prevention program. Our first trial of this intervention suggested it produced reductions in body dissatisfaction, dieting, negative affect, and bulimic symptoms, but that these effects were not superior to those produced by the dissonance program (Stice, Chase et al., 2001). A follow-up trial found that this intervention produced significantly greater reductions in negative affect and bulimic symptoms through 6-month follow-up relative to waitlist controls (Stice, Trost, & Chase, 2003). The positive effects for the healthy weight intervention have been replicated in a trial conducted by an independent lab (Matusek et al., 2004).

Thus, the dissonance and healthy weight interventions appear to be the only two programs to produce significant intervention effects for eating pathology in multiple trials conducted by independent labs. We therefore conducted a large efficacy trial of these interventions that addressed certain limitations of prior studies. First, we compared our interventions to an active control intervention. Unless a prevention program has been found to outperform an active control condition, there is no way to rule out the possibility that apparent intervention effects are due to demand characteristics, participant expectancies, or attention. This is an important gap in the literature because most prevention trials have not used active control conditions. We also included an assessment-only control condition to facilitate comparisons with past trials that used this type of control condition. Second, we used blinded diagnostic interviews to assess bulimic symptoms, as they provide a more accurate assessment of eating disorder symptoms than self-report scales (Black & Wilson, 1996). Third, we used a longer follow-up period than most previous trials. Fourth, we used a larger and more ethnically diverse sample than past trials to increase generalizability and statistical power. Finally, we incorporated ecologically meaningful outcomes, including risk for obesity onset, psychosocial functioning, and health/mental health service utilization.

We hypothesized that participants in the dissonance and healthy weight interventions would show greater improvements in eating disorder risk factors (thin-ideal internalization, body dissatisfaction, dieting, negative affect), bulimic symptoms, risk for obesity onset, psychosocial functioning, and service utilization relative to both the active control condition and assessment-only control condition. Based on past findings, we also hypothesized that the dissonance intervention would produce superior effects for eating disorder risk factors and bulimic symptoms relative to the healthy weight intervention and that the healthy weight intervention would produce greater improvements on outcomes relative to the active control condition and assessment-only control condition. We focused on female adolescents between the ages of 14 and 19 because the peak period of risk for bulimic symptom onset occurs during late adolescence (Lewinsohn et al., 2000; Stice et al., 1998) and because females are at approximately 10 times the risk for bulimia nervosa than are males (Wilson et al., 2003). This report details the main effects of our interventions through 1-year follow-up; future reports will examine the longer-term main effects (through 3-year follow-up), the mediators of intervention effects, and the moderators of intervention effects.

## Methods

### Participants and Procedure

Participants were 481 adolescent girls ( $M$  age = 17.0,  $SD$  = 1.4) with a mean body mass index ( $BMI = \text{kg}/\text{m}^2$ ) of 23.2 ( $SD$  = 4.4). The sample was 10% Asian/Pacific Islander, 6% African American, 19% Hispanic, 58% Caucasian, and 7% who specified *other or mixed racial heritage*. Parental education, a proxy for socioeconomic status, ranged from high school graduate or less (17%) to graduate/professional degree (28%), with a mode of college graduate (31%). The sample was representative of the larger school population in terms of BMI ( $M$  =

22.8,  $SD = 5.0$ ), ethnicity (7% African American, 18% Hispanic, 65% Caucasian), and parental education (34% high school graduate or less; 25% some college; 26% college graduate; 15% graduate degree).

From 2001 to 2003 participants were recruited from high schools and a university using direct mailings, flyers, and leaflets inviting females between the ages of 14 and 19 with body image concerns to participate in a study evaluating interventions designed to *help females accept their bodies*. Informed written consent was obtained from all participants (and their parents if they were minors) through the mail before any data collection occurred. Inclusion criteria were that participants (a) had to indicate body image concerns during a phone screen and (b) had to be between 14 and 19 years of age. We used self-selection for this targeted prevention trial and did not require a specific response on a body dissatisfaction screen because we wanted to simplify recruitment so that this intervention could be easily disseminated. As observed in prior trials, this approach attracted high-risk females with elevated body dissatisfaction and thin-ideal internalization; mean body dissatisfaction ( $M = 3.5$ ;  $SD = 0.83$ ) and thin-ideal internalization ( $M = 3.7$ ;  $SD = 0.52$ ) scores for participants were significantly higher than mean scores on these variables from an aged-matched community-recruited sample of adolescent females (2.8 [ $SD = 0.87$ ] and 3.1 [ $SD = 0.69$ ] respectively; see Stice, Burton, & Shaw, 2004 for sample description). The mean body dissatisfaction score corresponds to a response option reflecting *moderate dissatisfaction* with body parts in our sample (1 = *extremely satisfied*, 2 = *moderately satisfied*, 3 = *neutral*, 4 = *moderately dissatisfied*, 5 = *extremely dissatisfied*). The mean thin-ideal internalization score corresponds to a response option indicating that participants *agree* with thin-ideal statements such as *Slender women are more attractive* (1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*). The sole exclusion criterion was that participants could not meet criteria for DSM-IV anorexia nervosa, bulimia nervosa, or binge eating disorder on the pretest interview. The 24 individuals who met criteria for these disorders were strongly encouraged to seek treatment, provided with referrals, and told that these prevention programs were not appropriate for them. An additional 12 individuals were excluded because they did not report body image concerns and another 5 were not between the ages of 14 and 19 (see Figure 1 for participant flow-chart).

In this 4-arm trial, participants were randomly assigned to the dissonance intervention, healthy weight intervention, expressive writing control intervention, or assessment-only control condition (via dice). The dissonance and healthy weight interventions consisted of 3 weekly 1-hour group sessions with 6–10 participants. With the exception of the initial delivery of each intervention, which was facilitated by the first-author for training purposes, one graduate student delivered all of the dissonance interventions and another delivered all of the healthy weight interventions. A detailed and scripted treatment manual was developed for both interventions. Facilitator training involved three steps: (1) facilitators directly observed the first-author deliver the intervention, (2) facilitators then delivered the intervention in the presence of the first-author and received supervision, and (3) the first-author reviewed audio recordings of the facilitator delivering the intervention alone and provided supervision until he decided that each component of the interventions were delivered with fidelity. Female undergraduates served as co-facilitators for both interventions and were responsible for distributing handouts, collecting homework, and writing on the whiteboard. Co-facilitator training involved two steps: (1) co-facilitators first observed the delivery of the intervention as an ostensive participant and (2) they then received supervision from the facilitator regarding their performance as a co-facilitator in on-going groups. The expressive writing condition consisted of 3 weekly 45-minute individual writing sessions.

Participants provided interview and survey data at pretest, posttest (termination of the interventions), 6-month follow-up, and 1-year follow-up. Female assessors, who had a bachelor, masters, or doctoral degree in psychology, were blinded to the condition of

participants. Assessors attended 24 hours of training, wherein they received instruction in interview skills, reviewed diagnostic criteria for relevant disorders, observed simulated interviews, and role-played interviews, as well as annual training workshops. They had to demonstrate high inter-rater agreement ( $\kappa [k] > .80$ ) with expert raters using 12 tape-recorded interviews conducted with individuals with and without eating disorders before collecting data. Participants were paid \$150 for completing the assessments, which were conducted at schools, project offices, or participant homes. The University of Texas at Austin Institutional Review Board approved this project.

### Dissonance intervention

We conceptualize this intervention as dissonance-based because all activities were designed to be counter-attitudinal for individuals who have internalized the thin-ideal, such as those recruited by our sampling frame. For example, for adolescent girls with body image concerns who endorse the thin-ideal, recording positive physical attributes about themselves while examining their reflection and writing an essay on the costs of pursuing the thin-ideal should be counter-attitudinal. Our clinical impressions corroborate that these exercises were generally challenging for participants because they required them to take a new perspective about the thin-ideal. Yet we acknowledge that some of these exercises may also be conceptualized from a different theoretical framework. For instance, the behavioral challenge exercise in session three can be conceived from a cognitive-behavioral perspective as an experience in which participants are exposed to anxiety provoking stimuli so that they can disconfirm negative body image cognitions.

