A COMPARISON OF BRIEF MIRROR EXPOSURE TECHNIQUES FOR EXTREME

SHAPE AND WEIGHT CONCERNS

By

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ABSTRACT OF THE THESIS

A Comparison of Brief Mirror Exposure Techniques for Extreme Shape and Weight

Concerns

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This study pilots the feasibility and effectiveness of two theoretically distinct, brief

approaches to mirror exposure (ME)—a treatment for body dissatisfaction—against an

ecologically-valid control condition with respect to improving body and appearance

satisfaction and mood. Female undergraduates ($N = 32$) exhibiting clinical-level shape

and weight concerns were randomized to complete a scripted, 5 minute ME exercise in

either a mindfulness-based (MB; $n = 11$), cognitive-dissonance-based (CD; $n = 10$), or

mirror-as-usual control (MAU; $n = 11$) condition. The MB condition focused on the

nonjudgmental aspect of the Delinsky and Wilson (2006) mindfulness-based ME

protocol, while the CD condition was adapted from an evidence-based eating disorders

prevention program (Stice and Presnell, 2007). Participants completed the Satisfaction

with Body Parts Scale (SBPS) and Visual Analog (VAS) measures of weight and

appearance satisfaction, and mood and anxiety at baseline and post-intervention. ME

exercises were recorded and coded for adherence to the scripted instructions. The present

study is one of the first to pilot such a brief format of these ME approaches, as well as to

directly compare two distinct ME approaches to an ecologically-valid control condition in women with clinical-level shape and weight concerns. Mixed model ANCOVAs indicated no change in VAS mood, anxiety, body anxiety, body feelings, and appearance satisfaction from baseline to posttest for any of the three conditions. A main effect of time was observed for VAS weight satisfaction, with all 3 conditions exhibiting an improvement in weight satisfaction from baseline to post-test, $F (1, 28) = 9.701$, $p = 0.004$, partial eta-squared = 0.26. A significant time by condition interaction was observed for the Satisfaction with Body Parts scale, $F (2, 28) = 3.778$, $p = 0.035$, partial eta-squared = 0.02. Post-hoc analyses revealed the CD condition resulted in significantly greater decreases in body dissatisfaction from baseline to posttest, than both the MB condition, and the MAU control condition, while the MB and MAU conditions did not differ from one another. Results are discussed within the context of the feasibility of using one session ME, as well as using an active mirror control as a comparison group.

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Introduction

The term "body image" has become ubiquitous in recent years, and is used in a variety of contexts. Contemporary research conceptualizes body image as a multi-component construct, consisting of affective, cognitive, perceptual, and behavioral elements (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Dysfunction in any one of the elements can result in body image disturbance. Extreme concern about, and overvaluation of body shape and weight represents a disturbance in the affective and cognitive elements of the body image construct (Farrell, Shafran & Lee, 2006) and is thought to form the core psychopathology of eating disorders (Fairburn & Harrison, 2003). The DSM-IV-TR (2000) lists overvaluation of body shape and weight, or "undue influence of body weight or shape on self-evaluation" as a core diagnostic feature of both anorexia nervosa and bulimia nervosa. This particular form of body image disturbance is a robust risk factor for the development and maintenance of eating disorders (Fairburn, Stice, Cooper, Doll, Norman, & O'Connor, 2003; Stice, 2002), and its continued presence is implicated in relapse (Fairburn, Peveler, Jones, Hope & Doll, 1993).

Though severe body dissatisfaction and undue influence of shape and weight in self-evaluation are less common in the general population than in clinical samples, varying degrees of body dissatisfaction are sufficiently prevalent in the general population of women to have earned the title "normative discontent" (Rodin, Silberstein & Striegel-Moore, 1984). Several studies conducted in community samples in the United States have reported elevated levels of body dissatisfaction and abnormal eating and weight control practices in approximately 25 percent of female high school students and adolescents (Crow, Eisenberg, Story, & Neumark-Sztainer, 2008; Forman-Hoffman,

2004; McVey, Tweed, & Blackmore, 2004), with similar estimates for middle-aged women (McLaren & Kuh, 2004). High levels of body image disturbance, even without the presence of eating pathology, can be a source of significant distress. In addition, elevated body dissatisfaction has been identified as a risk factor for major depression in a prospective longitudinal study of a large sample of adolescent girls (Stice, Hayward, Cameron, Killen & Taylor, 2000), and varying levels of body image disturbance were found to be associated with depression in a sample of 224 undergraduate men and women (Noles, Cash, & Winstead, 1985).

Given that body image disturbance a) is a risk factor for eating disorder development and maintenance, b) is associated with other forms of psychopathology, and c) causes distress even in the absence of other forms of psychopathology, the treatment of body image disturbance warrants a focus in both research and therapy. Many eating disorder treatment programs, including cognitive behavior therapy (CBT)—the evidence-based treatment of choice for bulimia nervosa (Wilson & Shafran, 2005)—address body image disturbance during the course of treatment. In fact, a dismantling study of the full CBT treatment for bulimia nervosa (Fairburn, Jones, Peveler, Carr, Solomon, O' Connor, et al., 1991) demonstrated that patients who completed a course of treatment that did not include the module addressing body image disturbance exhibited significantly more eating disorder symptoms at post-treatment than did patients who underwent the full protocol. Even when addressed in full treatments for eating disorders, however, body image disturbance has been shown to persist, both in weight-recovered patients with anorexia nervosa (Widenauer, Lennerts, Talbot, Touyz, & Beumont, 1993), and in patients with bulimia nervosa upon completion of CBT (Fairburn et al., 1993). Indeed,

though CBT is effective in reducing the behavioral symptoms found in bulimia nervosa (i.e., binge eating and purging), standard protocols are less effective at improving body image (Rosen, 1996). These attenuated findings have resulted in interest in more effective treatments for body image disturbance, as such treatments could improve outcomes for both clinical and non-clinical populations.

Empirically supported interventions that have been specifically designed to address body image disturbance use mainly cognitive and behavioral techniques, such as cognitive restructuring (i.e., identifying and challenging negative, unrealistic, or overvalued thoughts or emotions about one's body) , behavioral experiments (i.e., eliminating body checking/body avoidance, excessive reassurance seeking) and body size perception training (i.e., challenging overestimation of size and/or exaggeration of perceived defect). Rosen (1997) and Cash (1995) developed similar but separate body image treatments which have become the most commonly used and tested interventions in this area. Studies evaluating the effectiveness of these CBT programs for body image disturbance have demonstrated that the treatments are superior to no treatment on affective and cognitive measures of body image disturbance (Butters & Cash, 1987), and more effective than a minimal, non-specific treatment in a population of women with high levels of body image disturbance but no eating pathology (Rosen, Saltzberg & Srebnik, 1989). However, such interventions have rarely been tested against active treatments, and independent groups have failed to reliably replicate the effectiveness of the interventions against both nonspecific treatments (i.e., Reflective Therapy) and waitlist controls (Dworkin and Kerr, 1987; Fisher & Thompson, 1994).

