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In press: Body Image

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Author Note

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Abstract

Research supports the efficacy of both cognitive dissonance (CD) and healthy weight (HW) eating disorders prevention, and indicates that CD can be delivered by peer-facilitators, which facilitates dissemination. This study investigated if peer-facilitators can deliver HW when it is modified for their use and extended follow-up of peer-facilitated CD as compared to previous trials. Based on pilot data, we modified HW (MHW) to facilitate peer delivery, elaborate benefits of the healthy-ideal, and place greater emphasis on consuming nutrient dense foods. Female sorority members ($N=106$) were randomized to either two 2-hour sessions of CD or MHW. Participants completed assessment pre- and post-intervention, and at 8-week, 8-month, and 14-month follow-up. Consistent with hypotheses, CD decreased negative affect, thin-ideal internalization, and bulimic pathology to a greater degree post-intervention. Both CD and MHW reduced negative affect, internalization, body dissatisfaction, dietary restraint, and bulimic pathology at 14 months.

Keywords: eating disorders; prevention; cognitive dissonance; healthy weight; dissemination

Peer-facilitated cognitive dissonance versus healthy weight eating disorders prevention:

A randomized comparison

Eating disorders (EDs) are associated with a wide range of medical complications involving all major systems of the body (Kaplan & Woodside, 1987; Mitchell & Crow, 2006), and in severe cases EDs may lead to death (Herzog et al., 2000). Further, even the most empirically supported treatment for eating disorders (i.e., cognitive behavioral therapy for bulimia nervosa) is only effective for about 60% of those completing treatment (Fairburn et al., 1995). The seriousness of these disorders coupled with the dearth of empirically supported treatments make effective prevention efforts crucial.

Early ED prevention programs typically adopted a universal psychoeducation approach and, unfortunately, proved largely ineffective at reducing ED pathology (Stice & Shaw, 2004; Stice, Shaw, & Marti, 2007). Indeed the early history of ED prevention was marked by failure to improve attitudes and behaviors (Pearson, Goldklang, & Striegel-Moore, 2002). Researchers, however, recently have made marked progress in developing more effective ED prevention programs. One source of this progress has been the development of cognitive dissonance-based interventions (CD: see Stice, Shaw, Becker, & Rhode, 2008 for review on CD and empirical support). Cognitive dissonance theory states that people will work to resolve inconsistencies between their beliefs and actions (Festinger, 1962). CD induces dissonance by having participants engage in activities opposing the thin-ideal standard of female beauty. Theoretically, these actions are inconsistent with participants' assumed investment in this culturally reinforced ideal, and thus produce dissonance. In order to resolve dissonance, participants decrease their investment in the thin-ideal, which should reduce other risk factors implicated in the development of ED pathology (see Stice, 1994; Stice, 2001).

CD is one of very few ED prevention programs to meet the American Psychological Association's (APA) criteria for an efficacious intervention (APA, 1995), meaning that CD has outperformed no-intervention control groups, outperformed at least one alternative intervention, and results have been replicated by independent researchers. CD has been studied by five independent labs (see Stice, Shaw, et al., 2008 for review of all studies; see also Green, Scott, Diyankova, Gasser, & Pederson, 2005; Matussek, Wendt, Wiseman, 2004; Mitchell, Mazzeo, Rausch, & Cooke; 2007), and has been found to reduce the following ED risk factors: negative affect, internalization of the thin-ideal standard of female beauty, body dissatisfaction, maladaptive dietary restraint, and bulimic pathology (Stice, Shaw et al., 2008). Two meta-analyses also found that ED prevention programs producing the largest effects were those that were interactive (not didactic), multi-session (not single session), and dissonance-based (not psychoeducational) (Stice & Shaw, 2004; Stice et al., 2007). Moreover, in one trial CD reduced onset of EDs to 6% at 3 years compared to 15% for attention control in young women with body dissatisfaction (Stice, Marti, Spoor, Presnell, & Shaw, 2008). CD also has proven effective in mixed risk populations. Becker and colleagues also have demonstrated via a series of studies that CD reduces ED pathology (typically measured via the diagnostic items of the Eating Disorder Examination-Questionnaire) when delivered to collegiate women who had not been selected because of body dissatisfaction (Becker, Smith, & Ciao, 2005; Becker, Smith, & Ciao, 2006; Becker, Bull, Schaumberg, Cauble, & Franco, 2008; Perez, Becker, & Ramirez, in press). This is important because many social systems prefer to deliver programs more universally as opposed to selecting (and possibly stigmatizing) high risk individuals. Becker and colleagues also demonstrated that undergraduate students could be trained to effectively lead CD to their mixed risk peers (Becker et al., 2006; Becker, Bull, Schaumberg et al., 2008).

Another ED prevention program that has garnered some significant empirical support is the Healthy Weight (HW) intervention. Developed by Stice and colleagues initially as a placebo control group against which to compare CD, HW also has been found to reduce ED risk factors such as body dissatisfaction, negative affect, dieting, and bulimic pathology (Stice, Chase, Stormer, & Appel, 2001; Stice, Shaw, Burton, & Wade, 2006). Like CD, HW also has been found to reduce onset of eating disorders at 3 year follow-up, and long term changes in risk factors are comparable for both interventions at 3 years (Stice, Marti et al., 2008).