Several principles guided the development of the dissonance intervention. We minimized didactic presentation because psychoeducational interventions are less effective than interventions that actively engage participants (Stice & Shaw, 2004). We included in-session exercises that require participants to apply the skills taught in the intervention to facilitate skill acquisition. We relied on between-session homework to reinforce the skills taught in the sessions and help participants learn how to apply these skills. We used motivational enhancement exercises (Miller, 1983) to maximize motivation to use the new skills (e.g., we reviewed costs of body image concerns). Finally, we included group activities to foster social support and group cohesion.

**Session 1**—First, participants were told that this program is based on the idea that discussing how to help younger girls avoid body image problems can help them improve their own body satisfaction. Participants were asked if they would be willing to try this approach and verbal affirmation of their commitment was solicited. Next, participants defined the thin-ideal and critically discussed the origin of the thin-ideal, how it is perpetuated, the impact of messages about the thin-ideal from family, peers, dating partners, and the media, and how corporations profit from this ideal. For homework, they were asked to write a 1-page counter-attitudinal essay about the costs associated with pursuit of the thin-ideal and to engage in a self-affirmation task at home wherein they examined their reflection in a full-length mirror and recorded positive aspects of themselves (e.g., physical, behavioral, and emotional features), but no negative aspects. They were asked to bring their homework forms to the next session for discussion purposes.

**Session 2**—After an overview of the past session, participants discussed their experience of writing the essays and reviewed the costs of pursuing the thin-ideal. Second, they discussed the self-affirmation exercise and associated feelings and thoughts. They were then encouraged to share what they liked about themselves with the group. Third, a counter-attitudinal role-play was conducted, wherein participants attempted to dissuade facilitators from pursuing the thin-ideal. Facilitators played various roles, ranging from a regular dieter to a person with anorexia

nervosa. Finally, participants were asked to provide three examples from their life concerning pressures to be thin and to generate verbal challenges as homework. They were also asked to produce a top-10 list of things females can do to resist the thin-ideal (e.g., what can they avoid, say, do, or learn to battle the thin-ideal). They were asked to bring their homework forms to the next session for discussion. *Session 3.* After an overview of the past session, participants were asked to discuss a personal example concerning pressure to be thin. Second, potential difficulties in resisting the thin-ideal were discussed, as well as how each could be surmounted. They were then asked to role-play making counter thin-ideal statements to resist pressure from peers. To further increase awareness, they discussed future pressures to conform to the thin-ideal that they were likely to face and generated ways to respond to those pressures. Third, participants discussed their own body-related concerns and were encouraged to challenge themselves if they noticed they were engaging in thin-ideal thinking and to partake in behavioral challenges relating to body image concerns (e.g., wearing shorts if they have been afraid of doing so). Finally, we asked for specific suggestions that could help younger girls accept their bodies and avoid pursuit of the thin-ideal.

### Healthy weight intervention

**Session 1**—Participants were presented with the rationale that many body image concerns arise because people do not use healthy weight control skills. They were told that this program would help them make lasting changes that would allow them to bring their energy intake into balance with their energy needs and thus achieve a healthier body weight and body satisfaction. The thin-ideal was defined and contrasted to the healthy-ideal, and it was made clear that this intervention focuses on achieving the latter. Motivational interviewing was used to allow participants to explore advantages of the healthy-ideal, such as less illness and greater social acceptance. They were instructed in how to develop a balanced diet and were encouraged to begin these dietary changes as part of a gradual healthy lifestyle adoption. Strategic self-presentation was used to reinforce lifestyle changes (e.g., they made public commitments to change behaviors). To ensure an individualized plan, they applied these behavior modification tips to their own eating and exercise habits. Participants were asked to complete a 3-day eating and exercise diary and to make healthy changes to their diet for homework.

**Session 2**—The group first reviewed the benefits of maintaining a healthy weight in an effort to increase their motivation to acquire healthy weight management skills. Participants then reviewed their eating and exercise diaries and the changes they made and group members provided support for each other if problems were encountered. They then discussed the importance of exercise and listed the benefits of regular activity. The homework assignment was to list 10 personally meaningful reasons for pursuing the healthy-ideal, complete the eating and exercise diaries, and make healthy changes to their diet and exercise behaviors.

**Session 3**—After reviewing the past session, participants discussed problems they encountered when trying to improve eating and exercise habits and the group suggested ways to overcome these barriers. The importance of balancing input and output was again emphasized and participants were encouraged to make additional healthy changes to diet and exercise in the future. They then shared their reasons for signing up for the group and what they hoped to accomplish. Participants were asked to e-mail about their progress in making additional lifestyle changes after one week.

### Expressive writing control intervention

We used an individual expressive writing control intervention to isolate the effects of demand characteristics and expectancy effects from non-specific factors, such as social support from group members, as we believe the latter factors contribute to the beneficial effects of group-based interventions such as the dissonance and healthy weight interventions. In this condition,

which is based on the work of Pennebaker (1997), participants were asked to write about issues of emotional significance in three individual weekly 45-minute sessions. They were told that research has found that body image concerns are linked to emotional issues and that expressive writing helps resolve these issues. Sample topics included relationships or goals. They were told that their work would not be read, and that the only requirement was to write for the duration of the session about an emotionally important topic. We selected this as an active control condition because expressive writing had no effects on body dissatisfaction and dieting in a controlled trial (Truxillo, 2001).

### Assessment-only control condition

Participants in this condition received no intervention, but were referred to treatment if they met criteria for anorexia nervosa, bulimia nervosa, or binge eating disorder at any of the follow-up assessments (as were participants in all conditions). Across conditions, 3 participants showed onset bulimia nervosa and 7 showed onset of binge eating disorder over the 1-year follow-up (3 were in the assessment-only control condition); these onset rates did not differ significantly across conditions, as would be expected given the low base-rates.

### Measures

**Thin-ideal internalization**—The Ideal-Body Stereotype Scale-Revised assessed thin-ideal internalization (IBSS-R; Stice, Fisher, & Martinez, 2004). Items used a response format ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Items were averaged for this scale and those described below. This scale has shown internal consistency ( $\alpha = .91$ ), test-retest reliability ( $r = .80$ ), and predictive validity for bulimic symptom onset (Stice, Fisher et al., 2004).

**Body dissatisfaction**—Body dissatisfaction was assessed with 8 items from of the Satisfaction and Dissatisfaction with Body Parts Scale (Berscheid, Walster, & Bohrnstedt, 1973) that assessed body parts that are often of concern to females (e.g., stomach, thighs, and hips). Participants indicate their level of satisfaction with body parts on scales ranging from 1 = *extremely satisfied* to 6 = *extremely dissatisfied*. This scale has shown internal consistency ( $\alpha = .94$ ), 3-week test-retest reliability ( $r = .90$ ), and predictive validity for bulimic symptom onset (Stice, Fisher et al., 2004).

**Dieting**—The Dutch Restrained Eating Scale assessed dieting (DRES; van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986). Participants indicated the frequency of dieting behaviors using scales ranging from 1 = *never* to 5 = *always*. The DRES has shown internal consistency ( $\alpha = .95$ ), 2-week test-retest reliability ( $r = .82$ ), convergent validity with self-reported caloric intake, and predictive validity for bulimic symptom onset (Stice, Fisher et al., 2004; van Strien et al., 1986).

**Negative affect**—Negative affect was assessed with the sadness, guilt, and fear/anxiety subscales from the Positive Affect and Negative Affect Scale-Revised (PANAS-X; Watson & Clark, 1992). Participants reported the extent to which they had felt various negative emotional states on scales ranging from 1 = *very slightly or not at all* to 5 = *extremely*. This scale has shown internal consistency ( $\alpha = .95$ ), 3-week test-retest reliability ( $r = .78$ ), convergent validity, and predictive validity for bulimic symptom onset (Stice, Trost et al., 2003; Watson & Clark, 1992).