The aforementioned treatments for body image disturbance contain multiple components, and as such, may be over-inclusive. Dismantling studies that demonstrate the effectiveness of individual components of such interventions could improve efficiency. Mirror exposure is a commonly used behaviorally-oriented component in CBT for body image disturbance (Rosen, 1997). ME is used in body image treatments both for size perception training (perceptual disturbance), and for reducing avoidance of one's body image and the anxiety induced by it (cognitive, behavioral and affective disturbances). Some researchers have studied ME as a potential stand-alone treatment for body image disturbance, outside the context of a larger treatment protocol. ME consists of clients systematically observing, attending to, and/or describing various parts of their bodies while observing their reflection in a mirror for a given amount of time. ME is based on the behavioral principles of exposure therapy for anxiety disorders, and is thought to address the anxiety component that accompanies body image disturbance, particularly when an individual looks in the mirror. Evidence suggests that individuals with eating disorders report higher levels of negative cognitive responses and emotional distress (i.e., sadness, anxiety, tension, insecurity) when viewing their body image, both on video-tape (Tuschen-Caffier, Vogele, Bracht, and Hilbert, 2003) and in a mirror (Cooper & Fairburn, 1992; Hilbert, Tuschen-Caffier, Vogele, 2002; Vocks, Legenbauer, Wächter, Wucherer, & Kosfelder, 2007) compared to healthy controls.

The specific mechanisms underlying mirror and body image exposure are not known. Some researchers have theorized that, similar to exposure for anxiety disorders, systematic mirror exposure serves to reduce body-related anxiety through habituation processes. For example, Vocks et al. (2007) exposed female patients with eating

disorders (ED; n = 21) and normal controls (NC; n=28) to their bodies in front of a mirror for a 40 minute interval, during which time participants were systematically instructed to attend to various body parts, and emotional, cognitive, and physiological (i.e. salivary cortisol levels) assessments were taken. ED patients showed higher negative emotional and cognitive responses to body exposure as compared to NCs, but no group differences were observed for physiological reactions. Over the course of the 40 minute exposure, the extent of negative emotions and cognitions decreased significantly (with higher effects observed for emotions than for cognitions) for both the ED and NC groups. In this case, it would seem, prolonged exposure to one's mirror image (i.e., the conditioned stimulus) in the absence of negative reinforcement (i.e. avoidance of one's body image) led to a decrease in the conditioned negative response to the stimulus (Hilbert, Tuschen-Caffier, & Vogele, 2002). In a small sample (n = 15) of inpatient weight-restored anorexic patients, Key, George, Beattie, Stammers, Lacey, and Waller (2002) compared a standard body image treatment to treatment supplemented with repeated "mirror confrontation," or unguided body image exposure over the course of the 8-week treatment. Compared to the standard treatment (which did not produce any significant changes on measures of body image at post-treatment or 6 month follow-up), the treatment supplemented with ME produced significant reductions on measures of body dissatisfaction, body anxiety, and body avoidance that were maintained at follow-up.

Other forms of ME have guided participants through the exposure and included a cognitive component which focuses on the link between negative body-related cognitions and the negative emotions they induce. Wilson (1999) suggested that ME designed to promote cognitive change and assist patients in distancing themselves from critical body-

related cognitions which are activated upon body exposure, is likely to be more effective than simple habituation-based ME. Similarly, Jansen, Bollen, Tuschen-Caffier, Roefs, Tanghe, and Braet (2008) incorporate a cognition component into the habituation process model of ME. Specifically, Jansen et al. (2008) propose that while body image is the conditioned stimulus (much like the simple habituation model), it is the continued pairing of body image with negative body-related cognitions that links body image exposure directly to the conditioned response (i.e., anxiety and distress). In this model then, body image exposure must occur in the absence of negative body-related cognitions in order to facilitate new learning that does not lead to a negative emotional response.

Different types of ME use different methods to address the negative body-related cognitions that are activated upon body image exposure. An evidence-based eating disorders prevention program (Stice & Presnell, 2007), which has been shown to reduce eating disorder risk factors (Stice & Presnell, 2007; Stice, Shaw, Becker, & Rohde, 2008) includes a version of ME based on the principle of cognitive dissonance (CD). Briefly, cognitive dissonance theory posits that the discomfort resulting from a disconnect between internally held thoughts and externally expressed behavior, will cause an individual to change one to become congruent with the other (Festinger, 1975). The CD mirror exercise in the Stice and Presnell (2007) program instructs participants to describe their physical, social, emotional, and intellectual qualities aloud while looking in a full-length mirror. For individuals with body dissatisfaction, explicit verbalization of positive physical qualities should be at odds with internally held negative body-related beliefs. This incongruence should activate cognitive dissonance, thus resulting in internally held cognitions to be modified to conform to external behavior. Though Stice and Presnell's

(2007) full eating disorder prevention program has been empirically supported in multiple studies, the precise effectiveness of the CD ME component has not been examined.

In a different approach to ME, Delinsky and Wilson (2006) compared a three session mindfulness-based mirror exposure to a non-directive body image treatment (ND) in a sample of women with extreme shape and weight concerns (n = 45). Delinsky and Wilson's (2006) mindfulness-based ME emphasized being present in the current moment while participants systematically observed their entire mirror image. Participants were instructed to take a more "holistic" focus to viewing their entire body rather than focusing exclusively on perceived undesirable parts. During this holistic observation, participants were instructed to describe each body part using nonjudgmental, factual-based descriptors vs. negative and subjective descriptions. Indeed, adopting a nonjudgmental perspective is a crucial aspect of mindfulness, and challenges the negative perspectives held by individuals with high levels of body dissatisfaction (Stewart, 2004). At post-treatment and 1 month follow-up, participants in the mindfulness-based ME condition exhibited significantly greater reductions than participants in the ND group on measures of body checking, body avoidance, depression, self-esteem, and shape and weight concern. For a measure of body dissatisfaction, ME was not significantly different from ND, with both groups achieving reductions by follow-up.

Some evidence suggests that guiding participants through a systematic and neutral description of body parts during ME, even without mindfulness exercises, results in improvements. Hilbert, Tuschen-Caffier, and Vogele (2002) guided 30 patients with binge eating disorder (BED) and 30 healthy control participants through neutral

description ME on two separate days. Mood, appearance self-esteem and frequency of negative cognitions were assessed throughout exposures. During both ME sessions, BED patients showed significantly lower mood than controls. In the first ME session, more negative body-related cognitions occurred in the BED group compared with the healthy controls, while appearance self-esteem was low in both groups. By the end of the second session, both groups demonstrated improved mood and appearance self-esteem , and fewer negative cognitions, leading the authors to conclude that repeated neutral description ME improves mood, appearance self-esteem, and incidence of negative body-related cognitions in patients with BED. However, measures of cognitions and emotions were not administered repeatedly during each exposure session, so examination of the possible changes of cognitions and emotions within session was not possible. Jansen et al. (2008) piloted the Hilbert et al. (2002) procedure of neutral description ME in a small sample (n = 16) of adolescents taking part in a year-long residential treatment program for obesity. Their findings, though preliminary, suggest that the neutral description ME procedure, conducted in six, 50 minute sessions, resulted in reductions in anxiety and improvements in body satisfaction in this population, compared to a no exposure control group of obese adolescents.