Whereas the goal of CD is for participants to reject the thin-ideal, HW promotes the balancing of caloric intake and output in order to attain a healthy body weight. In HW, participants evaluate eating and exercise habits through self-monitoring and then commit to small, manageable changes to their diet and exercise for homework assignments. Once participants experience progress in changing unhealthy habits and successfully balance intake and output, they theoretically feel empowered to achieve a healthy weight for their body type. Both the behavior change tools and increased self-efficacy are presumed to contribute to reduced body dissatisfaction, negative affect, and ED pathology. HW may not decrease thin-ideal internalization to the degree that CD does (Stice, Trost, & Chase, 2003), however. This may be because participants do not engage in dissonance inducing activities, and may still feel pressure (from outside sources and/or themselves) to pursue the thin-ideal.

As noted above, research indicates that CD can be delivered by collegiate peer-facilitators when they receive sufficient training and manuals are adjusted to their needs. Having peers (i.e., endogenous providers who are natural to the social system) deliver interventions is potentially one method for improving large-scale dissemination of efficacious programs given that many social systems do not have the resources to administer interventions to a large number

of participants with doctoral or even masters-level clinicians. For instance, based on the research supporting CD generally and peer-facilitated CD specifically, the Delta Delta Delta fraternity (i.e., Tri Delta sorority) has begun large scale dissemination of peer-facilitated CD (i.e., *Reflections: Body Image Program*) with the aim of reaching 20,000 collegiate women over 5 years (Becker, Stice, Shaw & Woda, 2008). The Tri Delta executive office has noted that peer-facilitation was a crucial factor in making the program financially feasible. Research also indicates that administering CD can have positive implications for the peer-facilitators themselves. Becker, Bull, Smith, & Ciao (2008) found that peer-facilitators experienced further reductions in ED risk factors beyond those they experienced as participants in the same program.

The purpose of the present randomized effectiveness/dissemination study was to determine whether or not a modified version of HW (MHW) could be effectively delivered by endogenous providers (i.e., peer-facilitators), which would assist dissemination. Although CD has been embraced by specific communities (e.g., sororities), other communities may prefer a program that has a weight management/nutrition/physical activity focus. For instance, in a related line of ongoing research, we have found that many athletes prefer the face validity of a program that targets eating behavior versus body image. Similarly, schools that face pressure to address obesity as well as eating disorders might prefer a program that not only reduces eating disorder risk factors but may also reduce obesity onset; HW has been shown in one trial to reduce risk for obesity onset 1 year following the intervention (Stice et al., 2006). In summary, it makes sense to provide communities with as many effective prevention options as possible so as to meet their needs.

In a pilot study (Becker, Schaumberg, Mallett, Hay, & Williams, 2007), we found that peer-facilitators showed poor adherence to HW even though we already had modified structural

aspects of the HW protocol (e.g., having peer-facilitators guide participants through a self review of food logs as opposed to having peer-facilitators personally review logs) so as to make the intervention more amenable to peer-facilitation. Furthermore, a small but meaningful number of participants actively provided negative feedback about HW. More specifically, participants reported feeling that the original version of HW encouraged pursuit of the thin-ideal and made them upset about weight gain that they had experienced since coming to college. Based on this, we reviewed session audiotapes which suggested that because HW had a focus on managing weight many participants had trouble distinguishing pursuit of the healthy-ideal, which we define as however a woman's body looks when she is doing everything she can to appropriately and simultaneously maximize physical health, mental health, and quality of life, versus the thin-ideal standard of female beauty. As such, participants interpreted peer-facilitated HW as promoting the thin-ideal. This is likely because undergraduate peer-facilitators have limited clinical skills and the manual was not sufficiently tailored for their needs.

To address these issues, we decided to further modify the healthy weight protocol and rename it MHW so as to differentiate the version used in this study with that used by Stice et al. (2006; 2008). Revisions were not made with a specific theory in mind. Rather, we viewed this as an iterative process whereby we sought to alter the intervention in response to participants' confusion about pursuit of the healthy- versus thin-ideal. Thus, whereas HW largely focuses on tuning the caloric intake/output balance to obtain a healthy body weight, MHW also adds a greater focus on increasing the nutrient density of one's diet and exploration of the benefits of the healthy-ideal and differences compared to the thin-ideal so that participants understand that the goal of tuning energy intake and output is healthy weight management not pursuit of the thin-ideal. We added the new components to provide peer facilitators with explicit tasks to help

participants better understand that the intervention was promoting healthy weight management. Based on past experiences with CD, we have learned that giving peer-facilitators specific dialogue works better than expecting them to spontaneously address complex issues. We also added psychoeducation about the role lack of sleep can play in weight gain. Because this line of participatory research involves delivering interventions to an entire social system, some participants without marked eating/exercise concerns attend the interventions. Many college students have poor sleep habits, however, and this gives students who have good eating/exercise behaviors an additional option for improving a behavior that can impact weight via sleep's effects on leptin and ghrelin (Taheri, Lin, Austin, Young & Mignot, 2004).

