An experimental manipulation of body checking and mirror exposure over time in men and women with high shape or weight concern

Dvora Catherine Walker

University at Albany, State University of New York, dwalker2@albany.edu

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AN EXPERIMENTAL MANIPULATION OF
BODY CHECKING AND MIRROR EXPOSURE
OVER TIME IN MEN AND WOMEN WITH
HIGH SHAPE OR WEIGHT CONCERN

by

D. Catherine Walker

A Dissertation
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Abstract

Although body checking and avoidance behaviors are associated with a range of negative behavioral, emotional, and cognitive outcomes and have been identified as maintaining factors in body dissatisfaction and eating disorder psychopathology, they have only recently begun to be researched as an important target of treatment. Few studies have used experimental means to examine the direct effects of body checking manipulations, and those that have were conducted on one occasion. Further, research published to date has only examined potential treatments aimed at reducing body checking and avoidance behaviors in female or predominantly female samples. The present study sought to address the gaps in the body checking and avoidance literature by comparing an experimental manipulation of body checking and mindfulness-based mirror exposure (MME), a promising body image treatment technique, in a mixed gender high shape/weight concern sample over the course of a week. The study design allows for the examination of direct and more lasting effects of the body checking and MME manipulations. Women were more reactive to the body checking and MME procedures, showing direct decrements in mood, self-esteem, and body image satisfaction following body checking and longer-lasting improvements in the same variables after MME. Unlike female participants, men in the control condition demonstrated improvement over time in body image, self-esteem, and mood. Current findings are discussed as they relate to theoretical accounts the role of body checking and avoidance in eating disorder and body image psychopathology.
Introduction

Body image dissatisfaction is a risk factor in the development and maintenance of eating disorders. The degree of individuals’ body image disturbance has been found to predict disturbed eating (Thompson, Coovert, Richards, Johnson, & Cattarin, 1995), binge eating and compensatory behaviors (Stice & Agras, 1998), and eating disorders (Garner, Garfinkel, Rockert, & Olmsted, 1987). Higher body dissatisfaction in male and female adolescents predicted higher levels of dieting, unhealthy and very unhealthy weight control behaviors, and lower levels of physical activity in a five-year longitudinal study that examined a large, ethnically and socioeconomically diverse sample (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Additionally, the degree of baseline overvaluation of shape and weight predicted persistence of binge eating over time in a prospective study of the natural course of bulimia nervosa (BN; Fairburn, Peveler, Jones, Hope, & Doll, 1993). Furthermore, in a “dismantling” study of cognitive behavioral therapy (CBT) for BN (CBT-BN), the full treatment that addresses body image disturbance resulted in significantly greater improvement of eating disorder symptoms than a behavioral version that did not address body image disturbance (Fairburn et al., 1991).

Current empirically supported CBT-BN and CBT for binge eating disorder (BED) are relatively successful in their ability to reduce binge eating and inappropriate compensatory behaviors such as purging and laxative use, with approximately 40-50% of treatment completers reaching abstinence from binge eating and purging by the end of treatment (Wilson & Fairburn, 2002). However, negative body image and overconcern with shape and weight often persist following CBT for eating disorders, leaving patients
at increased risk of relapse (Fairburn et al., 1993). Leading eating disorder researchers have described the degree of change in body image following CBT for eating disorders as “modest,” leading many to look for ways to improve body image treatments (Delinsky & Wilson, 2006). Eating disorders are costly for patients, their loved ones, the health care industry, and society in general, so improving body image treatments may be one route to treating eating disorders more effectively and reducing relapse. Additionally, because body image dissatisfaction is associated with unhealthy weight control behaviors (Farrell, Shafran, & Lee, 2006; Neumark-Sztainer et al., 2006) and depression in diverse nonclinical samples (Noles, Cash, & Winstead, 1985), and is quite prevalent (Rodin, Silberstein, & Striegel-Moore, 1984), prevention programs that are able to successfully reduce body image dissatisfaction would be expected to not only help prevent the onset of clinical eating disorders in at-risk individuals, but may also improve individuals’ overall mental and physical health and well-being.

**Body Checking and Avoidance**

Body image is currently understood as a multi-component construct, with cognitive, affective, behavioral, and perceptual facets (Farrell et al., 2006). Behavioral components are an important area of study because they are directly observable and measurable. Additionally, some of the more effective treatment techniques in CBT are largely behaviorally focused. Behavioral techniques such as exposure and response prevention for the treatment of obsessive compulsive disorder (OCD), exposure for the treatment of simple phobias, and behavioral activation for the treatment of depression are effective not only at reducing maladaptive behavior but also at reducing negative cognitive and emotional sequelae even when those are not directly addressed in treatment.
(Jacobson et al., 1996). Additionally, there is an early treatment response phenomenon in CBT for depression and CBT-BN in which initial response to treatment is a strong predictor of treatment outcome (Fairburn, Walsh, Agras, Wilson, & Stice, 2004; Wilson, 1999a). Ilardi and Craighead (1994) found that 60-70% of treatment gains from CBT for depression occur within the first 4 weeks of therapy and Wilson (1999a) calculated that in a CBT-BN study, 76% of total binge eating frequency reduction and 69% of vomiting frequency reduction occurred by Week 3 of treatment and it was not until the third week that cognitive restructuring was introduced, suggesting that cognitive restructuring was not the primary reason for symptom improvement. Notably, initial treatment in both CBT for depression and CBT-BN is largely focused on changing maladaptive behaviors and not on modifying maladaptive cognitions.