The above findings suggest that a full mindfulness-based ME may be over-inclusive, and that neutral, nonjudgmental description may be the effective component in this type of ME. In a recent study designed to compare the aforementioned types of ME, Luethcke, McDaniel, and Becker (2011) randomized 168 female undergraduates to 2 sessions of either mindfulness-based (MB) ME, cognitive dissonance-based (CD) ME, or nonjudgmental (NJ) ME. ME procedures were scripted in order to facilitate delivery by

undergraduate research assistants. Measures of eating disorder risk factors, including body avoidance, body checking, body satisfaction, depression, and eating pathology were administered at baseline, post-test, and at 1 month follow-up. Results demonstrated a main effect of time for all measures (except body dissatisfaction)—in all 3 conditions, with improvements from baseline to posttest that were maintained (though not further improved) at 1 month follow-up. For body dissatisfaction (as measured by the Satisfaction with Body Parts Scale (SBPS); Berscheid et al., 1973) there was a significant time by condition interaction demonstrating that only CD ME significantly improved body satisfaction from baseline to post-test, with gains maintained at 1 month follow-up.

The recent Luethcke et al. (2011) study is the first to directly compare these different types of mirror exposure, and replication is necessary. In addition, Luethcke et al. (2011) used a normal female undergraduate sample; different types of mirror exposure have not yet been compared in a population of women with extreme shape and weight concerns (as was used in Delinsky &Wilson, 2006). The Luethcke et al. (2011) study focused on a relative comparison of active ME conditions, but did not include a control condition. Indeed, prior ME studies have either administered one ME condition to a clinical group vs. a healthy control group (Hilbert et al., 2002; Tuschen-Caffier et al., 2003; Vocks et al., 2007) or an ME condition vs. a no-mirror control condition (Delinsky & Wilson, 2006; Jansen et al., 2008; Key et al., 2002). To our knowledge, no prior studies have compared mirror exposure to an ecologically-valid control condition—in other words, a non-directed exposure to one's mirror-image. As yet, different types of ME have not been directly compared to simple mirror exposure as it is experienced in everyday life. Demonstration of the superior effectiveness of specific, theory-driven types

of ME to a "mirror-as-usual experience" (an ecologically-valid control) for individuals with body dissatisfaction, would represent a stronger test of the specific aspects of a given ME procedure.

Though some prior studies of ME (Delinsky & Wilson, 2006; Luethcke et al., 2011) have used relatively abbreviated formats (2 sessions in the former, 3 in the latter), no studies have yet compared different types of mirror exposure in a one-session format. In a recent study, Wade, George, and Atkinson (2009) induced body dissatisfaction in a sample of female undergraduates (n = 100) and then randomized participants to brief (5 minutes) body dissatisfaction interventions (including distraction, acceptance, and cognitive dissonance), a ruminative attention control, or a no intervention control. Participants in distraction, acceptance, and cognitive dissonance all demonstrated improvements in a visual-analog measure of weight satisfaction as compared to the two control groups, but only the acceptance condition resulted in improved appearance satisfaction relative to the control. Though Wade et al. (2009) did not use brief mirror exposure interventions, their results nonetheless provide evidence that even very brief interventions for body dissatisfaction can result in improvements. Brief format interventions, ones that are stripped to the "bare bones" if found to be effective, could enhance understanding of the precise effective components of longer, multi-component interventions, thus improving the efficiency of treatments for body image disturbance—which some have argued may be over-inclusive (Farrell, Shafran, & Lee, 2006)—and facilitate dissemination and implementation.

The present study, though preliminary in nature, aims to begin to address several current questions in the ME literature by, 1) comparing different approaches to ME in a

sample of women with extreme shape and weight concerns, 2) including an ecologically valid mirror control condition, and 3) piloting the feasibility of a brief (one session) approach to ME. To that end, the current study compares the effectiveness of cognitive dissonance-based (CD) ME, mindfulness-based ME (MB), and an ecologically-valid mirror control (Mirror-As-Usual; MAU) in a population of women with extreme shape and weight concerns, on measures of body dissatisfaction and visual analog measures of mood, anxiety, and weight and appearance satisfaction.

The nonjudgmental aspect of the Delinsky and Wilson's (2006) mindfulness-based ME was adapted for use in the present study. In order to facilitate the brief intervention and standardize total exposure time with the other conditions, a more complete mindfulness-based mirror exposure was not used here. The "MB" group used in the current study included only the nonjudgmental description aspect of mindfulness— not a "full" mindfulness intervention. The content of the present study's cognitive dissonance-based mirror exposure (CD ME) was taken directly from the exercise included in the Stice and Presnell (2007) program. Luethcke et al. (2011) used an adapted version of this exercise in their recent two-session ME comparison study, which included extending the exercise to 2 sessions (vs. 1) and instructing participants to voice explicit positive comments only about their physical appearance while looking in the mirror (excluding mention of positive emotional, social, or intellectual qualities as the original CD exercise instructed). Given the adaptations, the precise effects of the original CD mirror exercise as it is written in the prevention program are as yet unknown. The MAU control condition in the present study holds both participants' exposure to their mirror

image and participant body-related verbalizations constant across conditions, while maintaining a nondirective stance.

Based on prior findings that both CD ME (Luethcke et al., 2011) and MB ME (Delinsky & Wilson, 2006) are effective at improving body satisfaction, we hypothesized that participants randomized to the CD and MB ME conditions would demonstrate a decrease in ratings of body dissatisfaction and an increase in ratings of weight and appearance satisfaction from baseline to post-test, relative to participants in the MAU control condition. Given that the current study aimed to evaluate ME in a population of women with extreme shape and weight concerns, we hypothesized that participants in the MAU control condition would experience decreases in positive mood and increases in anxiety from baseline to posttest, while participants in the CD and MB ME conditions would experience improvements on these measures over the course of the intervention.

Method

Participants

Participants were female undergraduates who ranged in age from 18 to 22 years ($M = 20.06$, $SD = 1.04$). The sample was 56.3% Caucasian, 12.5% Latina, 9.4% Asian, 6.3% African American, 6.3% South Asian, 6.3% biracial participants, and 3.1% who specified other. Parental education level, which was used as a proxy for socioeconomic status, ranged from high school completion (21.9%) to a Bachelor's degree (25%) to advanced post-graduate degrees (46.9%), with Master's degrees comprising the modal level of parental education.

Participants were screened for eligibility through a secure, online questionnaire. In order to be eligible, participants had to be female, at least 18 years of age, able to

speak English, and had to indicate a clinically significant level of shape and weight concern (as indicated by a score ≥ 4 on the Eating Disorder Examination-Questionnaire (EDE-Q) item, "Over the past 4 weeks, how much has your shape/weight influenced how you think about (judge) yourself as a person?") Exclusion criteria were a) more than one episode of binge eating in the previous month, b) the presence of any objective bulimic episodes in the previous month, and c) a reported body mass index (BMI) < 18.5, indicating underweight, or BMI > 30, indicating overweight with a recommendation for weight loss, according to the obesity clinical guidelines set forth by the National Heart, Lung, and Blood Institute (NHLBI) (NHLBI clinical guidelines, 1998).