This universal-selective prevention study compares peer-facilitated MHW to peer-facilitated CD when administered to a mixed risk population of college women (see Becker et al., 2005; Becker, Bull, Schaumberg et al., 2008 for evidence showing that sororities consist of members who are both at low and high risk, which is why we refer to this approach as universal-selective). Because CD has been shown to produce superior results to waitlist/assessment only controls (e.g., Becker et al., 2005; Stice et al., 2006; 2008), alternative interventions (e.g., Becker et al., 2006) and placebo control (e.g., Stice et al., 2006), we employed a comparative intervention strategy (Kazdin, 2003) and chose to compare peer-facilitated MHW with the ED prevention program that has amassed the greatest amount of empirical support (i.e., CD). We also chose to adopt this strategy because the present study was conducted as part of a long-term participatory research relationship with a sorority system. Participatory research methodology involves insuring that all relevant stakeholders have a real voice in decision making (Israel, Eng, Schulz, & Parker, 2005), and sorority leaders did not believe that the research benefits of a no-intervention control group outweighed the clinical downsides to their members given the

extensive data showing that CD produces positive effects. The present study also adds a longer follow-up than has been previously published with peer-facilitated CD. Consistent with the findings of Stice et al. (2006), we predict that CD will reduce negative affect, thin-ideal internalization, body dissatisfaction, dietary restraint, and bulimic pathology to a greater degree than MHW at post-intervention, but that differences between the two interventions will dissipate by 14-month follow-up (also consistent with Stice et al., 2006). We hypothesize that both CD and MHW will produce reductions in negative affect, thin-ideal internalization, body dissatisfaction, dietary restraint, and bulimic pathology long term when delivered by endogenous providers (i.e., peers).

Method

Participants

New members who joined any of the seven local sororities at Trinity University in February 2008 were required to participate in an annual body image program associated with sorority orientation. The program consists of attending the group sessions. Participation in the study, however, which consisted of filling out several questionnaires, was completely voluntary. Out of the 114 new members who joined a sorority, 5 were excused from participation in the program due to academic commitments or de-pledging. Ninety-seven percent of the remaining members participating in the program agreed to participate in the study ($N = 106$). As in our previous studies (Becker et al., 2005; 2006; 2008), participants ($n = 4$) who appeared to meet criteria for an ED based on their responses to the Eating Disorder Examination-Questionnaire (Fairburn & Beglin, 1994) were excluded from all analyses because the interventions being studied are aimed at prevention not treatment. The remaining 102 participants ranged in age from 18 to 21 years ($M = 18.73$, $SD = 0.72$). Mean body mass index (BMI), based on self-reported

height and weight, was 22.07 ($SD = 3.33$). The majority of participants self-identified their ethnicity as Caucasian (80%). The remainder endorsed African American (1%), Asian (2%), more than one race (10%), or no response (7%). Participants received no compensation for their participation.

Procedure

Overview. As appropriate, the program and study were reviewed and approved by the Institutional Review Board (IRB), Greek Council, and Student Affairs at Trinity University (e.g., Greek Council approved both study and program whereas IRB approved only the study). A list of all new sorority members was compiled, and new members were randomized by undergraduate research assistants (RAs) into 12 groups of 8 to 10 members stratified by sorority. Thus, each group had roughly equal representation of members from each sorority. After the groups were created the RAs blindly randomized the groups to either CD or MHW. At the beginning of the program, new sorority members from each of the seven campus sororities attended a brief orientation session. Consenting participants completed baseline questionnaires using a self-generated ID number to ensure confidentiality and then placed these in a large envelope. All participants were informed that they could pretend to fill out the questionnaires and return them in the envelope to reduce coercion. After completing questionnaires, participants met with their assigned groups to begin the first session. The second session took place exactly one week after the first session. Sessions were designed to last approximately 105 minutes plus time to complete questionnaires. Consenting participants filled out post-intervention questionnaires after the completion of the second session. Additional questionnaires were completed at 8-week, 8-month, and 14-month follow-up during each respective sorority's weekly meeting.

All sessions were audio taped to evaluate peer-facilitator adherence to the program manuals. Each tape was rated by two raters who determined to what degree each key step in the highly scripted manuals was completed using an adherence rubric. Raters consisted of undergraduate RAs who had participated in over 40 hours of training on the interventions. Because kappa, which is commonly used to assess inter-rater reliability, can at times produce surprisingly low scores even when rater agreement is very high (Gwet, 2002), we utilized the alternative chance corrected AC1 statistic proposed by Gwet (2002) to assess inter-rater reliability, which was excellent in this study ($AC1 = .96$). In contrast to Becker, Schaumberg et al. (2007), in which peer-facilitator adherence to HW was poor, we found that peer-facilitators had good adherence to both the CD and MHW protocols.