Compared to behavioral expressions of dissatisfaction with shape and weight such as dietary restriction, binge eating, and inappropriate compensatory behavior, body checking and body avoidance are behavioral expressions of body dissatisfaction that have received little attention in the eating disorder research literature. Body checking and its avoidance are believed to maintain body image dissatisfaction and eating disorder symptomatology (Fairburn, Cooper, & Shafran, 2003; Wilson 1999b). Although body checking and avoidance behaviors have been targeted in the treatment of eating disorders (Fairburn, 2008), body dysmorphic disorder (BDD; Rosen, 1995; Rosen, Reiter, & Orosan, 1995), and extreme body image dissatisfaction (Cash, 2008; Cash & Smolak, 2011), only a small literature has addressed the nature, function, and consequences of body checking.
Body checking describes frequent evaluation of one’s body to gain information about size, shape, or weight (American Psychiatric Association, 2000; Shafran et al., 2004). Examples include repeated weighing, checking specific body parts in the mirror and other reflective surfaces, asking for others’ opinions about one’s body, comparing oneself to others, feeling for bones, and checking the fit of certain items of clothing. Avoidance behaviors encompass a range of behaviors aimed at avoiding information about one’s weight, shape, and size, such as not weighing oneself, wearing loose-fitting clothing, avoiding looking in and/or covering mirrors, and avoiding situations in which one’s body shape would be revealed, such as the gym or the beach.

Body checking and body image avoidance are commonly reported by people with eating disorders (Fairburn, Shafran, & Cooper, 1999; Williamson, Muller, Reas, & Thaw, 1999; Wilson, 2005), BDD (Rosen, 1995), and a form of BDD called muscle dysmorphia (MD; Pope, Gruber, Choi, Olivardia, & Phillips, 1997). For example, in a sample of women with eating disorders, Shafran et al. (2004) found that 92% of the females reported body checking and that 70% of participants engaged in various body checking behaviors on a regular basis. However, body checking and avoidance are also reported by those without eating disorders or BDD. For example, overweight and obese men and women endorse body checking and avoidance (Grilo et al., 2005; Latner, 2008) as do normal weight women (Shafran, Lee, Payne, & Fairburn, 2007) and men (Walker, Anderson, & Hildebrandt, 2009) without eating disorders psychopathology.

**Correlates and consequences of body image avoidance.**

Body avoidance behaviors can take a number of forms, such as avoiding weighing oneself, avoiding looking in or covering up mirrors, refusing to be photographed, wearing
baggy clothing and other camouflaging behavior, and avoiding social situations where body size, shape, or weight might be salient to themselves or others. Although body checking and avoidance appear to be diametrically opposed to one another, they both maintain shape and weight concerns and are positively correlated with one another (e.g., Grilo et al., 2005; Latner, 2008). If an individual monitors his or her body frequently and continually receives negative feedback, it may become so aversive that the individual begins to actively avoid body-related information. Avoidance behaviors prevent the person from disconfirming the hypothesis that s/he has lost control and his/ her shape or weight have changed in the undesirable direction, so that fear of loss of control and failure often also motivates continued restraint (Fairburn et al., 1999). Both body checking and body avoidance behaviors are negatively reinforcing, increasing the likelihood that an individual will continue to engage in those behaviors in the future (Williamson, White, York-Crowe, & Stewart, 2004).

Body avoidance in mixed gender overweight and obese weight loss treatment-seeking samples were significantly correlated with body checking behavior, overvaluation of weight, overvaluation of shape, and binge eating (Grilo et al., 2005; Latner, 2008). In the mixed gender behavioral weight loss sample, avoidance was also significantly correlated with self-esteem, fear of fatness, and body dissatisfaction, but was not significantly associated with a history of weight stigmatization (Latner, 2008). Following a body image treatment in a female sample, body image avoidance scores were significantly reduced and body avoidance change scores were highly correlated with Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) change scores, $r = .63$ (Rosen, Srebnik, Saltzberg, & Wendt, 1991). A study comparing
individuals with subclinical BDD symptoms and healthy controls found that implicit associations made between attractiveness and competence significantly predicted BDD symptom severity and distress and avoidance during a mirror exposure task (Buhlmann, Teachman, Naumann, Fehlinger, & Rief, 2009).

Nonclinical male and female adolescents reported using behavioral avoidance more often than any other coping strategy to manage social physique anxiety, and short-term appearance management was the second most commonly reported coping strategy in female participants and third most common coping strategy reported by male participants (Kowalski, Mack, Crocker, Niefer, & Fleming, 2006). In this sample, behavioral avoidance was significantly correlated with both state and trait social physique anxiety, $r = .36, p < .001$ and $r = .28, p < .001$, respectively (Kowalski et al., 2006).