Procedure

Recruitment and Eligibility Screening

Participants were recruited via announcements made and advertisements distributed in undergraduate psychology courses, and by flyers posted in student centers and academic buildings. In an attempt to recruit participants with high levels of shape and weight concern, advertisements included a statement that read, "Are you a woman with a high level of body image concerns?" Interested potential participants were directed to the brief, secure online eligibility screening questionnaire. The screening questionnaire assessed participant sex, age, primary language, Body Mass Index (BMI), level of shape and weight overvaluation (via one question from the EDE-Q—"Over the past 4 weeks, how much has your shape/weight influenced how you think about (judge) yourself as a person?"), and presence of disordered eating behaviors via questions from the EDE-Q assessing objective episodes of binge eating or purging (i.e., self-induced vomiting, laxative, diet pill, or diuretic use). Participants who were deemed ineligible due to not

meeting minimum BMI standards (BMI> 18.5) or due to the possible presence of an

eating disorder were routed (via the survey's logic and routing capabilities) to a screen

that referred them to either their healthcare provider (in the case of underweight) or to

Rutgers Counseling and Psychiatric Services (CAPS). Participants who were deemed

ineligible by the other criteria were routed to a screen informing them of their ineligibility

and thanking them for their time. The screening survey did not indicate to participants the

particular reason for their ineligibility. However, in cases where participants were routed

to screens referring them to their healthcare provider or CAPS, they may have ascertained

which criteria determined their ineligibility. Participants who were deemed eligible by the

screening survey were routed to a screen that instructed them how to schedule their

participatory session with the researcher.

Of the 205 women who completed the eligibility questionnaire, 148 were

disqualified. Participants were excluded for: scoring less than a "4" on the question

assessing level of shape and weight overvaluation ($n = 45$), not meeting BMI inclusion

criteria ($n = 13$ scored ≤ 18.5; $n = 20$ scored ≥ 30), indicating one or more purging

episodes in the previous month ($n = 28$), or for indicating more than one episode of binge

eating in the previous month ($n = 42$). Of the 205 women screened for the study, 57 met

the eligibility requirements as determined by the screening survey. Of those eligible, 32

agreed to participate and attended their session. Participants were paid twenty dollars and

entered into one of three raffles to win a $100 prepaid VISA giftcard as compensation for

their participation.

Session timeline and content

All sessions were conducted by the author, a graduate student in clinical

psychology. As part of the study, each participant completed one, 35-40 minute session. When they arrived for their session, participants read and signed an informed consent document, which included their consent to randomization to conditions. Participants were then randomly assigned using a block-randomization procedure to one of three ME conditions: MB condition ($n = 11$), CD condition ($n = 10$), or the MAU control condition ($n = 11$), but remained blind to their condition.

Participants completed the baseline assessment, which included the demographic form, the SBPS, and the initial Visual Analog Scale (VAS) questions. They were then instructed to stand in front of a full-length mirror, and listen to a set of scripted instructions regarding the ME exercise as read to them by the researcher. After they heard the instructions, participants were given an opportunity to ask clarification questions. Clarification questions were answered and instructions were read twice in order to help ensure that participants understood the instructions before they began the ME. Participants were given 5 minutes to follow the ME instructions in front of the full length mirror. All three mirror exposure conditions required the participant to survey her reflection in the mirror for a period of 5 minutes, but specific instructions (and thus the content of explicit verbalizations) varied by condition. After the ME exercise (which was audio-recorded to facilitate evaluation of condition adherence), participants again completed the VAS questions and SBPS. Finally, participants received compensation and were debriefed.

Instructions for each ME condition were scripted in order to standardize the instructions as much as possible across conditions. In all three conditions, participants were instructed to stand in front of the mirror and look at themselves, and to try their best

to follow the instructions. Each of the three condition-specific instructions ended by saying the researcher would sit out of participants' direct view, and only comment if participants strayed from instructions (in the MB and CD conditions, not in the MAU condition in which the researcher never commented during the exercise). Participants were encouraged to try to use the full 5 minutes allotted.

In the MB ME condition, each participant was instructed to "Describe your body parts, out loud, from head to toe. It is important that you do not skip over OR dwell on any parts, but rather, give equal attention to everything you see. Also, do not use critical or unkind language, such as "fat," "too big," "gross," "flabby," etc. Instead, use objective, nonjudgmental descriptors, such as those relating to color, texture, proportion, shape, or symmetry. For example, instead of saying, "my stomach is too big and fat," one might observe "my stomach is slightly rounded." Similarly, instead of saying "my hair is ugly," one might say "my hair is brown and of medium length" (if that describes you); instead of "My butt is gross," one might say "my butt extends beyond the tops of my legs." This exercise may seem difficult, but try your best to stick with it."

In the CD ME condition, each participant was instructed to "Please think about, and then say aloud all of your POSITIVE qualities. These include physical, emotional, intellectual, and social qualities. For example, you may like the shape of your arms, the strength of your legs, your long dark hair, the sound of your laugh, or the fact that you are a good friend. Make sure to include at least three physical attributes on your list of positive qualities. This exercise may seem difficult, as many people are used to putting themselves down when looking in the mirror. However, try your best to stick with it, and feel free to take a minute or two to think about your qualities. It is VERY IMPORTANT

that you ONLY say your POSITIVE ATTRIBUTES aloud. Please try to name at least 3 positive physical attributes, and 3 positive emotional, social, or intellectual qualities."

In the MAU control condition, each participant was instructed to "Pretend that you are at home and looking in the mirror—that is, do what you typically do when you look in the mirror. Use the mirror as you usually do, except, describe the process out-loud—what thoughts go through your head, where do you focus your attention, do you get distracted, etc. In other words, narrate what your typical experience of looking in the mirror is like, while you use this mirror as you would use one at home. During this exercise, I will sit out of your direct view and not comment, so do your best to engage in the task as you would if you were alone with the mirror. This exercise may seem difficult or strange, because most people are not used to narrating their own experiences. However, do your best to follow the instructions."

Adherence

Using the tape-recorded ME exercises, the researcher coded participants' adherence to the given instructions during each ME session. Adherence was rated on a Likert scale from one to four (1 = *did not follow instructions at all,* 2 = *somewhat followed instructions*, 3 = *mostly followed instructions*, 4 = *fully followed instructions*). Specifically, tapes were coded for improper inclusions or omissions depending on the specific set of instructions. In the case of an improper inclusion or omission, the researcher pointed out the error and the participant was given the opportunity to correct the mistake. If mistakes were not corrected, they were coded as improper inclusions or omissions and affected the total adherence score. The MB condition was coded for mention of only nonjudgmental descriptors and description of all body parts. The CD

condition was coded for mention of 3 physical qualities, 3 emotional/social/intellectual qualities, and no mention of any "dislikes." Although no specific instructions either required or proscribed any content in the MAU condition, MAU was coded for any mention of positive qualities or nonjudgmental descriptors, in an attempt to reduce confounding this ecologically valid control group with the two experimental conditions.