Peer-facilitator training. Research assistants (RAs) recruited interested sorority members at weekly meetings for each respective sorority. All peer-facilitators were sophomores, juniors, or seniors who had previously participated in an ED prevention intervention in one of our earlier studies. Potential peer-facilitators were asked to refrain from becoming a peer-facilitator if they were suffering from an ED or had significant body image concerns. Further we emphasized the need for peer-facilitators to be able to be a positive role model for health and body image even after the program was completed because the appearance of hypocrisy on the part of peer-facilitators could damage the program. Peer-facilitators were told that if they chose to withdraw we would assume it was because the time commitment was too high, so that there was no social stigma involved in withdrawing. Peer-facilitators were randomly assigned to two 4.5 hour CD or MHW training sessions based on their availability to attend training. Experiential training sessions were conducted by a licensed psychologist (CBB) and undergraduate RAs. During training, peer-facilitators were given an overview of the respective intervention (i.e., CD

or MHW), and in teams of three, ran an abbreviated version of the intervention while the remaining peer-facilitators acted as mock participants. Training sessions included nine peer-facilitators and so, by the end of training, each peer-facilitator had experienced the intervention once as a facilitator and twice as a participant. Peer-facilitators received detailed supervision after each practice session and had the opportunity to ask questions or voice concerns about leading the interventions. Thus, all peer-facilitators heard three rounds of supervision.

Intervention programs. CD and MHW consisted of two sessions. At the start of the first session of both interventions, participants (a) committed to give the program a try and keep an open mind, and (b) agreed to keep personal information brought up in the groups confidential.

Dissonance-based intervention. In session one, CD participants: (a) defined the thin-ideal, (b) discussed the origin of the thin-ideal and how it is perpetuated, (c) brainstormed costs of pursuing the thin-ideal, (d) participated in a verbal challenge activity (i.e., identified a time when they felt pressure to pursue the thin-ideal and indicated how they could have responded to counter the thin-ideal message) and (e) were given a mirror homework assignment. The mirror assignment asked them to stand in front of a mirror wearing as little clothing as they felt comfortable and list positive physical and emotional qualities about themselves. In session two, participants (a) reviewed the mirror assignment, (b) engaged in role plays in which peer-facilitators assumed the roles of women invested in the thin-ideal and participants tried to discourage pursuit of the thin-ideal, (c) discussed ways to challenge and avoid common “fat talk” statements, (d) listed ways to resist pressure to pursue the thin-ideal both individually and collectively as sororities (called “body activism”) (e) discussed possible barriers to body activism and ways to overcome those barriers, and (f) individually selected a self-affirmation exercise to continue their practice of positive body talk.

Modified healthy weight. In session one, MHW participants (a) defined the thin-ideal, (b) defined the healthy-ideal and contrasted it with the thin-ideal (c) discussed the importance of eating nutrient dense foods in maintaining an intake/output balance (d) listed the benefits of aspiring to a healthy-ideal, (e) discussed the importance of sleep in maintaining a healthy weight and body, (f) listed reasons to pursue the healthy-ideal, and (g) were given two homework assignments. The first assignment involved selecting a specific individual health goal to change within the next week. The health goal could be eating, exercise, or sleep related. Because the program is run on a semi-mandatory basis, it is possible that an occasional participant who is randomized to MHW may report not needing to change exercise or eating¹. In this situation, the participant can pick sleep – which also is often poor in college students. Participants were encouraged, however, to pick eating or exercise over sleep if either area needed improvement, and to do so for health not pursuit of the thin-ideal. The second assignment asked participants to keep a food log for two weekdays and one weekend day, and an exercise log for the whole week. In session two, participants (a) reviewed the benefits of pursuing the healthy-ideal, (b) discussed the difference between healthy dietary restriction (e.g., moderate, flexible, aimed at pursuing the healthy-ideal in a obesogenic food culture) and unhealthy dietary restriction (rigid, overly restrictive, extreme, typically aimed at pursuing the thin-ideal), (c) reviewed food and exercise logs, (d) identified healthy changes they could make to improve their diet with respect to nutrient density, along with barriers to such change, and strategies to overcome barriers (e) discussed specific ways to make meals more nutrient dense (f) discussed the benefits of exercise (g) identified healthy changes they could make to be more active, along with barriers to change, and strategies to overcome barriers (h) discussed ways that sororities could promote a healthy-ideal

for their members, and (i) committed to specific goals to continue their pursuit of the healthy-ideal.

Measures

Negative affect. Negative affect was assessed with the fear, guilt, and sadness subscales from the Positive and Negative Affect Schedule-Revised (PANAS-X; Watson & Clark, 1992). Participants indicated how much they had been feeling various emotional states (e.g., nervous, scared, and lonely) over the past few weeks by providing a rating from 1 = *very slightly or not at all* to 5 = *extremely* (scale range: 1-5). Scores from the 17 items were averaged. Past research with this scale has demonstrated good internal consistency ($\alpha = .95$), convergent validity with affective measures, and predictive validity for bulimic symptom onset (Stice & Agras, 1998; Watson & Clark, 1992). In the present study internal consistency was good ($\alpha = .89$).

Thin-ideal internalization. Thin-ideal internalization was assessed with the Ideal Body Stereotype Scale-Revised (IBSS-R; Stice, Ziemba, Margolis, & Flick, 1996). This scale consists of 10 items, in which participants endorse how much they agree (1 = *strongly disagree*, 5 = *strongly agree*; scale range: 1-5) with statements such as “thin women are more attractive.” Scores from the items were averaged. In past studies, this scale has demonstrated adequate internal consistency ($\alpha = .89$) and test-retest reliability ($r = .63$) (Stice, 2001; Stice & Agras, 1998). Internal consistency in the present sample was consistent with past research ($\alpha = .87$).