**Bulimic symptoms**—The diagnostic items from the Eating Disorder Examination (EDE; Fairburn & Cooper, 1993), a semi-structured investigator-based interview, assessed DSM-IV bulimia nervosa symptoms. The dietary restraint and weight, shape, and eating concern scales were not administered to minimize respondent burden. Items assessing the symptoms in the

past month were summed to create an overall bulimic symptom composite for each assessment point, as done in previous studies (Presnell & Stice, 2003; Stice, Burton et al., 2004). Because this composite was skewed, a normalizing square root transformation was applied. We also tested whether the interventions reduced frequency of binge eating and compensatory behaviors and risk for future onset of binge eating and compensatory behaviors among initially asymptomatic participants. The adapted symptom composite showed internal consistency ( $\alpha = .92$ ), 1-week test-retest reliability ( $r = .90$ ), sensitivity to detecting intervention effects, and predictive validity for future onset of depression in past studies of adolescent and young adult females (Presnell & Stice, 2003; Stice, Burton et al., 2004). In the current trial the symptom composite showed internal consistency ( $\alpha = .86$  at pretest) and 1-month test-retest reliability for assessment-only controls ( $r = .81$ ). To assess the test-retest reliability for eating disorder diagnoses for this adapted interview, a randomly selected subset of 137 participants who were interviewed by the assessors for this study and another ongoing study (Stice, Burton et al., 2004) were re-interviewed by the same assessor within a 1-week period, resulting in high test-retest reliability for threshold and subthreshold diagnoses of anorexia nervosa, bulimia nervosa, and binge eating disorder ( $\kappa = .96$ ). To assess the inter-rater agreement for these threshold and subthreshold eating disorder diagnoses, a randomly selected subset of 149 participants who were interviewed by the assessors for this study and the other ongoing study were re-interviewed by a second blinded assessor, resulting high inter-rater agreement ( $\kappa = .86$ ).

**Obesity**—BMI was used to reflect adiposity (Pietrobelli et al., 1998). After removal of shoes and coats, height was measured to the nearest millimeter using stadiometers and weight was assessed to the nearest 0.1 kg using digital scales. Two measures of each were obtained and averaged. BMI correlates with direct measures of body fat such as dual energy x-ray absorptiometry ( $r = .80 - .90$ ) and health measures such as blood pressure, adverse lipoprotein profiles, and diabetes mellitus (Dietz & Robinson, 1998; Pietrobelli et al., 1998). BMI showed 1-month test-retest reliability for assessment-only controls ( $r = .99$ ). Following Barlow and Dietz (1998), adolescent obesity was defined using the 95<sup>th</sup> centiles of body mass index for age and sex based on nationally representative survey data from the NHANES I study (Himes & Dietz, 1994).

**Social functioning**—Items adapted from the Social Adjustment Scale (Weissman & Bothwell, 1976) assessed psychosocial functioning in the family, peer group, school, and work spheres. The SAS has shown convergent validity with clinician and collateral ratings ( $M r = .72$ ), discriminates between controls and psychiatric patients, and is sensitive to treatment effects (Weissman & Bothwell, 1976). This adapted scale has shown internal consistency ( $\alpha = .77$ ) and 1-week test-retest reliability ( $r = .83$ ; Stice, Fisher et al., 2004). This scale had an  $\alpha = .76$  at pretest.

**Health service utilization**—Two items assessing the frequency of visits to health and mental health care providers (e.g., *How often have you seen a doctor (physician) because of illness, injury, long-term health problems, or for regular check-ups in the last 6 months?*) were generated for this study. We used these simple items to minimize respondent burden. The health service and mental health service items showed 1-year test-retest reliability for assessment-only controls ( $r = .82$  and  $r = .89$  respectively).

## Results

### Preliminary Analyses

We verified that the four groups did not differ significantly on any demographic factor (age, ethnicity, or parental education) or any outcome measures at pretest, suggesting that randomization created initially equivalent groups (means are provided in Table 2 for



continuous outcomes). Further, groups did not differ on clinically significant body image concerns (defined as average score on the body dissatisfaction scale corresponding to at least the *moderately dissatisfied* response option) or on subthreshold anorexia nervosa, bulimia nervosa, or binge eating disorder (individuals who reported the presence of all symptoms for a particular eating disorder, but a subthreshold level on one or more symptoms [e.g., binge eating only once per week], were considered to be subthreshold). There were no significant differences in ancillary psychiatric treatment across conditions (range 15% – 26%) or evidence that ethnicity or age moderated intervention effects.

Session attendance was high and did not differ across conditions. Among dissonance participants, 91% attended all three sessions, 6% attended two sessions, and 3% attended one session. Parallel attendance rates were 91%, 6%, and 3% for the healthy weight intervention and 98%, 1%, and 1% for the expressive writing condition. The proportion of participants who completed the homework assignments was not significantly different in the dissonance (80%) versus the healthy weight condition (87%).

A random sample of sessions (10%) were audio taped and coded by undergraduate research assistants who were blinded to intervention condition to determine whether the facilitators covered the main exercises listed in the relevant treatment manual and did not cover the main exercises listed in the other treatment manual (each session contains 4 – 6 main exercises). Results suggested that all interventions covered the main exercises from the relevant manual and did not include any exercises from the other manual. We considered this approach sufficient to assess fidelity because we used highly scripted treatment manuals for these 3-session interventions and sufficient to assess discriminability because the two interventions were based on very distinct conceptual rationales.

The 4% of participants who did not complete the assessments through 1-year follow-up did not differ from the 96% of participants retained in the trial on any demographic or outcome measures at pretest and attrition did not differ across conditions. Nonetheless, we used full information maximum likelihood (ML) estimation to impute missing data because this approach produces more accurate and efficient parameter estimates than list-wise deletion or alternative imputation approaches such as last-observation-carried-forward (Schafer & Graham, 2002). It should be noted that 93% of the effects were identical (significant effects remained significant and non-significant effects remained non-significant) when we used list-wise deletion.

Participants completed an item assessing their expectation that they would benefit from the “body acceptance class” at the end of the first session so we could test whether we succeeded in portraying the dissonance, healthy weight, and expressive writing interventions as equally effective. Response options were 1 = *not at all*, 2 = *somewhat*, 3 = *moderately*, 4 = *a lot*, and 5 = *extremely*. The dissonance condition ( $M = 3.4$ ;  $SD = 0.86$ ) did not differ significantly from the healthy weight condition ( $M = 3.6$ ;  $SD = 0.89$ ) or the expressive writing condition ( $M = 3.1$ ;  $SD = 0.91$ ) in perceived credibility, but the expressive writing condition was perceived as significantly less likely to be beneficial than the healthy weight intervention ( $p < .001$ ,  $r = .26$ ). Although the absolute difference between the conditions was not large, this effect should be considered when interpreting any contrasts between the healthy weight and expressive writing conditions.

### Intervention Effects for Primary Outcomes

Omnibus repeated measures ANOVA models tested whether there were differential changes in the outcomes across the four conditions over the entire study period (condition was a 4-level between-subjects factor and time was a 4-level within-subject factor). We focused on both significance level and effect size (indexed by  $r$ ). Time x condition interactions indicated there

was significantly differential change over time across conditions for thin-ideal internalization ( $F [9/1431] = 6.77, p < .001, r = .20$ ), body dissatisfaction ( $F [9/1431] = 6.50, p < .001, r = .20$ ), dieting ( $F [9/1431] = 3.04, p = .001, r = .14$ ), negative affect ( $F [9/1431] = 2.58, p = .006, r = .13$ ), and bulimic symptoms ( $F [9/1431] = 2.52, p < .007, r = .13$ ).

We next conducted focused follow-up ANOVA models that contrasted pairs of conditions at each of the follow-up periods to determine precisely which groups differed significantly from each other and how long these significant differences persisted. In each of these repeated measures models condition was a 2-level between-subjects factor and time was a 2-level within-subjects factor (pretest to posttest, pretest to 6-month follow-up, and pretest to 1-year follow-up). Table 1 provides the effect sizes and  $p$ -values for the time-by-condition interactions from each of these models. These time-by-condition interactions test whether participants in one condition showed significantly greater decreases on the outcome than participants in the other condition at each particular follow-up, and as such, represent a direct test of the effects of each intervention relative to each other and relative to the two control conditions. Contrasts that test for differential change across conditions are necessary to parse intervention effects from reductions in outcomes that result from regression to the mean, particularly in high-risk samples, and from measurement artifacts from multiple testing.