Measures

Satisfaction with Body Parts Scale (SBPS). The SBPS (Berscheid, Walster, & Bohrnstedt, 1973) measures the level of satisfaction with 23 body parts on a 6-point Likert scale where lower scores indicate greater satisfaction with that particular body part (1 = *extremely satisfied*; 6 = *extremely dissatisfied*). Individual item scores are averaged for a total score. One item on the scale—voice—was excluded because it does not represent a physical feature, and is therefore not relevant to present study aims. The 22-item SBPS used in this study had good internal consistency ($\alpha = .89$)

Visual Analog Scales. Computerized Visual Analog Scales were used, in which participants indicated their responses by dragging an electronic slider along a 100-pixel horizontal line representing two extremes. The following questions were asked on VAS measures: "How satisfied do you feel about your weight right now?" "How satisfied do you feel about your appearance right now?" (0= extremely dissatisfied, 100= extremely satisfied), "How anxious are you about your body right now?" "How anxious do you feel right now?" (0= not at all anxious, 100=extremely anxious), "How do you feel about your body right now?" (0=ashamed, 100=proud), and "How would you describe your mood right now?"(0=very sad/blue, 100=very happy). Three of the questions used were based on Heimberg and Thompson (1995) and Wade et al. (2009) (weight satisfaction,

appearance satisfaction, body anxiety), and the present study added the questions

assessing mood, anxiety (similar to Jansen et al., 2008) and body shame/pride as

exploratory VAS measures in this brief ME procedure. Such measures have been shown

to be valid and reliable indicators of change in body satisfaction, are quick and easy to

administer, and are accurate in representing small changes in short periods of time

(Heinberg & Thompson, 1995; Tiggemann & McGill, 2004). Each question was treated

as its own dependent variable, for the purposes of exploring possible changes on this

measure after a brief ME exercise.

   Eating Disorder Examination-Questionnaire (EDE-Q). The EDE-Q (Fairburn and

Beglin, 1994) is a self-report measure of eating disorder pathology created directly from

the Eating Disorder Examination (EDE; Fairburn and Cooper, 1993) interview. The full

EDE-Q has demonstrated good internal consistency ($\alpha = 0.90$; Peterson et al., 2007). The

EDE-Q (5th ed.) contains multiple subscales, including two separate subscales that

measure shape and weight concerns, respectively. The two scales each have good internal

consistency (shape concern, $\alpha = 0.83$, and weight concern, $\alpha = 0.72$; Peterson et al.,

2007), and previous research has combined the two scales (Becker et al., 2010) given

their high correlation ($r = 0.92$), and the high internal consistency of the combined scale

($\alpha = 0.94$). Recent factor studies in samples of patients with binge eating disorder (Grilo

et al., 2010) and bariatric surgery candidates (Hrabosky et al., 2008) suggest that a

psychometric distinction between questions of shape vs. weight is unnecessary. In

addition, Grilo et al. (2010) and Hrabosky et al. (2008) each found that one question

assessing the importance of shape and weight in self-evaluation (overvaluation of shape

and weight) correlates highly with the entire shape and weight concern subscales both on

the EDE and the EDE-Q. Therefore, the present study used one question from the EDE-Q (5th ed), "Over the past 4 weeks, how much has your shape/weight influenced how you think about (judge) yourself as a person?" to screen for participants with high levels of shape and weight concern and overvaluation. Responses to items range from 0 (not at all) to 6 (markedly) on a Likert scale, with scores ≥ 4 indicating clinically significant levels (Cooper & Fairburn, 1993).

Demographic questionnaire. Participants were assessed for sex, age, ethnicity, height, weight, and parents' level of education (as a proxy for socioeconomic status).

Results

Preliminary Analyses

No differences on any of the dependent measures, BMI, EDE-Q screening question, or age were found between conditions (MAU, MB-NJ, CD) at baseline, as indicated by one-way ANOVAs (for age, $p = 0.063$; all other $ps ≥ .129$).

A one-way ANOVA indicated that adherence scores were significantly different across conditions, $F (29) = 8.760$, $p= .001$. Post hoc comparisons using Tukey's HSD indicated that the mean adherence score for the MB condition ($M = 3.00$, $SD = 1.00$) was significantly lower than the mean adherence score for both the CD condition ($M = 4.00$, $SD = 0.00$, $p = 0.002$) and the MAU condition ($M = 3.91$, $SD = 0.30$, $p = 0.004$). Adherence scores between the CD and MAU conditions did not significantly differ ($p = 0.939$). In other words, participants did not adhere to scripted instructions in the MB conditions as well as in the CD and MAU conditions. It is worth noting that although

adherence in the MB condition was lower as compared to the CD and MAU conditions, it was still relatively high given the adherence scale—a mean of 3.0 on a 4 point scale. In addition, the adherence score grand mean across conditions was high—3.62 on a 4-point scale. In order control for the difference in script adherence, adherence scores were entered as covariates in all subsequent analyses.

Despite the screening strategy aimed at recruiting women with extreme weight and shape concerns, and the sample's mean on the EDE-Q screening question assessing shape and weight concern falling above the clinical threshold of "4" ($M = 4.59$, $SD = 0.71$), baseline levels of body dissatisfaction in the current sample were not consistent with those typical of a clinical sample. Unadjusted baseline means on the SBPS in our sample were compared with the mean on the SBPS in a recent study using normal, female college students (Luethcke, McDaniel, and Becker, 2011). After the present study's variable means were reverse coded to facilitate description, descriptive analyses revealed that the mean scores of our participants on the SBPS ($M = 4.33$, $SD = 0.65$) were within one standard deviation of the SBPS mean reported by Luethcke, McDaniel, and Becker (2011), ($M = 4.34$, $SD = 0.57$). In terms of baseline levels of body dissatisfaction, therefore, our sample is more representative of normal female undergraduates than a clinical sample.

Primary Analyses

Main analyses included mixed model ANCOVAs with condition (MAU, CD, MB) as a between-subjects factor, time (pre, post) as a within-subjects factor, and ME script adherence as a covariate. Although multiple comparisons were conducted, Bonferroni or other correction procedures were not employed given the exploratory

nature of this pilot study. Given that the current study aimed at elucidating the feasibility and potential of ME procedures when applied in a very brief format, conservative correction procedures may have obscured a potentially interesting finding that did not reach conventional levels of significance due to insufficient power.

For five of the VAS measures (appearance satisfaction, body anxiety, general anxiety, body feel, and mood), mixed model ANCOVAs revealed no significant main effects of time, or significant time by condition interactions (see Table 1 for means and standard deviations, and Table 2 for results of analyses). In contrast, significant differences were observed for VAS weight satisfaction ("How satisfied do you feel about your weight right now?") with scores ranging from 0 (extremely dissatisfied) to 100 (extremely satisfied). A mixed model ANCOVA (which demonstrated equality of covariances across conditions, Box's M = 12.17, F = 1.83, p = 0.09) revealed a significant main effect of time, Wilks' Lambda = .74, $F(1, 28)$ = 9.701, $p < .004$, partial eta squared = 0.027, with all three conditions demonstrating improvements in VAS weight satisfaction scores from baseline to post-test (see Tables 1 and 2).