Body dissatisfaction. Body dissatisfaction was calculated using the shape concern and weight concern subscales from the Eating Disorder Examination Questionnaire, (EDE-Q; Fairburn & Beglin, 1994). The EDE-Q is a self report version of the Eating Disorder Examination, which is currently considered the “gold standard” for assessing ED pathology (EDE; Fairburn & Cooper, 1993). The EDE-Q, which has been extensively researched and tested

for its psychometric properties (e.g. see Luce & Crowther, 1999; Mond, Hay, Rodgers, Beumont, & Owen, 2004; Peterson, et al., 2007), has been widely used. The shape concern and weight concern EDE-Q subscales assess body dissatisfaction over the past month and both subscales have shown good internal consistency at baseline (shape concern, $\alpha = .93$; weight concern, $\alpha = .89$) and 2-week test-retest reliability (shape concern, $r = .94$; weight concern, $r = .92$) (Luce & Crowther, 1999). Body dissatisfaction scores were calculated by adding scores from the shape concern subscale and weight concern subscale and dividing by two. The two scales were highly correlated ($r = .92$), which provides support for combining them into one scale, and internal consistency for this combined scale was excellent ($\alpha = .94$) in the present study.

Dietary restraint. Although dietary restraint measures have not been shown to be good measures of actual dietary intake (Stice, Fischer & Lowe, 2004), these measures have been shown to predict bulimic pathology (Stice, Fischer & Lowe). Thus, we used the restraint subscale from the EDE-Q (Fairburn & Beglin, 1994) to measure this bulimic predictive construct. On this measure, participants report on how many days over the past month they have engaged in dietary restraint (e.g., “Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?”). This 5-item subscale assessing restraint has shown good internal consistency ($\alpha = .84$) and 2-week test-retest reliability ($r = .81$) (Luce & Crowther, 1999). Internal consistency in the present study was adequate ($\alpha = .78$).

Bulimic pathology. As in our previous peer-facilitated studies (Becker et al., 2006; 2008) we generated a composite bulimic scale from the diagnostic items (e.g., “over the past 28 days how many times have you taken laxatives as a means of controlling your shape or weight?”) of the EDE-Q (Fairburn & Beglin, 1994) to assess bulimic pathology. This 10-item measure

assesses to what degree participants have engaged in bulimic behaviors over the past month. Internal consistency for the bulimic composite was adequate ($\alpha = .81$) in the present sample.

Analysis

Despite the lack of differential dropout, all analyses were conducted on an intent-to-treat basis and missing data points were filled in with maximum likelihood imputation procedures for participants who did not complete all follow-ups. By 14-month follow-up, nine participants had subsequently undergone training as peer-facilitators for the next year's program. These participants were evenly distributed between the two interventions (5 in CD and 4 in MHW). Analyses including and excluding these participants did not yield significantly different results. Therefore, all analyses included data from these participants.

In order to test our preliminary hypothesis that CD would produce greater decreases than MHW on all dependent measures at post-intervention, ANOVAs were conducted with the intervention (CD, MHW) as the between-subjects factor and time as a two level (pre, post) within-subjects factor. For our main analyses, we used time (pre-, post-, 8-week, 8-month, 14-month) as the within-subjects factor. Skewed EDE-Q data was normalized using a square root transformation and skewed PANAS-X data was normalized using a logarithmic transformation. A one-way ANOVA revealed no significance baseline differences between interventions for all dependent measures, age, or BMI. Table 1 shows dependent variable means by intervention group and time, as well as calculated Cohen's *d* effect sizes for post-intervention and all follow-ups. Table 1 also shows results from paired t-tests between baseline and all post-intervention time points for each group. These analyses should not be used to infer differences between groups beyond those supported by ANOVA analyses.

Results

Participant Flow

Of the 102 participants who were included in the analyses, 90 (88%) completed 8-week follow-up, 83 (81%) completed 8-month follow-up, and 75 (74%) completed 14-month follow-up (see Figure 1). Three participants dropped out after the first session and three dropped out after session 2. There was no significant difference between conditions in dropout rates.

Preliminary Pre-Post Analyses

Negative affect. The repeated-measures ANOVA (pre-post) for negative affect revealed a significant Time effect and a Time x Group interaction (Table 2). There was no effect for Group. Consistent with our hypothesis, CD produced a larger effect size than MHW (Table 1).

Thin-ideal internalization. The repeated-measures ANOVA for thin-ideal internalization revealed a significant effect of Time and a Time x Group interaction (Table 2). CD yielded a significantly greater decrease in internalization as compared to MHW (Table 1). There was no effect for Group.

Body dissatisfaction. The repeated-measures ANOVA for body dissatisfaction revealed a significant effect of Time. There was no effect for Group or a Time x Group interaction (Table 2). Thus, our hypothesis was not supported.