**Correlates and consequences of body checking.**

Because body checking and avoidance are behavioral indicators of body dissatisfaction and appear to be relatively common phenomena occurring frequently in women with eating disorders, overweight and obese men and women, and individuals with BDD, in addition to nonclinical samples of men and women, it is important to understand the consequences and functions of these behaviors and whether they differ in clinical and nonclinical samples. Research has examined body exposure in samples with and without eating disorder psychopathology in order to better understand its consequences and whether and how they differ based on degree of psychopathology. Current evidence suggests that body-related information is processed differently in those with and without eating disorders psychopathology.
In nonclinical females, scores on the Body Checking Questionnaire (BCQ; Reas, Whisenhunt, Netemeyer, & Williamson, 2002) were significantly correlated with Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) total scores ($r = 0.73$) and the EDE-Q subscales, the highest of which was the correlation with the shape concern subscale ($r = 0.74$), and BCQ scores were also significantly related to dieting (Reas, von Soest, & Lask, 2009). In a separate sample of nonclinical women, BCQ scores were significantly negatively correlated with self-esteem and positively correlated with measures of disordered eating, body dissatisfaction, social anxiety, and alexithymia (De Berardis et al., 2007). Alexithymia describes a cluster of symptoms characterized by difficulty identifying and describing one’s feelings, difficulty distinguishing feelings from bodily sensations, difficulty with introspection, and concrete thinking (De Berardis et al., 2007). When subscales of the alexithymia measure were examined individually, BCQ scores were significantly positively correlated with the difficulty identifying feelings and difficulty describing feelings subscales but were not significantly correlated with the externally oriented thinking subscale of the alexithymia measure (De Berardis et al.).

When a nonclinical sample of women received a positive or negative implicit manipulation of self-esteem and then engaged in a 1 min mirror exposure exercise, those who were high in trait body dissatisfaction experienced significantly increased state body image dissatisfaction following the negative self-esteem induction and no change in body dissatisfaction following the positive self-esteem induction (Svaldi, Zimmermann, & Neumann, 2012). In contrast, women who were low in trait body dissatisfaction experienced no significant changes in state body dissatisfaction following mirror
exposure with either positive or negative implicit self-esteem manipulations (Svaldi et al., 2012). In other words, among body dissatisfied women, manipulating self-esteem had a significant effect on the impact that mirror exposure had on their body image (Svaldi et al., 2012). In a separate sample of nonclinical women, Haase, Mountford, and Waller (2011) found that both body checking cognitions and body checking behaviors discriminated between disordered eating behaviors (purging, objective binge eating, subjective binge eating, and dietary restriction), but body checking cognitions and behaviors were somewhat worse at identifying individuals who exercised for weight control.

Smith and Rieger (2006) found that directing nonclinical female undergraduates’ attention to negative shape and weight related words increased body dissatisfaction following exposure to magazine images of the female thin ideal compared to participants whose attention had been directed to neutral words or negatively-valenced emotion words prior to thin ideal exposure. A study that recruited women who were high and low in shape concern found that participants with high shape concern reported looking specifically at disliked body parts more frequently than those with low shape concern (Farrell, Shafran, & Fairburn, 2004). Additionally, participants with high shape concern reported engaging in more body checking behaviors that involved physical manipulation of the body to examine body composition (Farrell et al., 2004). Participants with high shape concern were also significantly more likely to report avoiding looking at themselves in the mirror than those low in shape concern (Farrell et al., 2004). Participants rated their cognitions and emotions as either negative/mixed or positive/neutral following mirror exposure, and, in comparison to those with low shape
concern, the high shape concern participants reported a significantly greater proportion of
negative/mixed cognitions (93% for high shape/weight concern vs. 64% for low
shape/weight concern) and emotions (91% for high shape/weight concern vs. 45% for low
shape/weight concern; Farrell et al., 2004). Notably, there were no significant group
differences in reported frequency or duration of mirror gazing, leading Farrell and
colleagues (2004) to conclude that an individual’s specific cognitions and the behaviors
in which the individual engages when looking in the mirror are crucial in determining the
effect that mirror exposure has on body image dissatisfaction.

In a sample of eating disorder patients and healthy controls, BCQ scores
successfully discriminated eating disorder patients from controls, distinguished dieters
from nondieters, and were positively correlated with BMI (Calugi & Dalle Grave, 2006).
Additionally, patients with BN scored significantly higher on the BCQ than AN patients
(Calugi & Dalle Grave, 2006), a finding which has been replicated. In a large sample of
women with AN, BN, and healthy controls, Probst, Vancampfort, Pieters, and
Vanderlinden (2008) used one body checking and avoidance item from the Body Attitude
Test (Probst, Van Coppenolle, & Vandereycken, 1995), ‘I observe my appearance in the
mirror,’ and found that women with BN observed their appearance in the mirror more
often than AN patients or control women. Categorizing participants who reported never
looking at themselves in the mirror as avoiders and those who reported always looking at
themselves in the mirror as body checkers, Probst et al. (2008) found that women with
AN and control women who either checked or avoided their appearance consistently
experienced significantly greater body image dissatisfaction as measured by the BAT and
the body dissatisfaction and drive for thinness subscales of the Eating Disorder Inventory
(Garner, Olmsted, & Polivy, 1983), whereas BN patients categorized as body checkers and avoiders did not report significantly elevated body image dissatisfaction compared to those at less extreme levels of body checking and avoidance (Probst et al., 2008).