Time x condition interactions presented in Table 1 indicated that the dissonance intervention produced significantly greater decreases in thin-ideal internalization, body dissatisfaction, dieting, negative affect, and bulimic symptoms relative to assessment-only controls from pretest to posttest, and that all of these effects were significant at 6-month follow-up; the effects for thin-ideal internalization, dieting, and bulimic symptoms were significant at 1-year follow-up. The dissonance intervention also produced significantly greater decreases in thin-ideal internalization, body dissatisfaction, dieting, negative affect, and bulimic symptoms relative to the expressive writing intervention from pretest to posttest and all of these effects, except for thin-ideal internalization, were significant at 6-month follow-up; the effect for dieting was significant at 1-year follow-up. The dissonance intervention also produced significantly greater decreases in thin-ideal internalization, body dissatisfaction, dieting, negative affect, and bulimic symptoms relative to the healthy weight intervention from pretest to posttest; the effect for negative affect was significant at 6-month and 1-year follow-ups.

Also as indicated in Table 1, the healthy weight intervention produced significantly greater reductions in thin-ideal internalization, body dissatisfaction, and negative affect relative to assessment-only controls from pretest to posttest; the healthy weight intervention produced significantly greater decreases in thin-ideal internalization, body dissatisfaction, dieting, and bulimic symptoms relative to assessment-only controls from pretest to 6-month follow-up and all of these effects, except for body dissatisfaction were significant at 1-year follow-up. Further, the healthy weight intervention produced significantly greater reductions in thin-ideal internalization, body dissatisfaction, negative affect, and bulimic symptoms than the expressive writing condition from pretest to posttest; the effect for body dissatisfaction and bulimic symptoms were significant at 6-month follow-up and the effect for thin-ideal internalization was significant at 1-year follow-up.

Table 1 also indicates that participants in the expressive writing condition only showed significantly greater reductions in thin-ideal internalization from pretest to 6-month follow-up and in bulimic symptoms from pretest to 1-year follow-up relative to assessment-only controls.

The means and SD for each condition on each outcome at each assessment are shown in Table 2 with results of pairwise contrasts testing whether mean changes over time within group were statistically significant. There were consistent significant decreases in all outcomes in the dissonance and healthy weight conditions over time, fewer significant decreases in the

expressive writing condition, and even fewer significant decreases in the assessment-only control condition. However, these results should not be interpreted as testing intervention effects because they do not test whether change in one condition was significantly greater than change in another condition: this question is addressed by the time-by-condition interactions reported in Table 1.

We also tested whether there were differences in change in the behavioral symptoms of bulimia nervosa. There were significantly different changes in past 4-week binge frequency ( $F [9/1425] = 1.85, p = .05, r = .11$ ) and past 4-week compensatory behavior frequency ( $F [9/1431] = 2.76, p = .003, r = .13$ ) across conditions. Paired contrasts revealed that there were significant decreases in binge frequency and compensatory behavior frequency from pretest to posttest, pretest to 6-month follow-up and pretest to 1-year follow-up in the dissonance and healthy weight conditions ( $p$ -values ranged from  $< .001$  to  $.022$ ), but that 10 of the 12 paired contrasts for the expressive writing and assessment-only control conditions were non-significant.

In addition, we tested whether the interventions reduced risk for future onset of binge eating and compensatory behaviors among initially asymptomatic participants. Risk for binge eating onset by 6-month follow-up differed significantly across conditions (see Table 3). Follow-up contrasts indicated that risk was marginally lower in the dissonance condition than in the assessment-only and expressive writing control conditions ( $p = .06, OR = 1.67 [95\% CI = 0.97 - 2.90]$  and  $p = .07, OR = 1.65 [95\% CI = 0.95 - 2.84]$  respectively) and that risk was significantly lower in the healthy weight condition than in the assessment-only and expressive writing conditions ( $p = .008, OR = 2.36 [95\% CI = 1.32 - 4.22]$  and  $p = .009, OR = 2.31 [95\% CI = 1.29 - 4.15]$  respectively); no other differences between conditions were significant. We reported marginal effects for the analyses involving dichotomous outcomes, but not for the analyses involving continuous outcomes, because the former have less statistical power than the latter, which increases risk for false negative findings. Risk for binge eating onset by 1-year follow-up was also significantly different across conditions. Follow-up contrasts indicated that risk was significantly lower in the healthy weight condition than in the assessment-only and expressive writing conditions ( $p = .009, OR = 2.22 [95\% CI = 1.27 - 3.87]$  and  $p = .008, OR = 2.27 [95\% CI = 1.30 - 3.97]$  respectively); no other differences between conditions were significant.

Risk for onset of compensatory behaviors by 6-month follow-up was marginally different across the conditions. Follow-up contrasts indicated that risk was significantly lower in the healthy weight condition than in the expressive writing and assessment-only conditions ( $p = .009, OR = 2.18 [95\% CI = 1.14 - 4.17]$  and  $p = .015, OR = 2.07 [95\% CI = 1.08 - 3.95]$  respectively); no other differences across conditions were significant. Risk for onset of compensatory behaviors by 1-year follow-up was also marginally different across the conditions. Follow-up contrasts indicated that risk was significantly lower in the healthy weight condition than in the expressive writing and assessment-only conditions ( $p = .013, OR = 2.02 [95\% CI = 1.09 - 3.75]$  and  $p = .016, OR = 1.97 [95\% CI = 1.06 - 3.65]$  respectively); there were no other significant differences across conditions.

To examine the clinical significance of the change in bulimic symptoms over the 1-year follow-up, we conducted reliable change score analysis using the reliable change index (Jacobson & Truax, 1991). There were significantly different rates of reliable change on the bulimic symptoms composite across conditions (see Table 3). Follow-up contrasts indicated that reliable change rates were significantly higher in the dissonance and healthy weight conditions than in the assessment-only control condition ( $p = .002, OR = 2.61 [95\% CI = 1.38 - 4.92]$  and  $p = .002, OR = 2.61 [95\% CI = 1.39 - 4.91]$  respectively); no other differences across conditions were significant.

## Intervention Effects for Ecologically Valid Outcomes

Repeated measures ANOVA models tested for differential change across conditions in psychosocial functioning, health service utilization, and mental health service utilization from pretest to 1-year follow-up (these outcomes were assessed only at these points to reduce respondent burden). There was no evidence of differential change across conditions for psychosocial functioning ( $F [3/477] = 0.61, p = .609, r = -.06$ ) and health service utilization ( $F [3/477] = 0.25, p = .859, r = .02$ ), but there was differential change for mental health service utilization ( $F [3/477] = 2.73, p < .044, r = .13$ ). Follow-up models found that dissonance participants showed greater decreases in this outcome than assessment-only controls ( $F [1/239] = 4.88, p = .028, r = .14$ ), but not relative to expressive writing participants ( $F [1/236] = 0.06, p = .807, r = .00$ ) or healthy weight participants ( $F [1/230] = 0.16, p = .692, r = .10$ ). Healthy weight participants showed greater decreases in this outcome than assessment-only controls ( $F [1/241] = 4.70, p = .031, r = .14$ ), but not relative to expressive writing participants ( $F [1/238] = 0.04, p = .852, r = .00$ ). Expressive writing participants showed marginally greater decreases in this outcome than assessment-only controls ( $F [1/176] = 3.32, p = .070, r = .14$ ).