Dietary restraint. The repeated-measures ANOVA for dietary restraint revealed a significant effect of Time. There was no effect for Group or Time x Group interaction, which indicates that results failed to support our hypothesis about CD being superior (Table 2).

Bulimic pathology. The repeated-measures ANOVA for bulimic pathology revealed a significant effect of Time and a Time x Group interaction (Table 2). CD yielded larger effects as compared to MHW (Table 1). There was no effect for Group.

Main Analyses

Negative Affect

The repeated-measures ANOVA for negative affect revealed a significant effect of Time, but no effect of Group and no Time x Group interaction (see Table 3). Post hoc analyses indicated that CD reduced negative affect at all post-intervention time points, whereas MHW only showed significant reductions at 8 months and 14 months.

Thin-Ideal Internalization

The repeated-measures ANOVA for internalization also revealed a significant Time effect. There was no effect for Group or Time x Group interaction (Table 3). Consistent with our hypotheses, both groups showed reductions in thin-ideal internalization at 14 months. Table 1 displays additional results from post-hoc tests.

Body Dissatisfaction

The repeated-measures ANOVA for body dissatisfaction revealed a significant effect of Time. There was no effect for Group or Time x Group interaction (Table 3). Post-hoc tests indicated that both CD and MHW significantly reduced body dissatisfaction from baseline at all post-intervention time points, including 14 months.

Dietary Restraint

The repeated-measures ANOVA for dietary restraint revealed a significant effect of Time. There was no effect for Group or Time x Group interaction (Table 3). Both groups decreased dietary restraint at 14 months, and all other post-intervention assessments with the exception of 8 months for MHW.

Bulimic Pathology

The repeated-measures ANOVA for bulimic pathology revealed a significant effect of Time. There was no effect for Group or Time x Group interaction (Table 3). Once again, both groups showed comparable and significant reductions in bulimic pathology over 14 months (see Table 1 for additional detail).

Discussion

This study sought to replicate and extend findings for two ED prevention programs that have garnered empirical support, CD and MHW. As predicted, both CD and MHW reduced ED risk factors at 14-month follow-up. At post-intervention, CD produced significantly greater reductions than MHW in negative affect, thin-ideal internalization, and bulimic pathology. This is an important and unusual finding in that it suggests that at post-intervention CD produces larger effects than a credible and structurally equivalent alternate prevention intervention. This outcome is rare, though not unheard of, in prevention studies. Indeed, this very specific result has been found in a previous study comparing CD with HW (Stice, et al., 2006), despite differences in participants and providers, which suggests that it may represent a real difference between CD and MHW/HW. This finding also provides support for the notion that these interventions operate via different mechanisms and suggests that CD may be a faster acting intervention than MHW/HW, which makes sense given that the benefits of changing health behaviors may take time to become evident. As noted above, however, differences between CD and MHW were not present for any measures at longer follow-up (all $p > .293$), suggesting that differences between these two interventions fade over time.

It is unclear why initial differences fade. For the most part, it appears that MHW largely caught up to CD, although CD consistently produced larger – but not significantly larger – effect sizes at 14 months. One option, as implicated above, is that MHW simply takes more time to

produce effects. Alternatively, the context in which these interventions are delivered may partially explain the dissipation of initial differences. Participants are members of a social system (group of local sororities) that is actively attempting to reject the thin-ideal and to reduce the use of “fat talk” statements on a daily basis secondary to the annual use of CD for over 7 years. Thus, MHW participants are eventually exposed to some of the components of CD. Also, peer-facilitators, who have the greatest exposure to the program, are encouraged to push their fellow sorority members to “live” the overarching message of the program (i.e., reject the thin-ideal and embrace the healthy-ideal) on a daily basis even after the interventions are completed. This tendency has become even more pronounced now that peer-facilitated CD, which was developed with the local sororities at Trinity University, has been launched throughout North America (i.e., *Reflections: Body Image Program*) by Tri Delta. Campus sorority members take significant pride in seeing what they perceive as “their program” expanded to a significant number of other campuses (e.g., 41 in 2009-2010). In addition, sorority members report using what they learn during the program to collaborate with other members as “body activists,” both individually and within their sororities. Thus, continual sorority-wide collaboration in rejecting the thin-ideal may cause the initial differences seen between CD and MHW to decrease over time. It should be noted, however, that Stice et al. (2006) also found that post-intervention differences faded between CD and HW at 1 year follow-up and they did not run their study in a structured social system – which suggests that what was observed in this study is not solely due to this setting.