Research comparing treatment-seeking individuals with BDD to those with AN and BN and a gender-matched psychiatric control group recruited from a range of treatment settings (e.g., inpatient, outpatient, partial hospitalization, etc.) found both similarities and some notable differences between BDD and ED patients in the focus of their body dissatisfaction and preoccupation, in coping behaviors, and in the degree of impact on overall functioning and quality of life (Hrabosky et al., 2009). There were no significant differences in overall body dissatisfaction between BDD and ED patients; however, BDD patients reported significantly greater investment in self-evaluative body image and appearance management and reported significantly more appearance fixing coping behavior than AN and BN patients (Hrabosky et al., 2009). In addition, BDD patients reported significantly worse body image related quality of life and overall psychiatric disturbance than AN and BN patients (Hrabosky et al., 2009). There were no significant differences in levels of appearance fixing or experiential avoidance between BDD and ED patients, but there were significant differences in the methods of coping with body image threats: in comparison to AN or BDD patients, those with BN used eating to cope with negative emotions (Hrabosky et al., 2009). These findings suggest that while individuals with BDD, AN, and BN may experience negative effects of mirror exposure and body image threats to a similar degree, they may use different maladaptive coping mechanisms (Hrabosky et al., 2009). It is important to note that these data were cross-sectional, so causal relationships cannot be determined.
Consequently, experimental studies are necessary in order to examine effects of mirror exposure. A study that manipulated the duration of mirror gazing (25 s short session vs. 10 min long session) in individuals with and without BDD and found that the long sessions led to greater self-reported distress, self-focused attention, urge to continue gazing, and urge to avoid looking and less certainty about appearance in participants with BDD compared to control participants (Windheim, Veale, & Anson, 2011). Participants in both conditions reported significantly greater levels of distress and self-focused attention after mirror gazing (Windheim et al., 2011). Neither the main effect of mirror gaze duration nor the interaction between gaze duration and group (BDD vs. control) had a significant impact on appearance-related distress and self-focused attention, and participants with BDD reported significantly greater levels of distress, self-focused attention, and more appearance-related cognitions following the exposure session regardless of the gaze duration (Windheim et al., 2011). In comparison to the BDD group, control participants experienced more distress in reaction to the long mirror exposure than the short mirror exposure, perhaps reflecting a difference from typical mirror usage (Windheim et al., 2011). Lending further support to the importance of body checking cognitions, Haase, Mountford, and Waller (2007) found that social physique anxiety partially mediated the link between body checking cognitions and body checking behaviors in a sample of women with eating disorders, suggesting a process in which body checking behaviors are negatively reinforced by the short-term reduction of social physique anxiety.

When women with BN and BED and a control group of non-eating disordered women were exposed to their physical appearance in a mirror, the women with eating
disorders reported more negative body-related cognitions than did the control group (Hilbert & Tuschen-Caffier, 2005). Additionally, negative body-related cognitions occurred significantly more often than neutral or positive body-related cognitions in the eating disorder group, a relationship that was not seen in healthy controls (Hilbert & Tuschen-Caffier, 2005). In a similar study design in which women with and without eating disorders were exposed to their bodies for 40 minutes and assessed every 10 minutes, women with eating disorders reported higher negative emotional and cognitive responses to the exposure task than controls (Vocks, Wächter, Wucherer, & Kosfelder, 2008). The eating disordered women showed a significantly greater increase in negative emotions from pre-exposure to the first exposure assessment than controls, and the initial increase in negative emotions was significant only in the eating disorders group (Vocks, Wächter, et al., 2008). Hofmann and Heinrichs (2004) found that a brief mirror exposure increased body focus even among nonclinical samples. Mirror exposure has also been shown to increase negative emotions such as fear, tension, insecurity, and sadness in nonclinical women, although the magnitude of that effect was greater in women with BN compared to healthy controls (Tuschen-Caffier, Vögele, Bracht, & Hilbert, 2003).

Although Vocks, Kosfelder, Wucherer, and Wächter (2008) predicted that eating disordered participants who engaged in body checking behavior more frequently would have lower ratings of negative emotion at the onset of a mirror exposure exercise, they found the reverse. Women with eating disorders who habitually checked their appearance displayed greater negative emotionality in response to mirror exposure, likely because they were used to specifically attending to disliked body parts (Vocks, Kosfelder, et al., 2008). Supporting Vocks, Kosfelder, et al.’s hypothesis regarding their unexpected
results, women with eating disorders reported that when body checking, they almost always focused on specific body parts that they disliked (Shafran et al., 2004).