Finally, chi-square analyses tested whether dissonance and healthy weight participants showed lower risk for future onset of obesity over the 1-year follow-up than assessment-only and expressive writing controls among initially non-obese participants. Rates of obesity onset were significantly different across the conditions (see Table 3). Follow-up contrasts revealed that risk for obesity onset was significantly lower in the dissonance condition than in the assessment-only condition and the expressive writing condition ( $p = .016, OR = 4.13 [95\% CI = 1.39 - 12.19]$  and  $p = .050, OR = 3.06 [95\% CI = 1.00 - 9.41]$  respectively) and lower in the healthy weight condition than in the assessment-only condition and the expressive writing condition ( $p = .008, OR = 12.82 [95\% CI = 1.27 - 3.87]$  and  $p = .017, OR = 9.52 [95\% CI = 1.65 - 55.56]$  respectively); there were no other significant differences across conditions. The 25 participants who showed onset of obesity gained an average of 7.1 kg (31 lbs) over the 1-year follow-up, verifying that they showed clinically significant weight gain rather than just a small increase in weight that moved them above the obesity threshold. It should be noted that repeated measures ANOVA models indicated that there were no significant differences in change in the continuous BMI measure over time across intervention conditions (all  $p$ -values  $> .10$ ) for all participants or for those above the 50<sup>th</sup> and 85<sup>th</sup> percentile of initial BMI. These results suggest that the two interventions effectively reduced the risk for medically hazardous weight gain (obesity onset), but not normative increases in weight (which would not be as desirable from a public health standpoint).

## Discussion

Overall, participants in both the dissonance and health weight prevention programs showed some important reductions in eating disorder risk factors, bulimic symptoms, and health service utilization, as well as decreased risk for onset of future eating disorder symptoms and obesity. Results for the dissonance and healthy weight interventions are discussed in turn.

Participants in the dissonance condition showed significantly greater decreases in eating disorder risk factors, including thin-ideal internalization, body dissatisfaction, dieting, and negative affect, and in bulimic symptoms, as well as greater reliable reductions in bulimic symptoms than assessment-only controls. These effects cannot be easily attributed to regression to the mean or a measurement artifact, as these processes would have affected assessment-only controls equally. Effect sizes were small to medium, which compare favorably to those observed in past eating disorder prevention trials (Stice & Shaw, 2004). Theoretically, the act of voluntarily critiquing the thin-ideal resulted in cognitive dissonance that motivated participants to reduce their subscription to this ideal, which resulted in a consequent reduction in body dissatisfaction, dieting, negative affect, and bulimic symptoms. These effects generally

replicated the effects of prior smaller-scale trials conducted by our lab and others (Becker et al., in press; Matusek et al., 2004; Stice et al., 2003) and suggest that the intervention effects are reproducible.

Results also extend the evidence-base for the dissonance intervention. First, this intervention produced significantly greater reductions in several outcomes relative to both an alternative intervention (the healthy weight intervention) and an active control intervention (the expressive writing condition). Although these effects faded over follow-up, these findings are remarkable because this represents the most rigorous test of a prevention program because intervention effects cannot be easily attributed to expectancies, demand characteristics, or attention. To the best of our knowledge, no other eating disorder prevention program has outperformed alternative interventions that are structurally equivalent or an active control condition. Although it is possible that the superior effects emerged because there were stronger expectancies and demand characteristics for the dissonance intervention, this is unlikely given the evidence that (a) participants actually expected more benefits from the healthy weight intervention and (b) the dissonance program produced superior effects for an outcome for which there should have been equivalent demand characteristics and expectancies: body dissatisfaction. Second, there was evidence of prophylactic effects, in that dissonance participants showed marginally lower risk for future onset of binge eating than controls, echoing prior findings (Stice et al., 2000). Although the prophylactic effects were slightly larger for the healthy weight intervention, this type of effect is rare in the eating disorder prevention literature (Stice & Shaw, 2004). Third, the dissonance intervention affected two ecologically valid outcomes: mental health service utilization and risk for obesity onset. The former finding suggests that eating disorder prevention programs might be cost-effective, as the expense of administering this brief intervention is modest relative to that of psychiatric care. The evidence that this intervention resulted in a 3-fold decrease in risk for obesity onset may be the most important finding, as obesity is credited with 400,000 deaths annually in the US (Mokdad, Marks, Stroup, & Gerberding, 2004). Also notable is the fact that most obesity prevention programs have not achieved this effect (Stice, Shaw, & Marti, 2005). This is encouraging from a public health standpoint because it suggests that a single, brief intervention may produce positive effects for both eating pathology and obesity.

Healthy weight participants showed significantly greater decreases in eating disorder risk factors and bulimic symptoms, as well as greater reliable reductions in bulimic symptoms, than assessment-only controls, which suggests these positive effects are not due to regression to the mean or a measurement artifact. Effects were small to medium in magnitude. Theoretically, this intervention motivated participants to make lasting healthy changes to their diet and activity level, which improved body satisfaction and decreased their reliance on unhealthy weight control behaviors such as purging. The focus on pursuing the healthy-ideal, versus the thin-ideal, likely resulted in the observed decreases in thin-ideal internalization and transitory dieting. These effects generally replicated those observed in prior smaller-scale studies conducted by our lab and others (Matusek et al., 2004; Stice et al., 2003), suggesting that the intervention effects are reproducible.

Findings also extend the evidence-base for the healthy weight intervention. One novel finding was that this intervention resulted in greater reductions in several outcomes than an active control intervention (the expressive writing condition). Although these effects faded with time, these results are noteworthy because they suggest that the intervention effects cannot be readily attributed to expectancies, demand characteristics, or attention. A second novel finding was the prophylactic effects, wherein healthy weight participants showed significantly lower risk for future onset of binge eating and compensatory behaviors. Indeed, these prophylactic effects were larger than those observed for the dissonance intervention. The third novel finding was that the healthy weight intervention reduced mental health service utilization and risk for

obesity onset, which are important ecologically valid outcomes. The evidence that the healthy weight intervention produced a 12-fold decrease in risk for obesity onset relative to the assessment-only condition is particularly remarkable because most obesity prevention programs have not achieved effects of this magnitude. Again, findings imply that a single intervention may impact both eating pathology and obesity.

Results suggest that the dissonance intervention and healthy weight interventions may have somewhat different strengths. On the one hand, the dissonance intervention produced significantly greater decreases in several eating disorder risk factors from pretest to posttest and in one eating disorder risk factor (negative affect) through 6 month and 1-year follow-up relative to the healthy weight intervention. In contrast, there was no evidence that the healthy weight intervention produced significantly stronger effects for any outcome relative to the dissonance intervention. This pattern of findings suggests that the dissonance intervention produces larger decreases in certain risk factors and more rapid reductions in others, both of which are clinically desirable. On the other hand, the healthy weight intervention was more effective in reducing risk for onset of binge eating, compensatory behaviors, and obesity than the dissonance intervention. This is an important advantage because prophylactic effects are extremely rare for eating disorder prevention programs (Stice & Shaw, 2004), as well as for obesity prevention programs (Stice, Shaw, & Marti, 2005). Given that obesity results in far greater morbidity and mortality than eating pathology and that the healthy weight intervention might be more easily integrated with universal prevention programs that promote healthy eating and exercise, implies that the healthy weight intervention may have greater public health potential.

Both the dissonance and healthy weight interventions have now received enough empirical support to be termed *efficacious*. According to the American Psychological Association (1995), an intervention has to have produced significantly stronger effects than a waitlist or measurement-only control condition in at least two trials conducted by independent labs and significantly stronger effects than a placebo or alternative treatment to be considered efficacious. To our knowledge, no other eating disorder prevention programs have received enough empirical support to be considered efficacious.

There were also other noteworthy findings. First, participants in the expressive writing condition only showed significantly greater reductions on thin-ideal internalization from pretest to 6-month follow-up and on bulimic symptoms from pretest to 1-year follow-up relative to assessment-only controls, which represents significant effects for 2 of the 24 contrasts that tested for differential change across these two conditions for the assorted outcomes at the various follow-up points (8%). Given that this approaches the percentage of effects that would be expected based on chance (5%), these two effects may be Type I errors. In comparison, 71% of the contrasts testing for differential change between the dissonance condition and assessment-only controls and 71% of the contrasts testing for differential change between healthy weight participants and assessment-only controls were significant. The scarcity of effects for expressive writing in the present trial dovetails with the evidence from a prior trial that this intervention did not affect body dissatisfaction and dieting (Truxillo, 2001). Although this pattern of findings may imply that demand characteristics and expectancies might produce relatively small effects in eating disorder prevention trials, it is also possible that these two effects represent a placebo response. Second, intervention effects for the dissonance and healthy weight interventions faded over time relative to the expressive writing and assessment-only control groups. It appears that this pattern of findings emerged because initial effects for the two interventions showed a tendency to disappear over time and because participants in the two control conditions often showed gradual improvements over time – the latter effect likely emerged because of regression to the mean, which often occurs

in high-risk samples. These findings collectively suggest that efforts should be made to strengthen initial intervention effects and enhance their persistence.