One alternative explanation is that sorority members naturally improve over time on ED risk factors. This seems implausible for several reasons. First, although limited data address this question, Allison and Park (2004) found that 57 sorority women showed no change, either positive or negative, in drive for thinness, body dissatisfaction and bulimia over a three year

period. Second, in a previous study we found that CD significantly outperformed a waitlist control group at one month (Becker et al., 2005) and that the control group showed virtually no changes from pre-intervention to one-month follow-up (dietary restraint $d = -.01$, thin-ideal internalization $d = .14$; body dissatisfaction $d = .01$; bulimic pathology $d = -.11$). Further, in another study (Becker et al., 2006) we found that whereas CD produced significant reductions in dietary restraint, thin-ideal internalization, body dissatisfaction and bulimic pathology at 8 months in sorority members, an alternate credible media advocacy intervention failed to do so in 3 out of the 4 dependent variables (d range $-.03$ to $.14$) suggesting no natural improvement over that time period and an equivalent sample. Finally, in yet another study we found that whereas low risk sorority members who participated in CD improved in risk status over 8 months, low-risk members who participated in an alternate intervention showed small but worsening changes over time (Becker, Bull, Schaumberg et al., 2008). Thus it seems unlikely that the significant results that were found here resulted from natural improvement. Rather, given that Stice et al. (2006) found that both CD and HW significantly outperformed assessment only at one year and given that within group effect sizes in the present study at 14 months (CD d range = $0.48 - 0.97$; HW d range = $0.34-0.83$) compare closely to those reported by Stice et al. for 12 months (CD d range = $0.48 - 0.65$; HW d range = $0.32-0.63$), it appears that this study replicated previous findings.

Despite espousing markedly different aims, both CD and MHW do contain certain similarities that may bolster their effectiveness beyond the strict content of the sessions. Indeed, Stice and colleagues have posited that such overlapping techniques (e.g., motivational exercises and public commitments to change) may contribute to the concurrent effectiveness of CD and HW (Stice, Shaw et al., 2008). Trials for both interventions also have been largely multi-session,

which allows participants to complete homework assignments reinforcing topics covered within sessions. For instance, for homework in CD, participants are asked to stand in front of a mirror and list positive qualities about themselves, both physical and emotional. In HW (and MHW), participants are asked to identify and commit to specific changes in diet and exercise between sessions. These assignments are individualized in that they require participants to apply what they have discussed within sessions to their own personal body image and health concerns. Thus, HW clearly utilizes some of the general principles that have been included in CD and only research dismantling each intervention will be able to parcel out the exact contributions from different components.

Results from the current study also suggest that MHW may be superior to HW in terms of the viability of using peer-facilitators for dissemination given that adherence was poor in our pilot study of peer-facilitated HW (Becker, Schaumberg et al., 2007) and good in the present examination of MHW. We also had no student reports of distress with peer-facilitated MHW in contrast to peer-facilitated HW. Thus, the additional modifications to MHW appear to have been sufficient to allow peers to lead this intervention.

This study also extended follow-up as compared to our previous trials (Becker et al., 2006; 2008) and indicated that effects for peer-led CD remain even at 14 months. Eight-month effect sizes for CD were also fairly consistent with previous trials, providing additional replication. Importantly, as noted above, review of means and standard deviations in Stice et al. (2006), which is arguably one of the best controlled eating disorders prevention studies conducted to date, indicate that the 14-month effect sizes for CD in the present study are generally similar (e.g., negative affect, thin-ideal internalization) or larger (e.g., body dissatisfaction, dietary restraint, bulimic pathology) than the one year effect sizes found by Stice

et al. This suggests that using peer-facilitators to deliver a two-session version of CD in a supportive social system may produce similar effects to the 4 session non-peer-facilitated version of CD. This is particularly exciting given that at 3 years Stice et al. (2008) found that CD reduced onset of eating disorders by 60%. This is also impressive given that Stice et al. employed a high risk sample with elevated body image concerns, whereas the present study accepted all new sorority members and our previous research has shown that sorority members comprise a mixed risk population with both lower and higher risk members (Becker et al., 2005; 2008). Thus, the present study is less likely to be influenced by regression to the mean and may have had greater problems with floor effects.

There are several limitations to this study, the first being that assessment was limited to self-report due to its utility in non-clinical settings. Secondly, there may have been spillover effects between the two intervention groups because sororities members spend a significant amount of time with one another. Third, although we used intent-to-treat analyses and determined that dropout was not different between groups, at 14-month follow-up we only retained three quarters of our sample, less than Stice and colleagues typically retain. It should be noted, however, that this was an unfunded naturalistic study and that, in contrast to Stice et al. (2006), participants were not paid for attending follow-up. Thus, the similarity in findings between this study and the Stice et al. study support the generalizability of Stice et al.'s results. Finally, in this study, we did not use a no intervention control group for comparison. The present study is best viewed as a dissemination and implementation study that is aimed at determining how well interventions perform in real world settings when implemented by cost-effective endogenous providers. As noted above, past efficacy studies have shown that both CD and HW

outperform waitlist control (CD only: Becker et al., 2005; CD & HW: Stice et al., 2003) and assessment only control groups (CD & HW; Stice et al., 2006; 2008).

This study suggests that both CD and MHW are effective when delivered by peer-facilitators, which is encouraging in lieu of current and future dissemination efforts. It should be noted that informal qualitative feedback from the sororities seemed to indicate that participants preferred CD to MHW, although peer-facilitators who were exposed to both CD as a participant in earlier studies and MHW as facilitators in this study felt that both were useful. Further, they described MHW as a good follow-up to CD. It remains to be seen, however, if there truly is an additive benefit to receiving both interventions.