Selective attention to disliked body parts is believed to maintain body dissatisfaction similarly to the way in which selective attention to internal cues is believed to maintain panic disorder (Shafran, Farrell, Lee, & Fairburn, 2009). Women with eating disorders almost always selectively attend to their most disliked parts when viewing themselves (Shafran et al., 2004), which increases negative body-related cognitions and negative emotions (Tuschen-Caffier et al., 2003; Vocks, Wächter, et al., 2008; Vocks, Kosfelder, et al., 2008), and selective attention to negative weight and shape related information increases body dissatisfaction (Smith & Rieger, 2006).

Rather than relying on self-report, a number of research teams have used eye-tracking technology to provide a more complete picture of individuals’ body checking and avoidance behaviors. Eye-tracking technology is especially helpful in measuring avoidance because of the difficulty associated with assessing the absence of a behavior using other available assessment methodology. Using eye-tracking technology, Jansen, Nederkoorn, and Mulkens (2004) examined eye movements, pupil dilation, and number of blinks in women with and without eating disorder symptomatology when exposed to images of others’ bodies and their own body. They found that women with eating disorder symptomology focused significantly more on their body parts that they described as ‘ugly’ than on those they described as ‘beautiful,’ whereas healthy controls focused more on their ‘beautiful’ body parts than those they thought were ‘ugly’ (Jansen et al., 2004) These patterns reversed when participants looked at images of other women. The women with disordered eating focused more on other women’s ‘beautiful’ body parts.
and less on other women’s ‘ugly’ body parts, whereas the healthy control women again showed a self-serving cognitive bias, focusing more on others’ ‘ugly’ body parts than on their ‘beautiful’ ones (Jansen et al., 2004). This pattern was evident in both the percentage of time spent looking at and the total number of fixations on each body part. Additionally, the blink frequency and pupil dilation were significantly different in eating symptomatic and healthy control participants when looking at their own bodies, indicating increased attention, concentration, and cognitive load in women with eating disorder symptoms (Jansen et al., 2004).

Similar results were found in a sample of BN patients and healthy control women who looked at slides of their own bodies and comparison bodies with higher and lower BMIs using eye-tracking technology (Blechert, Nickert, Caffier, & Tuschen-Caffier, 2009). Women with BN looked significantly longer at the comparison bodies with lower BMIs than their own when compared to health controls (Blechert et al., 2009). In contrast, women with BN showed the reverse trend when looking at women with a higher BMI, looking for significantly less time when compared to control women’s fixation duration for higher BMI comparison bodies (Blechert et al., 2009). Women with BN looked at the lower BMI comparison bodies for longer durations the more attractive they rated them to be and looked at the higher BMI comparison bodies for less time the less attractive they rated them to be (Blechert et al., 2009). The degree to which BN patients displayed the upward social comparison bias was significantly associated with how attractive they perceived themselves to be: the less attractive and larger BN patients perceived themselves as being, the longer they looked at the lower BMI comparison bodies and the shorter they fixated on the higher BMI comparison bodies. Additionally,
upward social comparison (looking at the lower BMI comparison bodies) was significantly associated with decreased body satisfaction in the sample (Blechert et al., 2009).

Female undergraduate students who were high and low in appearance satisfaction showed similar results in a study where they looked at their own faces in a mirror and at a photograph of a neutral female face, and rated the attractiveness of each face before and after a 3.5 minute exposure session (Mulkens & Jansen, 2009). Attractiveness ratings decreased when appearance-dissatisfied women looked in the mirror and increased when they looked at the neutral female’s face. In contrast, the attractiveness ratings of appearance-satisfied women did not change after viewing another woman’s face and they increased after looking at their own face (Mulkens & Jansen, 2009), again demonstrating a self-serving cognitive bias.

A study comparing overweight female binge eaters to overweight non-binge eaters using eye-tracking technology found that women in the binge eating group looked at their least preferred body parts significantly longer than the control group looked at their least preferred body parts (Svaldi, Caffier, & Tuschen-Caffier, 2011). They found that both binge eating and non-binge eating women in the study had a bias toward looking at their least preferred body parts and the body parts of other women that they considered to be the ‘ugliest’ and that BMI significantly moderated the relationship between gaze duration and frequency of the ‘ugliest’ self body part (Svaldi, Caffier, et al., 2011).

In addition to using eye-tracking technology, functional neuroimaging research supports differential neural activation in individuals with and without eating disorders.
when viewing images of themselves. One such study examined women’s neural activation in response to viewing photographs of their bodies that had been distorted to look like they were lower and higher BMIs (Mohr et al., 2011). Women with and without eating disorders showed differences in neural activity both when rating how satisfied they were with the presented image and when they were doing a body size estimation task (Mohr et al., 2011). Differential activation appeared in areas associated with emotional processing during the body satisfaction task and areas associated with perception of the human body, which were only activated in healthy controls and not BN patients, when completing the body size estimation task (Mohr et al., 2011). Vocks, Busch, Grönemeyer, et al. (2010) also compared neural activity in response to viewing photographs of their own and a control women’s body (BMI = 19) in women with eating disorders and healthy controls and found that although women with AN and BN self-reported significantly greater negative affect than the control group when viewing their own bodies, they did not show corresponding greater amygdala activity. The authors posited that the lack of amygdala activity in response to viewing photographs of their bodies was a result of body image avoidance, supported by decreased activity in areas that are believed to be responsible for visuospatial and attentional processing, although the correlation between the Body Image Avoidance Questionnaire (BIAQ; Rosen et al., 1991) and activation in these areas was not significant (Vocks, Busch, Grönemeyer et al., 2010). Interestingly, they did find significantly greater right amygdala activity in individuals with AN compared to those with BN and controls when looking at the pictures of the other woman’s body in addition to significantly increased self-reported negative affect in AN participants compared to healthy controls, whereas changes in negative affect in women
with BN were not significantly different from women with AN or controls (Vocks, Busch, Grönemeyer et al., 2010). The increased right amygdala activity in women with AN when viewing the other woman’s body may underlie the affective response to social comparison.