A different pattern of results emerged for the Satisfaction and Dissatisfaction with Body Parts Scale (SBPS)—specifically, a mixed model ANCOVA (which demonstrated equality of covariances across conditions, Box's M = 5.69, F = 0.85, p = 0.53) revealed a significant time by condition interaction for outcomes on the SBPS, Wilks' Lambda = .79, $F (2, 28)$ = 3.778, p = 0.035, partial eta squared = 0.021. In order to determine the nature of the interaction, post hoc analyses were conducted.

Paired-samples t-tests revealed no significant main effect of time (pre and post) in the MB condition, $t(10)$ = - 0.464, p = 0.652, or in the MAU condition, $t(10)$ = - 0.201, p

= 0.845. However, in the CD condition, total body dissatisfaction decreased from pretest

(M =2.69, SD = 0.70) to posttest (M = 2.49, SD = 0.81), (where higher scores indicate

greater body Dissatisfaction), $t(9)$ = 3.523, p = 0.006, *Cohen's d* = 0.26. Participants in

the CD condition experienced a decrease in body dissatisfaction as measured by the

SBPS from baseline to posttest, whereas participants in either the MB or MAU conditions

did not experience such a decrease.

To determine whether participants in the CD condition had significantly better

outcomes on the SBPS than both the MB and MAU conditions, additional post-hoc

analyses compared CD with MB and CD with MAU. The mixed model ANCOVAs with

group (CD, MAU) as the between subjects factor, time (pre, post) as the within subjects

factor, and adherence to the ME script as the covariate, revealed a marginally significant

time by condition interaction, F (1, 18) = 4.368, p = 0.051. The mixed model ANCOVA

with group (CD, MB) and time (pre, post) revealed a significant time by condition

interaction, F (1, 18) = 7.746, p = 0.012. Overall, post-hoc analyses[1] demonstrate that the

CD condition resulted in significantly greater decreases in body dissatisfaction from

baseline to posttest, than either the MB condition, or the MAU control condition.

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[1] The above described post-hoc analytic procedure is the same as that used in a recently
published article on ME comparison (Luethcke, McDaniel, and Becker, 2011). An
alternative post-hoc procedure for the significant time by condition interaction on body
dissatisfaction scores on the SBPS can be found in Appendix A.

Discussion

Overall, the hypotheses were largely unsupported by the results. No changes for any conditions were observed on VAS measures of appearance satisfaction, body anxiety, body feelings, mood, and anxiety from baseline to post-test. In addition, though we hypothesized that MB and CD ME conditions would result in increased VAS weight satisfaction, while the MAU control condition would result in decreases, participants in all three conditions (MB, CD, and MAU) demonstrated higher levels of weight satisfaction from baseline to post-test. The hypothesis that MB and CD ME conditions would result in increased body satisfaction (on the SBPS) from baseline to posttest was only partially supported—analyses of body satisfaction within each condition indicated that CD ME was the only condition in which scores on body dissatisfaction significantly decreased from baseline to posttest. Contrary to the hypothesis, MB ME in this study did not differ from MAU control in body dissatisfaction scores from baseline to posttest.

For VAS measures of mood, anxiety, body anxiety, body feelings, and appearance satisfaction, no significant main effects of time or time by condition interactions were observed in any of the conditions. Many of the VAS measures were used in an exploratory fashion in this pilot study. The 0-100 point pixel analog used may not have been sensitive enough to capture changes in the small amount of time that elapsed between pre- and posttest. For example, Wade et al. (2009) used VAS measures of weight and appearance satisfaction assessed on a 0-500 pixel scale, in non-ME brief body dissatisfaction interventions. Additionally, Wade et al. (2009) induced body dissatisfaction in participants immediately prior to the procedures, and then measured VAS weight and appearance satisfaction multiple times over the course of the brief

intervention. It is possible that measuring appearance satisfaction , body anxiety, body feelings, mood, and general anxiety multiple times over the course of a brief ME may have captured sensitive changes during various parts of the exposure. It is also possible that such brief formats of mirror exposure may not have been sufficient to effect changes in the areas assessed by the VAS measures.

Unlike the other VAS measures, all three conditions resulted in improved VAS weight satisfaction from baseline to post-test, with a main effect of time observed (partial η^2-squared = 0.26). The improvement in weight satisfaction in the MB and CD conditions was predicted, and consistent with results from prior studies that have documented the effectiveness of both types of ME (Delinsky & Wilson, 2006; Hilbert et al., 2002; Jansen et al., 2008; Luethcke et al., 2011). The MAU control condition was not hypothesized to result in improved weight satisfaction. It is possible that simple exposure to a mirror image (as used in this active control) resulted in improvements in weight satisfaction, at least as measured by a visual analog scale in a short time frame. Though an "active" mirror control comparison is important in testing the strength of an ME procedure, this finding indicates the potential difficulty of designing an ecologically-valid mirror control condition that does not include unintended intervention effects. Future studies should compare ME to an active mirror control, though the specific content of that control may need to be revised.

Given that the MAU condition asked participants to narrate a typical mirror experience while they stood in front of a full length mirror, it is also possible that MAU findings may be different in a population of women with higher baseline levels of body dissatisfaction. Although MAU was coded for any potential confounds with either the

MB or CD ME conditions (i.e., mention of nonjudgmental descriptors, mention of positive qualities), which were not found, it is possible that the overall MAU procedure when conducted in women with higher baseline levels of body dissatisfaction, would have included more negative evaluations and critical body-related observations that may have differentially affected post-test assessments of mood, anxiety, and satisfaction on the VAS measures, and resulted in greater effects on the SBPS than those observed.

The results for body dissatisfaction are important to the current study, as ME aims to address body dissatisfaction directly. Results indicate that only the CD ME condition, and not the MB or MAU conditions, resulted in decreased body dissatisfaction from baseline to post-test. Given that the MB condition in the present study was a representation of the "nonjudgmental" aspect of mindfulness manifested in the neutral description of body parts (which has characterized other forms of ME (Hilbert et al., 2002; Jansen et al., 2008)), results of the current study suggest that the positive approach offered by the CD condition was superior to the neutral or control approaches offered by the MB and MAU conditions in decreasing body dissatisfaction. This finding is inconsistent with prior findings (Hilbert et al., 2002; Jansen et al., 2008) that demonstrated neutral description ME improved participant appearance-related self-esteem (which is similar to body dissatisfaction). However, the present finding is consistent with Luethcke et al.'s (2011) finding for body dissatisfaction—specifically that CD ME (but not a nonjudgmental ME) improved body satisfaction; both the present finding for body dissatisfaction and Luethcke et al.'s (2011) finding demonstrated small effect sizes (partial $\eta^2 = 0.02$). Luethcke et al. (2011) also used the full-version SBPS that was used in the current study—perhaps the similar finding could be related to this

particular measure of body dissatisfaction. That the present finding is consistent with Luethcke et al.'s (2011) is notable due to the differences in sample size (Luethcke and colleagues had at least 55 per condition), and ME procedure (Luethcke and colleagues conducted a 2 session ME with a longer exposure period and adapted instructions) across the two studies.