This study also supports the longer-term effectiveness of peer-facilitated CD, which extends past research. Future research would be helpful in order to ascertain the effective components of each intervention and explore the use of message framing in ED prevention. Replication of results, particularly with respect to MHW is also needed.

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Footnotes

1. Based on peer-leader training, we estimate that over 95% of students can identify ways to improve exercise or eating. The sleep option is available for the remaining 5%.

Table 1
Means and Standard Deviations for Dependent Measures

Measures	Baseline	Post Intervention	8-wk. Follow-up	8-mo. Follow-up	14-mo. Follow-up	Post Intervention	8 wk.	8 mo.	14 mo.
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>d</i>	<i>d</i>	<i>d</i>	<i>d</i>
Negative Affect									
CD	1.76 (0.62)	1.48 (0.47)	1.60 (0.66)	1.54 (0.64)	1.47 (0.58)	0.51*	0.25*	0.35*	0.48*
MHW	1.58 (0.48)	1.48 (0.44)	1.51 (0.63)	1.34 (0.34)	1.41 (0.51)	0.22	0.12	0.58*	0.34*
Thin-Ideal. Internalization									
CD	3.37 (0.61)	2.89 (0.68)	3.30 (0.69)	3.18 (0.67)	3.05 (0.65)	0.74*	0.11	0.30*	0.51*
MHW	3.37 (0.62)	3.16 (0.56)	3.38 (0.70)	3.38 (0.51)	3.10 (0.71)	0.36*	-0.02	0.00	0.41*
Body Dissatisfaction									
CD	2.30 (1.53)	1.60 (1.23)	1.65 (1.36)	1.46 (1.29)	1.03 (1.05)	0.50*	0.45*	0.59*	0.97*
MHW	1.73 (1.25)	1.39 (1.01)	1.19 (0.97)	1.34 (0.90)	0.84 (0.87)	0.30*	0.48*	0.36*	0.83*
Dietary Restraint									
CD	1.52 (1.22)	0.84 (0.88)	0.93 (1.21)	1.10 (1.17)	0.65 (0.99)	0.64*	0.49*	0.35*	0.78*
MHW	1.27 (1.16)	0.81 (0.73)	0.78 (0.88)	0.91 (0.96)	0.62 (0.99)	0.47*	0.48*	0.34	0.60*
Bulimic Pathology									
CD	12.25 (8.64)	8.18 (6.36)	9.06 (7.85)	7.90 (7.15)	5.93 (6.00)	0.54*	0.39*	0.55*	0.85*
MHW	9.45 (6.81)	7.94 (5.12)	6.68 (5.70)	6.87 (4.99)	4.92 (6.54)	0.25	0.44*	0.43*	0.68*

Note: Cognitive Dissonance (CD) $n = 53$, Modified Healthy Weight (MHW) $n = 49$. All analyses are intent to treat.

* indicates $p < .05$ for post-hoc t-test comparison with baseline

Table 2.

Results of Repeated Measures ANOVA from Pre-Intervention to Post-Intervention

Analysis	<i>F</i>	<i>p</i> <	<i>p</i> η^2
<u>Negative Affect (<i>df</i> = 100)</u>			
Time	24.09	.001*	0.19
Group	0.88	.352	0.01
Time x Group	4.60	.034*	0.04
<u>Thin Ideal Internalization (<i>df</i> = 100)</u>			
Time	33.35	.001*	0.25
Group	1.56	.214	0.02
Time x Group	5.33	.023*	0.05
<u>Body Dissatisfaction (<i>df</i> = 100)</u>			
Time	34.70	.001*	0.26
Group	2.32	.131	0.02
Time x Group	3.74	.056	0.04
<u>Restraint (<i>df</i> = 100)</u>			
Time	43.02	.001*	0.30
Group	0.54	.464	0.01
Time x Group	2.20	.141	0.02

Bulimic Pathology ($df = 100$)

Time	17.53	.001*	0.15
Group	0.91	.343	0.01
Time x Group	4.27	.041*	0.04

Note: * indicates significant effect with significance level set at $p < .05$.

Table 3.

Results of Repeated Measures ANOVA from Pre-Intervention to Post-Intervention

Analysis	<i>F</i>	<i>p</i> <	<i>p</i> η^2
<u>Negative Affect (<i>df</i> = 100)</u>			
Time	18.23	.001*	0.15
Group	1.55	.217	0.02
Time x Group	0.02	.884	0.00
<u>Thin Ideal Internalization (<i>df</i> = 100)</u>			
Time	4.46	.037*	0.04
Group	1.63	.205	0.02
Time x Group	0.01	.905	0.00
<u>Body Dissatisfaction (<i>df</i> = 100)</u>			
Time	66.06	.001*	0.40
Group	2.27	.135	0.02
Time x Group	1.62	.206	0.02
<u>Restraint (<i>df</i> = 100)</u>			
Time	32.18	.001*	0.24
Group	0.62	.433	0.01
Time x Group	0.32	.575	0.00

Bulimic Pathology ($df = 100$)

Time	57.60	.001*	0.37
Group	1.64	.203	0.02
Time x Group	0.07	.786	0.00

Note: * indicates significant effect with significance level set at $p < .05$.

Figure 1.0. Sampling and Flow of Participants