Smeets, Tiggemann, et al. (2011) compared the effects of a body checking, body exposure, and control condition on body-related attentional bias in a sample of nonclinical women. Rather than instructing women to check certain parts of their body, the experimental conditions were masked as perceptual tasks where women in the body checking groups were asked to estimate the lengths of specific parts of their body using a full length mirror, those in the body exposure condition were asked to measure chair and table dimensions in front of a full length mirror, and those in the control condition were asked to estimate table and chair dimensions in the same room without any mirrors (Smeets, Tiggemann, et al., 2011). Those in the body checking and body exposure conditions were told that using the full length mirror would help in the size estimation tasks (Smeets, Tiggemann, et al., 2011). They found that women in the body checking condition exhibited significantly faster detection of body-related words in a visual search task and reported significantly increased body dissatisfaction following the task in comparison to those in the body exposure and control groups, but there were no group differences in distraction by body-related information (Smeets, Tiggemann, et al., 2011).

In a clever study design, Smeets, Jansen, and Roefs (2011) induced attention to disliked body parts in women who scored in the moderate range on the BSQ (21-41) to examine the causal nature of the negative bias, and they induced attention to preferred body parts in women with high body image dissatisfaction to assess treatment potential
for positive bias induction. They used participants’ prior ranking of their three most liked and most disliked body parts (taken from a list of 12 body parts) along with a faux perception and concentration task where participants viewed images of shapes (e.g., triangle, circle, square) superimposed over fuzzy pictures of their bodies alternating with pictures of neutral stimuli (e.g., golf balls, light bulbs, etc.) and were asked to identify the shape or color of the probe (Smeets, Jansen, et al., 2011). The eye-tracking system was used such that when the participant was focusing on the location of the probe (the shape), the image of the underlying body part was made less fuzzy and participants were instructed to keep focus on the probe shape for the 4 s duration that it was presented to ensure overt attention to the superimposed body part (Smeets, Jansen, et al., 2011).

Smeets, Jansen, and Roefs found that training nonclinical women to selectively attend to the body parts they dislike led to significantly lower body and weight satisfaction; however, inducing women to selectively attend to the most preferred body parts did not have a positive effect on their body or weight satisfaction. However, the women who underwent the negative bias attention task followed by the positive bias attention task did show significant improvement in body satisfaction, returning to baseline levels (Smeets, Jansen, et al., 2011). Smeets, Jansen, and Roefs also compared women with body dissatisfaction to a positive bias or a control attention training (where participants looked at all of their body parts) and found significant Time x Condition interactions such that the positive bias induction led to significant improvements in body and weight satisfaction compared to the control condition in which there were no significant changes.

Only 5% of a sample of women with eating disorders reported improved mood following body checking, suggesting that the behavior may be reinforced on a variable
ratio scale, at times improving the individual’s mood, but most often, worsening mood and body image (Shafran et al., 2004). People with high shape and weight concern attend to information about their shape and weight frequently and engage in body checking behaviors with three possible outcomes that will either confirm or attenuate their fears (Williamson et al., 2004): (1) the desired outcome; (2) no change; (3) perceived change in the undesired direction. Body checking is negatively reinforced by temporarily reducing anxiety that one’s shape/weight has changed in an undesirable direction when that is not the case (situation 1 and 2), and it is positively reinforced when an individual perceives that his or her shape/weight has changed in the desired direction (situation 1). When body parts are checked frequently, it is all but impossible to accurately assess perceivable change from one checking session to another, even when using relatively objective measures such as weight, which can fluctuate up to 5 lbs (1-2 kg) on a daily basis for reasons not pertaining to permanent muscle or fat loss or gain (Walker & Murray, 2012). Thus, if an individual regularly checked his or her weight, as a result of meaningless daily weight fluctuation, the checking would be negatively reinforced two-thirds of the time and positively reinforced one-third of the time. In fact, some patients purposefully engage in body checking behavior because the resultant negative body-related thoughts and feelings motivate their continued dietary restriction (Shafran et al., 2004). So, the one-third of the time when weight checking was not directly reinforcing, the results would still maintain the use of disordered weight control strategies.