It is possible that given the instructions in the CD condition (which were to express positive evaluations), increases in reported satisfaction on the SBPS at post-test were the result of demand characteristics. It is also possible that in such a brief time frame, self-affirmation and the subsequent induced cognitive dissonance may be more effective at reducing body dissatisfaction than a nonjudgmental approach. This interpretation is limited by a potentially confounding factor in the CD ME group—specifically, the CD ME group was the only group that instructed participants to comment on non-physical characteristics (i.e., positive emotional, social, and intellectual qualities). The MB and MAU conditions instructed participants to comment on physical attributes or mirror experience only. It is possible that inclusion of non-physical attributes to CD ME affected ratings of body dissatisfaction at post-test, relative to the other two conditions. Additionally, because the current study aimed to test the CD ME exercise precisely as instructed in the Stice and Presnell (2007) program, the CD condition did not require participants to comment on every body part (as was instructed in the MB condition). Future studies may seek to standardize conditions by adding an emotional/social/intellectual component to MB ME (or removing it from the CD ME as Luethcke et al. 2011 did). In addition, future studies investigating brief format ME might

include instructions to briefly attend to each body part within the context of each ME condition (much like the procedure use in Luethcke et al., 2011).

With regard to the feasibility of brief (1 session) mirror exposure, the present study had a particularly relevant finding. The conditions differed in adherence scores— namely, participants in the MB condition were less adherent to the scripted instructions than were participants in the CD and MAU conditions. Although it is important to note that even in the MB condition, the mean adherence score was still high (3 on a 4 point scale), the lower adherence may indicate a problem with the script used to instruct nonjudgmental description ME. This finding may also indicate that adequately teaching or learning the difficult task of nonjudgmental description of one's body may not be feasible in such a short time frame. Indeed, even though they employed a longer, 2 session ME, Luethcke et al. (2011) suggested that the lack of findings for neutral description ME (with regard to body dissatisfaction) in their study may have been due to the lack of clinician-guided practice of the skill of nonjudgmental description, or insufficient time to master the skill.

Results of the present study should be interpreted cautiously given its limitations. Perhaps most importantly, the present study used a small sample size and did not employ statistical correction procedures for multiple comparisons (i.e., Bonferroni). Given the pilot and exploratory nature of the current study aimed at elucidating the feasibility and potential of ME procedures applied in a very brief format, conservative correction procedures may have obscured a potentially interesting finding that did not reach conventional levels of significance due to insufficient power. However, the presence of multiple comparisons increases the probability of a Type I error when not adequately

corrected. Therefore, the present findings must be replicated in a larger sample that employs statistical corrections for multiple comparisons, before greater confidence can be placed in the results of this ME comparison. In addition, due to the lack of follow-up assessment, results do not show how long improvements in weight and body satisfaction after the ME procedures were maintained. Though it is interesting that even a brief ME procedure can result in some changes in measures of weight and body satisfaction, it is likely that for ME to result in true therapeutic benefit, the exposure time would need to be longer than five minutes. Any conclusions drawn about the utility of the brief ME procedures used in this study should be restrained by the fact that the effect sizes observed in this study were generally small. Perhaps effect sizes might be larger if ME procedures were tested in a population of women with higher initial levels of body dissatisfaction than that of the present sample.

Indeed, though the present study aimed to recruit individuals with body image disturbance both by advertising the study as appropriate for women with high body image concerns and selecting only participants who exhibited a clinical level of overvaluation of shape and weight on an eligibility questionnaire, comparison of our sample's baseline level of body dissatisfaction to those in prior studies revealed that our sample was representative of a normal, college population (rather than a clinical population) in terms of body dissatisfaction. In terms of undue importance of shape and weight in self-evaluation (or overvaluation of shape and weight), our sample's mean score was within the range of clinical significance ($M = 4.59$, $SD = 0.71$). The incongruence between participants' scores on baseline body dissatisfaction compared to overvaluation of shape and weight could be due to several factors. First, it is possible that given the text of

advertisements ("Are you a woman with high body image concerns?") the response required for eligibility on the overvaluation question was obvious to participants. However, given that 45 participants were deemed ineligible to participate after the screener due to low scores on the overvaluation question, this seems unlikely. Alternatively, it is possible that the full version of the SBPS used in this study resulted in lower scores on body dissatisfaction, as the total score is an average of 22 body parts (many of which are not typical "hot spots," i.e., face, ears, eyes, etc). Follow-up descriptive analyses of the average of only body-related items on the SBPS, demonstrated a slightly higher baseline mean compared to the full SBPS mean (full SBPS, $M = 2.65$, $SD = .64$; body items on SBPS, $M = 2.89$, $SD = .74$). However, both means were within one standard deviation of the other, and follow-up analyses using only the body-related SBPS items did not produce different results.

An additional explanation is that because evidence suggests that body dissatisfaction and undue influence of shape and weight are related but separate constructs, the eligibility question used in this study did not ensure that participants had high levels of each. A growing body of research suggests that body dissatisfaction and undue influence of shape and weight in self-evaluation are theoretically differentiated (Cooper & Fairburn, 1993; Grilo, Crosby, Peterson, Masheb, White, Crow, et al., 2010; Hrabosky et al., 2008). While body dissatisfaction is more common and labile, overvaluation of shape and weight is less widespread and more difficult to change. Indeed, while body dissatisfaction is pervasive enough to be labeled "normative discontent" (Rodin et al., 1984), overvaluation of shape and weight in self-evaluation is considered more pathological. Research suggests that overvaluation of shape and weight,

more so than body dissatisfaction, distinguishes eating disorder patients from healthy controls (Goldfein et al., 2000). Given the current sample's relatively low baseline levels of body dissatisfaction, results from the present study should be not generalized to populations of women with elevated levels of body dissatisfaction, though the present findings are interesting nonetheless in light of the overvaluation of shape and weight present in this sample. To ensure recruitment of individuals with multiple components of body image disturbance (i.e., body dissatisfaction and overvaluation of shape and weight), future studies should screen for both constructs separately.

Conclusions

Overall, results of this study suggest that different types of mirror exposure (nonjudgmental description, cognitive dissonance-based, and even simple mirror exposure with narration), even when applied in a brief, one session procedure, can result in improvements on an immediate measure of weight satisfaction, even in a sample of women with overvaluation of shape and weight. Only cognitive dissonance-based ME, however, resulted in decreases in body dissatisfaction from baseline to post-test. Effect sizes in this study were small, and results are tempered by a number of limitations, including a small sample size, and lack of statistical correction procedures to control for multiple comparisons. Though future studies should seek to standardize content across different approaches to ME, the present study provides valuable information about the immediate effects of brief CD ME as it appears in a larger eating disorders prevention program (Stice & Presnell, 2007), the feasibility of teaching nonjudgmental description in a brief time frame, and the challenges of designing a mirror control condition for future ME comparison studies. Future studies might: a) investigate CD ME presented in longer,

or more frequent exposure procedures, b) experiment with different approaches to an ecologically-valid mirror control condition that removes any unintended intervention effects in order to enhance future ME comparison studies, and c) test CD ME and other forms of mirror exposure in a population of women with multiple components of clinical-level body image disturbance (i.e., high levels of body dissatisfaction as well as overvaluation of shape and weight).