### Limitations

Although we improved upon many prior prevention trials by using random assignment, an active control condition, blinded diagnostic interviews, a large and ethnically diverse sample, and ecologically valid outcomes, the current study had important limitations. First, we relied on self-report data, with the exception of the direct measures of height and weight, which introduces the possibility that reporter bias might have distorted our estimates of intervention effects. It would be ideal if future prevention trials collected multiple-informant data and objective behavioral data. Second, the moderately small cell sizes limited our ability to test whether the interventions reduced risk for onset of clinically significant bulimic pathology (versus symptom onset). Third, we used a rudimentary approach to assess intervention fidelity and discriminability; future trials that compare multiple interventions should employ skilled clinicians as raters, rather than undergraduates, and should assess the finer details of these interventions. Fourth, because we only report data through the 1-year follow-up, it is difficult to know whether the intervention effects will persist over a longer period of time. Fortunately, we are collecting 2-year and 3-year follow-up data for a future report.

### Implications for Prevention and Future Research

The present findings have several implications. First, it will be important to examine factors that putatively mediate the intervention effects for the dissonance and healthy weight interventions. For instance, it would be useful to directly test whether the former prevention program produces intervention effects because it induces cognitive dissonance regarding subscription to the thin-ideal. Although this will be challenging because dissonance is typically inferred rather than directly measured, it would provide an important test of the conceptual basis of this intervention. Second, it would be useful to investigate factors that may moderate the intervention effects, such as initial levels of thin-ideal internalization for the dissonance intervention. Third, it will be vital to determine ways to enhance the magnitude and duration of the intervention effects from these two prevention programs. Strategies such as integrating promising programs, drawing further upon persuasion principles from social psychology, or using adjunctive interventions that target parents may enhance intervention effects. Fourth, additional efforts should be devoted to designing interventions that affect multiple health and mental health outcomes because this would greatly improve the yield of prevention efforts. Finally, it will be important to initiate effectiveness trials to determine whether these interventions will produce effects in the real world (e.g., all high schools in a district) when delivered by natural providers (e.g., school counselors) and to conduct dissemination studies to determine how best to implement these prevention programs on a large-scale basis.

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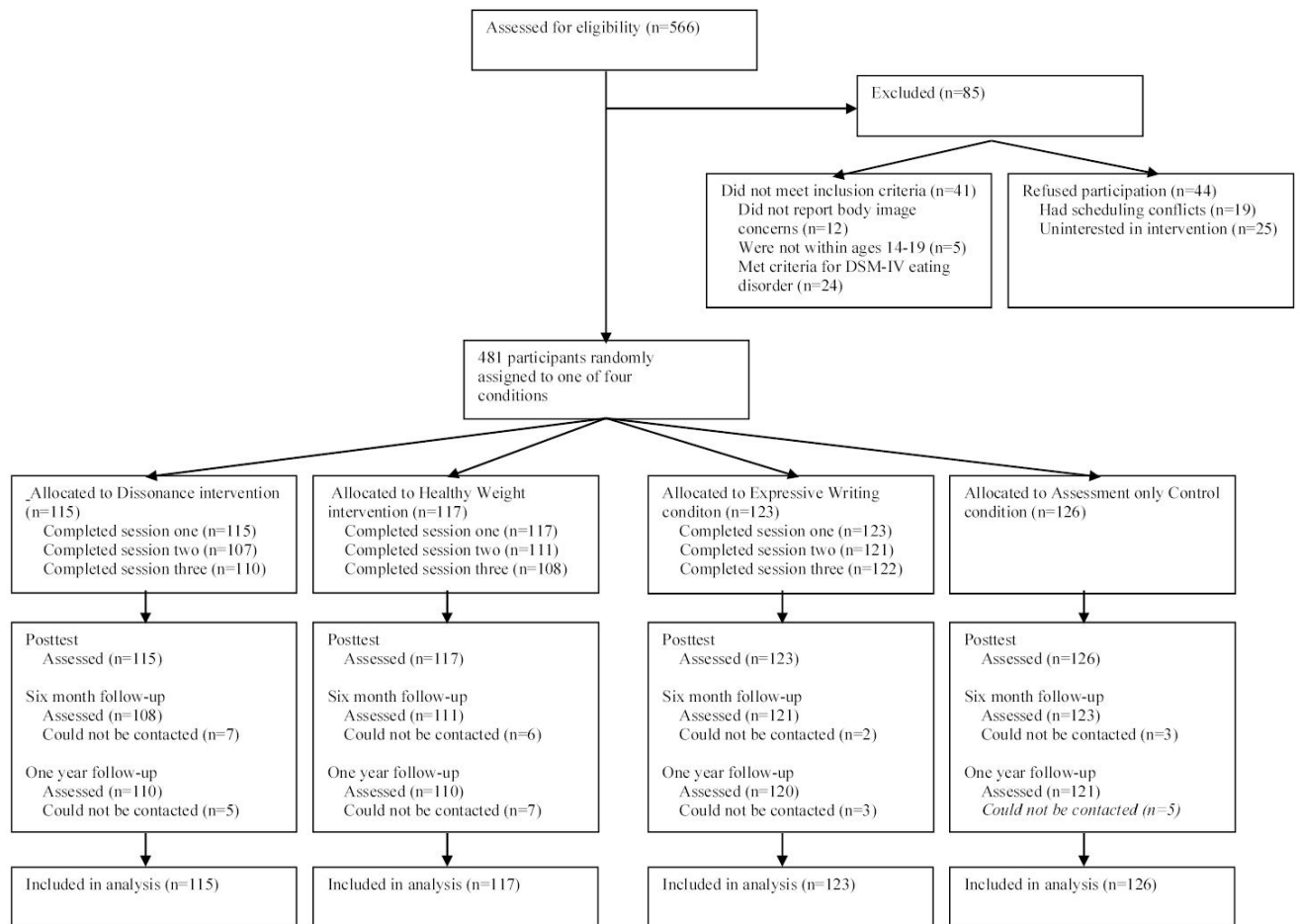
### References

- Agras WS, Walsh BT, Fairburn CG, Wilson GT, Kraemer HC. A multicenter comparison of cognitive-behavioral therapy and interpersonal psychotherapy for bulimia nervosa. *Archives of General Psychiatry* 2000;57:459–466. [PubMed: 10807486]
- American Psychological Association Task Force on Psychological Intervention Guidelines (1995). *Template for developing guidelines: Interventions for mental disorders and psychological aspects of physical disorders* Washington, DC: American Psychological Association.