One reason that has been proposed as to why frequent body checking and focus on individual body parts maintains eating disorders is that hypervigilance and intense scrutiny result in a distorted view of body shape (Shafran et al., 2009). A distorted
perception of one’s appearance characterizes BDD, MD, and eating disorders, most notably in AN. According to Fairburn and colleagues (1999), checking one’s weight and shape often, but for a brief duration, maintains emotional arousal and augments perceived bodily flaws. As the individual’s perception of his or her physical flaws is magnified, body-focused attention and anxiety increase, encouraging further monitoring, creating a harmful positive feedback loop.

Body size distortion is a commonly reported aspect of eating disorder psychopathology, with many individuals significantly overestimating their body size (American Psychiatric Association, 2000). In addition to significantly overestimating their body size from distorted digital images, compared to healthy controls, women with BN identified walking patterns as their own that were consistent with a significantly higher BMI than their own (Vocks, Legenbauer, Rüddel, & Troje, 2007). Compared to healthy controls, women with AN also show significantly greater body size distortion, both in their sensation of fatness and in their body size perception in comparison to their perception of other young women’s body sizes (Rushford & Ostermeyer, 1997). Smeets, Klugkist, van Rooden, Anema, and Postma (2009) examined women high and low on the BSQ in a body size estimation task where they were asked to estimate whether the width of their shoulders or the width of their hips was longer and found that while there were no differences in response time, women high on the BSQ were significantly less accurate at assessing small differences in the width of their shoulders and hips. In an inpatient sample of women with AN and BN, body size distortion and body dissatisfaction decreased following treatment in women with BN; however, there were no significant
changes in either body distortion or body dissatisfaction for inpatient women being
treated for AN (Benninghoven et al., 2006).

Body size perception also appears to fluctuate, with a number of temporal stimuli
affecting body size estimation (Vocks, Legenbauer, & Heil, 2007). For instance, research
has found that negative mood induction increases women’s body size estimation (Baker,
Williamson, & Sylve, 1995; Plies & Florin, 1992; Taylor & Cooper, 1992), as does
degree of body dissatisfaction (Baker et al., 1995). The discrepancy between actual and
estimated body size was found to be higher in restrained eaters than unrestrained eaters
(Plies & Florin, 1992). Exposure to images of the female body ideal also increased
women’s body size estimations (Waller, Hamilton, & Shaw, 1992). Vocks, Legenbauer,
and Heil randomly assigned nonclinical women to either watch a video while drinking a
milkshake or to just watch the video and body size estimates were taken afterwards. The
discrepancy between ‘actual and ideal’ and ‘felt and ideal’ body size was higher in
women who drank the milkshake than in the no food control group. Among those in the
experimental food intake group, the more the participants reported restrained eating or
eating, weight, and shape concern, the more their body image and mood worsened
(Vocks, Legenbauer, & Heil, 2007). Similarly, women with eating disorders who were
exposed to high calorie food in a virtual reality context displayed greater body size
overestimation and body dissatisfaction compared to a virtual low-calorie food exposure,
whereas healthy control women showed no situation-specific changes in body
dissatisfaction or body size distortion (Gutiérrez-Maldonado, Ferrer-García, Caqueo-
Urízar, & Moreno, 2010).
Although theories suggest a causal link between body checking and body size overestimation, only one experiment has assessed this link and it failed to yield a significant increase in body size estimation as a result of a body checking manipulation (Shafran et al., 2007). Shafran et al. (2007) assigned nonclinical women to high or low body checking conditions to determine the immediate effects of body checking on body dissatisfaction and body size estimations. Even though they found significant temporary increases in body dissatisfaction, feelings of fatness, and self-critical body related thoughts in the high body-checking group, there were no significant differences in current-ideal body size discrepancies as a result of the body checking manipulation (Shafran et al., 2007). However, body checking behavior is repeatedly expressed over time, so it is unclear whether the effects of repeated critical scrutiny of specific body parts would yield longer-lasting changes in body distortion. It is also possible that repeated body checking is needed before a change in body size estimation would be apparent.

Norris (1984) compared body size perception in AN inpatients, BN inpatients, non-eating disordered psychiatric inpatients, and healthy controls before and after a mirror confrontation during which participants stood in front of a full-length mirror in their undergarments and were instructed to examine their bodies in stages from head to foot, noting their body size, physically touching their body contours, using their hands to outline the four diameters that they were asked to estimate, and describing any emotions or physical sensations evoked by the procedure. Participants were not given a rationale for the mirror exercise and the researcher present remained neutral during the procedure (Norris, 1984). Norris found that participants with AN overestimated their body size,
although hip diameter was frequently underestimated, with BN and emotionally disturbed patients overestimating the size of their bodies to a similar degree as those with AN. In comparison, healthy control participants were relatively accurate (Norris, 1984). Following the mirror confrontation, there were significant group differences with regard to the reduction in body size overestimation, with AN patients demonstrating the greatest change and healthy controls the least; however, AN patients’ post-mirror confrontation estimations were not always more accurate than their initial estimates (Norris, 1984).