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Tables

Table 1. Means and Standard Deviations for Dependent Measures.

Measures	Baseline M(*SD*)	Post treatment M(*SD*)
VAS appearance satisfaction		
MB	60.50 (*23.31*)	53.32 (*23.11*)
CD	55.85 (*26.02*)	57.12 (*30.19*)
MAU	62.41 (*14.28*)	54.59 (*23.19*)
VAS body anxiety		
MB	43.16 (*23.70*)	46.00 (*25.88*)
CD	33.65 (*35.10*)	31.92 (*28.57*)
MAU	37.57 (*22.46*)	47.89 (*20.45*)
VAS total anxiety		
MB	27.89 (*25.34*)	40.27 (*30.11*)
CD	24.97 (*31.01*)	35.90 (*30.27*)
MAU	32.43 (*22.58*)	40.00 (*21.43*)
VAS body feelings*		
MB	59.25 (*27.52*)	54.84 (*28.00*)
CD	50.92 (*29.84*)	58.77 (*28.54*)
MAU	56.77 (*16.63*)	57.16 (*15.86*)
VAS mood*		
MB	60.36 (*23.34*)	57.48 (*27.66*)
CD	69.90 (*20.09*)	66.25 (*23.91*)
MAU	69.93 (*18.05*)	64.30 (*20.05*)
VAS weight satisfaction		
MB	38.20 (*18.59*)	51.09 (*24.65*)
CD	41.02 (*26.56*)	48.02 (*31.32*)
MAU	46.32 (*16.95*)	49.68 (*16.36*)
Satisfaction with body parts (SBPS)**		
MB	2.78 (*.72*)	2.82 (*.91*)
CD	2.69 (*.70*)	2.49 (*.81*)
MAU	2.48 (*.53*)	2.49 (*.55*)

Notes: Mindfulness-based (MB) *n* = 11, Mirror-As-Usual (MAU) *n* = 11, Cognitive Dissonance (CD) *n* = 10. VAS measures were on a 100-point scale.
*For VAS body anxiety and anxiety, higher scores indicate higher levels of anxiety.

For all other VAS measures, higher scores indicate a more positive outcome (i.e., higher levels of body pride, a more positive mood, higher levels of satisfaction).
**SBPS scores could range from 1-6, with higher scores indicating greater dissatisfaction.

Table 2. Mixed model ANCOVA Main Outcome Analyses for Time (Main Effect)

Measures	F(df)	p	partial eta-squared	Wilks' λ
VAS appearance satisfaction				
	$F(1, 28) = .07$	0 .791	0.003	0.997
VAS body anxiety				
	$F(1, 28) = .403$	0.531	0.014	0 .97
VAS total anxiety				
	$F(1, 28) = .088$	0 .770	0.003	0.088
VAS body feelings				
	$F(1, 28) = .044$	0 .835	0.002	0.99
VAS mood				
	$F(1, 28) = 2.47$	0.127	0.081	0.92
VAS weight satisfaction				
	$F(1, 28) = 9.70$	0.004*	0.257	0.97
SBPS (body satisfaction)				
	$F(1, 28) = 1.611$	0.215	0.054	0.95

Notes: Mindfulness-based (MB) $n = 11$, Mirror-As-Usual (MAU) $n = 11$, and Cognitive Dissonance (CD) $n = 10$. All primary analyses were conducted with ME adherence score as a covariate. *Significant at the $p < 0.01$ level.

Table 3. Mixed model ANCOVA Main Outcome Analyses for Time x Condition (Interaction)

Measures	ANOVA	p	partial eta-squared	Wilks' λ
VAS appearance satisfaction				
	$F(2, 28) = 1.306$	0.287	0.085	0.91
VAS body anxiety				
	$F(2, 28) = .701$	0.505	0.048	0.95
VAS total anxiety				
	$F(2, 28) = .084$	0.920	0.006	0.99
VAS body feelings				
	$F(2, 28) = .1.56$	0.227	0.101	0.90
VAS mood				
	$F(2, 28) = .451$	0.641	0.031	0.97
VAS weight satisfaction				
	$F(2, 28) = .391$	0.680	0.027	0.97
SBPS (body satisfaction)				
	$F(2, 28) = 3.78$	0.035*	0.021	0.79

Notes: Mindfulness-based (MB) $n = 11$, Mirror-As-Usual (MAU) $n = 11$, and Cognitive Dissonance (CD) $n = 10$. All primary analyses were conducted with ME adherence score as a covariate. *Significant at the $p < 0.05$ level.

Appendix

Alternative post-hoc analysis for significant time by condition interaction found for body

dissatisfaction (SBPS) scores:

For scores on the Satisfaction and Dissatisfaction with Body Parts Scale (SBPS),

a mixed model ANCOVA (which demonstrated equality of covariances across

conditions, Box's M = 5.69, F = 0.85, p = 0.53) revealed a significant time by condition

interaction for outcomes on the SBPS, Wilks' Lambda = .79, F (2, 28) = 3.778, p =

0.035, partial eta squared = 0.021. The estimated adjusted marginal means (which include

the covariate) for each condition by time are: CD Time 1 (M = 2.72, SE = .22; 95%

Confidence Intervals, 2.27 to 3.18), CD Time 2 (M = 2.492, SE = .262; 95 % Confidence

Intervals, 1.95 to 3.03), MB Time 1 (M = 2.72, SE = .24; 95% Confidence Intervals, 2.24

to 3.21), MB Time 2 (M = 2.81, SE = .28; 95% Confidence Intervals, 2.25 to 3.38), MAU

Time 1 (M = 2.51, SE = .21; 95% Confidence Intervals, 2.08 to 2.93), and MAU Time 2

(M = 2.50, SE = .24; 95% Confidence Intervals, 1.99 to 2.99). Simple contrasts (K

matrix) using the CD condition as the reference category reveal no difference between

the MAU and CD condition, (mean difference = -.105, SE = .31, p = .74) or the CD and

MB conditions, (mean difference = .163, SE = .38, p = .67). In addition, the multivariate

ANOVA testing the effect of time (based on the linearly independent pairwise

comparisons of estimated marginal means) was not significant, Wilks' Lambda = .95, F

(1, 28) = 1.38, p = .25. Also, the univariate ANOVA testing the effect of condition was

nonsignificant, F (2, 28) = .277, p = .76. This pattern of results contradicts the results of

the post-hoc analysis used in the main text. It suggests that no pairwise condition by time

differences exist between the CD and MB, or CD and MAU groups, despite the

significant time by condition interaction in the omnibus ANCOVA. It is possible that given the low observed power, (power $= 0.09$ for the simple contrasts, power $= 0.20$ for multivariate test of time) and lack of statistical correction employed in the original omnibus ANCOVA to control for the multiple tests on dependent variables, the original time by condition interaction observed was due to sample fluctuation.