- Barlow SE, Dietz WH. Obesity evaluation and treatment: Expert committee recommendations. The maternal and Child Health Bureau, Health Services Administration, and the Department of Health and Human Services. *Pediatrics* 1998;102:E29. [PubMed: 9724677]
- Bearman SK, Stice E, Chase A. Effects of body dissatisfaction on depressive and bulimic symptoms: A longitudinal experiment. *Behavior Therapy* 2003;34:277–293.
- Becker, C. B., Jilka, K., & Polvere, L., (2002). *Cognitive dissonance vs. media psychoeducation: A pilot study of eating disorder prevention in sorority members*. Paper presented at the Association for the Advancement of Behavior Therapy, Reno, NV.
- Becker, C. B., Smith, L., & Ciao, A. C. (in press). Reducing eating disorder risk factors in sorority members: A randomized trial. *Behavior Therapy*.
- Berscheid E, Walster E, Bohrnstedt G. The happy American body: A survey report. *Psychology Today* 1973;7:119–131.
- Black CM, Wilson GT. Assessment of eating disorders: Interview versus questionnaire. *International Journal of Eating Disorders* 1996;20:43–50. [PubMed: 8807351]
- Dietz WH, Robinson TN. Use of body mass index (BMI) as a measure of overweight in children and adolescents. *The Journal of Pediatrics* 1998;132:191–193. [PubMed: 9506622]
- Fairburn, C. G., & Cooper, Z. The eating disorder examination (12th ed.). In C. Fairburn & G. Wilson (Eds.), *Binge eating: Nature, assessment, and treatment* (pp. 317–360). NY: Guilford.
- Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford: Stanford University Press.
- Green M, Scott N, Diyankova I, Gasser C, Pederson E. Eating disorder prevention: An experimental comparison of high level dissonance, low level dissonance, and no-treatment control. *Eating Disorders* 2005;13:157–169. [PubMed: 16864339]
- Himes JH, Dietz WH. Guidelines for overweight in adolescent preventive services: Recommendations from an expert committee. *American Journal of Clinical Nutrition* 1994;59:307–316. [PubMed: 8310979]
- Jacobson N, Truax P. Clinical significance: A statistical approach to defining change in psychotherapy research. *Journal of Consulting and Clinical Psychology* 1991;59:12–19. [PubMed: 2002127]
- Johnson JG, Cohen P, Kasen S, Brook JS. Eating disorders during adolescence and the risk for physical and mental disorders during early adulthood. *Archives of General Psychiatry* 2002;59:545–552. [PubMed: 12044197]
- Lewinsohn PM, Striegel-Moore RH, Seeley JR. Epidemiology and natural course of eating disorders in young women from adolescence to young adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry* 2000;39:1284–92. [PubMed: 11026183]
- Matusek JA, Wendt SJ, Wiseman CV. Dissonance thin-ideal and didactic healthy behavior eating disorder prevention programs: Results from a controlled trial. *International Journal of Eating Disorders* 2004;36:376–388. [PubMed: 15558649]
- McVey GL, Lieberman M, Voorberg N, Wardrope D, Blackmore E. School-based peer support groups: A new approach to the prevention of disordered eating. *Eating Disorders* 2003;11:169–185. [PubMed: 16801249]
- McVey GL, Lieberman M, Voorberg N, Wardrope D, Blackmore E, Tweed S. Replication of a peer support program designed to prevent disordered eating: Is life skills approach sufficient for all middle school students? *Eating Disorders* 2003;11:187–195. [PubMed: 16801250]
- Miller WR. Motivational interviewing with problem drinkers. *Behavioural Psychotherapy* 1983;11:147–172.
- Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *Journal of the American Medical Academy* 2004;291:1238–1245.
- Neumark-Sztainer D, Butler R, Palti H. Eating disturbances among adolescent girls: Evaluation of a school-based primary prevention program. *Journal of Nutritional Education* 1995;27:24–31.
- Pennebaker JW. Writing about emotional experiences as a therapeutic process. *Psychological Science* 1997;8:162–166.
- Pietrobelli A, Faith M, Allison D, Gallagher D, Chiumello G, Heymsfield S. Body mass index as a measure of adiposity among children and adolescents: A validation study. *Journal of Pediatrics* 1998;132:204–210. [PubMed: 9506629]



- Presnell K, Stice E. An experimental test of the effect of weight-loss dieting on bulimic pathology: Tipping the scales in a different direction. *Journal of Abnormal Psychology* 2003;112:166–170. [PubMed: 12653425]
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods* 2002;7:147–177. [PubMed: 12090408]
- Stewart DA, Carter JC, Drinkwater J, Hainsworth J, Fairburn CG. Modification of eating attitudes and behavior in adolescent girls: A controlled study. *International Journal of Eating Disorders* 2001;29:107–118. [PubMed: 11429973]
- Stice E. Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin* 2002;128:825–848. [PubMed: 12206196]
- Stice E, Burton EM, Shaw H. Prospective relations between bulimic pathology, depression, and substance abuse: Unpacking comorbidity in adolescent girls. *Journal of Consulting and Clinical Psychology* 2004;72:62–71. [PubMed: 14756615]
- Stice E, Cameron R, Killen JD, Hayward C, Taylor CB. Naturalistic weight reduction efforts prospectively predict growth in relative weight and onset of obesity among female adolescents. *Journal of Consulting and Clinical Psychology* 1999;67:967–974. [PubMed: 10596518]
- Stice E, Chase A, Stormer S, Appel A. A randomized trial of a dissonance-based eating disorder prevention program. *International Journal of Eating Disorders* 2001;29:247–262. [PubMed: 11262503]
- Stice E, Fisher M, Martinez E. Eating disorder diagnostic scale: Additional evidence of reliability and validity. *Psychological Assessment* 2004;16:60–71. [PubMed: 15023093]
- Stice E, Killen JD, Hayward C, Taylor CB. Age of onset for binge eating and purging during adolescence: A four-year survival analysis. *Journal of Abnormal Psychology* 1998;107:671–675. [PubMed: 9830254]
- Stice E, Mazotti L, Weibel D, Agras WS. Dissonance prevention program decreases thin-ideal internalization, body dissatisfaction, dieting, negative affect, and bulimic symptoms: A preliminary experiment. *International Journal of Eating Disorders* 2000;27:206–217. [PubMed: 10657894]
- Stice E, Shaw H. Eating disorder prevention programs: A meta-analytic review. *Psychological Bulletin* 2004;130:206–227. [PubMed: 14979770]
- Stice, E., Shaw, H., & Marti, N. (2005). *A meta-analytic review of obesity prevention programs for children and adolescents: The skinny on interventions that work* Under review.
- Stice E, Trost A, Chase A. Healthy weight control and dissonance-based eating disorder prevention programs: Results from a controlled trial. *International Journal of Eating Disorders* 2003;33:10–21. [PubMed: 12474195]
- Truxillo CI. The effects of emotional disclosure on fitness and fitness-related social psychological constructs. *Dissertation Abstracts International* 2001;61(8):4481B.
- van Strien T, Frijters JE, Van Staveren WA, Defares PB, Deurenberg P. The predictive validity of the Dutch Restrained Eating Scale. *International Journal of Eating Disorders* 1986;5:747–755.
- Watson D, Clark LA. Affects separable and inseparable: On the hierarchical arrangement of the negative affects. *Journal of Personality and Social Psychology* 1992;62:489–505.
- Wilson, G. T., Becker, C. B., & Heffernan, K. (2003). Eating Disorders. In E. J. Mash, & R. A. Barkley (Eds.), *Child Psychopathology* (2<sup>nd</sup> ed., p. 687–715). New York: Guilford.
- Weissman MM, Bothwell S. Assessment of social adjustment by patient self-report. *Archives of General Psychiatry* 1976;33:1111–1115. [PubMed: 962494]



**Figure 1.**  
Participant Flow Throughout the Study

**Table 1**

Effect Sizes ( $r$ ) and Significance Levels for the Time x Condition Interactions from Focused Repeated Measures ANOVA Models that Tested whether there was Significantly Greater Reductions in One Condition versus the Other at each Follow-up Assessment

	Thin-ideal internalization	Body dissatisfaction	Dieting	Negative affect	Bulimic symptoms
<u>Pretest to posttest</u>					
Dissonance vs. assessment-only	.38 <sup>***</sup>	.35 <sup>***</sup>	.27 <sup>***</sup>	.24 <sup>***</sup>	.17 <sup>**</sup>
Dissonance vs. expressive writing	.31 <sup>***</sup>	.37 <sup>***</sup>	.26 <sup>***</sup>	.26 <sup>***</sup>	.23 <sup>***</sup>
Dissonance vs. healthy weight	.16 <sup>*</sup>	.18 <sup>**</sup>	.26 <sup>***</sup>	.13 <sup>*</sup>	.11 <sup>*</sup>
Healthy weight vs. assessment-only	.22 <sup>***</sup>	.19 <sup>***</sup>	.00	.12 <sup>*</sup>	.09
Healthy weight vs. expressive writing	.15 <sup>*</sup>	.22 <sup>***</sup>	.00	.14 <sup>*</sup>	.15 <sup>**</sup>
Expressive writing vs. assessment-only	.08	.04	.00	.00	.03
<u>Pretest to 6-month follow-up</u>					
Dissonance vs. assessment-only	.29 <sup>***</sup>	.28 <sup>***</sup>	.17 <sup>**</sup>	.12 <sup>*</sup>	.18 <sup>**</sup>
Dissonance vs. expressive writing	.05	.24 <sup>***</sup>	.15 <sup>**</sup>	.12 <sup>*</sup>	.13 <sup>*</sup>
Dissonance vs. healthy weight	.00	.05	.08	.14 <sup>*</sup>	.03
Healthy weight vs. assessment-only	.21 <sup>***</sup>	.25 <sup>***</sup>	.11 <sup>*</sup>	.00	.16 <sup>**</sup>
Healthy weight vs. expressive writing	.06	.20 <sup>***</sup>	.08	.00	.11 <sup>*</sup>
Expressive writing vs. assessment-only	.15 <sup>**</sup>	.05	.00	.00	.05
<u>Pretest to 1-year follow-up</u>					
Dissonance vs. assessment-only	.13 <sup>*</sup>	.08	.17 <sup>**</sup>	.08	.20 <sup>***</sup>
Dissonance vs. expressive writing	.04	.10	.12 <sup>*</sup>	.08	.09
Dissonance vs. healthy weight	.06	.03	.06	.11 <sup>*</sup>	.04
Healthy weight vs. assessment-only	.20 <sup>***</sup>	.06	.11 <sup>*</sup>	.00	.15 <sup>**</sup>
Healthy weight vs. expressive writing	.11 <sup>*</sup>	.08	.05	.00	.04
Expressive writing vs. assessment-only	.10	.00	.06	.00	.12 <sup>*</sup>

Note:

\*  $p < .05$ ,

\*\*  $p < .01$ ,

\*\*\*  $p < .001$

**Table 2**  
Means and Standard Deviations for Outcomes from the Four Conditions and Results from the Within-Condition Pairwise Contrasts

	Pretest M (SD)	Posttest (1 mo) M (SD)	6-mo follow-up M (SD)	1-yr follow-up M (SD)
<u>Thin-ideal internalization</u>				
Dissonance	3.76 (0.50) <sup>a</sup>	3.14 (0.63) <sup>b</sup>	3.43 (0.61) <sup>b</sup>	3.44 (0.65) <sup>b</sup>
Healthy weight	3.72 (0.53) <sup>a</sup>	3.30 (0.77) <sup>b</sup>	3.39 (0.69) <sup>b</sup>	3.33 (0.69) <sup>b</sup>
Expressive writing	3.73 (0.53) <sup>a</sup>	3.49 (0.71) <sup>b</sup>	3.48 (0.67) <sup>b</sup>	3.48 (0.59) <sup>b</sup>
Assessment-only	3.70 (0.51) <sup>a</sup>	3.52 (0.66) <sup>b</sup>	3.60 (0.64)	3.55 (0.65)
<u>Body dissatisfaction</u>				
Dissonance	3.55 (0.83) <sup>a</sup>	2.95 (0.78) <sup>b</sup>	3.00 (0.83) <sup>b</sup>	3.15 (0.83) <sup>b</sup>
Healthy weight	3.48 (0.80) <sup>a</sup>	3.13 (0.82) <sup>b</sup>	3.01 (0.82) <sup>b</sup>	3.12 (0.80) <sup>b</sup>
Expressive writing	3.44 (0.81)	3.42 (0.85)	3.27 (0.81)	3.21 (0.85)
Assessment-only	3.52 (0.87)	3.44 (0.93)	3.43 (0.90)	3.27 (0.95)
<u>Dieting behaviors</u>				
Dissonance	2.87 (0.85) <sup>a</sup>	2.19 (0.92) <sup>b</sup>	2.32 (0.94) <sup>b</sup>	2.27 (1.00) <sup>b</sup>
Healthy weight	2.69 (0.97) <sup>a</sup>	2.36 (0.93) <sup>b</sup>	2.27 (0.88) <sup>b</sup>	2.20 (0.83) <sup>b</sup>
Expressive writing	2.66 (0.89) <sup>a</sup>	2.35 (0.95) <sup>b</sup>	2.38 (0.94) <sup>b</sup>	2.27 (0.92) <sup>b</sup>
Assessment-only	2.73 (0.88) <sup>a</sup>	2.42 (0.97) <sup>b</sup>	2.49 (1.02)	2.43 (0.93) <sup>b</sup>
<u>Negative affect</u>				
Dissonance	2.21 (0.89) <sup>a</sup>	1.56 (0.69) <sup>b</sup>	1.72 (0.65) <sup>b</sup>	1.77 (0.75) <sup>b</sup>
Healthy weight	2.10 (0.81) <sup>a</sup>	1.61 (0.75) <sup>b</sup>	1.83 (0.79) <sup>b</sup>	1.84 (0.84) <sup>b</sup>
Expressive writing	2.15 (0.95) <sup>a</sup>	1.87 (0.81) <sup>b</sup>	1.86 (0.75) <sup>b</sup>	1.85 (0.73) <sup>b</sup>
Assessment-only	2.22 (0.92) <sup>a</sup>	1.92 (0.84) <sup>b</sup>	1.93 (0.84) <sup>b</sup>	1.92 (0.83) <sup>b</sup>
<u>Bulimic symptoms</u>				
Dissonance	1.03 (0.48) <sup>a</sup>	0.74 (0.55) <sup>b</sup>	0.73 (0.59) <sup>b</sup>	0.73 (0.57) <sup>b</sup>
Healthy weight	0.97 (0.49) <sup>a</sup>	0.76 (0.40) <sup>b</sup>	0.69 (0.53) <sup>b</sup>	0.71 (0.46) <sup>b</sup>
Expressive writing	1.00 (0.39) <sup>a</sup>	0.89 (0.52)	0.82 (0.51) <sup>b</sup>	0.78 (0.44) <sup>b</sup>
Assessment-only	0.97 (0.58)	0.84 (0.65)	0.85 (0.56)	0.86 (0.52)

Note: Means in the same row with different subscripts were statistically significantly different ( $p < .001$ ).

**Table 3**  
 Percentages of Participants Meeting Criteria for Categorical Outcomes across the Four Treatment Conditions

	Percentage showing binge eating onset by 6-month follow-up	Percentage showing binge eating onset by 1-year follow-up	Percentage showing compensatory behavior onset by 6-month follow-up	Percentage showing compensatory behavior onset by 1-year follow-up	Percentage showing reliable change in bulimic symptoms by 1-year follow-up	Percentage showing onset of obesity by 1-year follow-up
Dissonance	17%	23%	27% <sup>b</sup>	31% <sup>b</sup>	33% <sup>a</sup>	3% <sup>a</sup>
Healthy weight	13% <sup>a</sup>	15% <sup>a</sup>	17% <sup>a</sup>	20% <sup>a</sup>	33% <sup>a</sup>	1% <sup>a</sup>
Expressive writing	26% <sup>b</sup>	28% <sup>b</sup>	31% <sup>b</sup>	33% <sup>b</sup>	28%	9% <sup>bc</sup>
Assessment-only	26% <sup>b</sup>	28% <sup>b</sup>	30% <sup>b</sup>	33% <sup>b</sup>	16% <sup>b</sup>	12% <sup>bc</sup>
Overall test of statistical significance	$\chi^2 = 8.51$	$\chi^2 = 7.32$	$\chi^2 = 6.69$	$\chi^2 = 6.24$	$\chi^2 = 11.49$	$\chi^2 = 12.54$
	[ <i>df</i> =3, <i>N</i> =452] <i>p</i> = .037	[ <i>df</i> =3, <i>N</i> =454] <i>p</i> = .050	[ <i>df</i> =3, <i>N</i> =436] <i>p</i> = .069	[ <i>df</i> =3, <i>N</i> =441] <i>p</i> = .087	[ <i>df</i> =3, <i>N</i> =453] <i>p</i> = .009	[ <i>df</i> =3, <i>N</i> =403] <i>p</i> = .006

Note: Cells with different subscripts in the same column are significantly different from one another ( $p < .05$ ).