One study examining the phenomenon in which individuals overestimate the size of their mirror-reflected face offers a unique perspective on possible mechanisms involved in body size distortion (Dieguez, Schere, & Blanke, 2011). Participants overestimated their image when it was presented in the orientation seen when one looks in a mirror (left-right reversed) rather than the nonreversed orientation one sees in photographs (Dieguez et al., 2011). In contrast, based on familiarity of the way in which individuals view their own and others’ faces, the reverse effect was found for images of participants’ friends and family, in that the nonreversed faces were overestimated compared to left-right reversed images (Dieguez et al., 2011). The researchers found that there was a relationship between the degree of familiarity with family and friends’ images and the degree of facial size overestimation and that a brief mirror exposure session where participants were asked to examine the size of their reflection reduced the degree of size overestimation (Dieguez et al., 2011). It is possible that one mechanism by which increased body focus leads to body size overestimation mirrors the cognitive processes involved with our detection of size constancy in concert with an overestimation bias based on visual specular familiarity (Dieguez et al., 2011).
Social comparison.

Body checking behaviors include making social comparisons, which involves comparing oneself to peers or individuals in the media, to gain information about one’s own size, shape, and weight in comparison to others. Festinger’s (1954) social comparison theory posits that individuals, as social beings, have a tendency to assess their progress and success by comparing themselves to others in their social environments. Festinger asserted that the affective consequences of social comparisons depend on the direction of the comparison (upward or downward) and the characteristics of the individual to whom an individual compares him or herself. Upward social comparisons involve comparing oneself to people whom the individual perceives to be better on the trait of interest, typically resulting in negative cognitions and affect, whereas downward social comparisons are those made with individuals perceived to be worse on the trait of interest, and these typically yield positive cognitive and affective changes. Festinger posited that the degree to which the individual perceives the target of the comparison as similar to him or herself, the more the comparison will seem relevant and will affect the person making the comparison.

Festinger (1954) theorized that people generally make favorable, downward comparisons; however, research shows that upward appearance-based social comparisons are common among individuals with body dissatisfaction (Fitzsimmons-Craft, 2011; Leahey, Crowther, & Mickelson, 2007). Additionally, when making appearance-based comparisons, many women also compare themselves to dissimilar targets, such as models and celebrities, as often as they do to peers, even though models and celebrities represent an unrealistic beauty ideal (Engeln-Maddox, 2005). Interestingly, also contrary to
Festinger’s social comparison theory, perceived similarity to female TV characters predicted decreased body surveillance, a construct similar to body checking, in a sample of female undergraduates, even though wishful comparison to those characters was predictive of increased body surveillance (Greenwood, 2009).

In another sample of female undergraduates, neither general nor appearance-related social comparisons were significant mediators of the relationship between thin ideal internalization and body dissatisfaction (Fitzsimmons-Craft, Harney, et al., 2012). In a sample of female undergraduates, Tylka and Sabik (2010) found that social comparison significantly moderated the relationship between body surveillance and disordered eating, such that at high levels of body surveillance, women who also made frequent social comparisons reported significantly more eating disorder symptomatology, compared to women who did not frequently make social comparisons. Further, the interaction accounted for 2.3% of unique variance in disordered eating (Tylka & Sabik, 2010). Among measures of disordered eating, body satisfaction, self-esteem, depression, history of teasing about appearance, appearance comparison frequency, and the importance of individuals who were the target of social comparisons, Thompson and Heinberg (1993) found that the tendency to make social comparisons and a history of appearance-related teasing were the strongest predictors of body image disturbance. Research suggests that patients with eating disorders are also likely to make social comparisons with same sex therapists, as they rated the importance of their therapist’s figure significantly higher than a control group of patients with anxiety disorders (Vocks, Legenbauer, & Peters, 2007). Both groups preferred a therapist with an average figure and one that was similar to their own (Vocks, Legenbauer, & Peters, 2007).
People with body dissatisfaction or high shape and weight concern engage in body checking behaviors, including making social comparisons with peers and media images frequently, often many times a day. Thus, examining these behaviors in an ecologically valid manner is important in understanding their effects. Leahey et al. (2007) examined upward social comparisons using ecological momentary assessment (EMA) and found that upward appearance-based social comparisons were associated with body dissatisfaction, negative affect, and dieting and exercise-related cognitions in body dissatisfied women. Using EMA methodology, Leahey and Crowther (2008) found that women who made upward social comparisons to media images experienced greater body dissatisfaction than when they made upward social comparisons to peers, regardless of the women’s trait body dissatisfaction. Additionally, the women experienced greater positive affect when they made downward social comparisons to media images than when they made downward comparisons to peers (Leahey & Crowther, 2008). Ridolfi, Myers, Crowther, and Cielsa (2011) also examined social comparisons and other body checking behavior using EMA methodology in a sample of nonclinical female undergraduates and found that social comparisons with media images were associated with greater negative affect, feelings of guilt, and more frequent body checking behavior, whereas social comparisons with peers were not associated with increased negative affect (Ridolfi et al., 2011). When making upward appearance-based social comparisons to peers and media images, women exhibited increased body dissatisfaction and body checking (Ridolfi et al., 2011). Ridolfi and colleagues found that appearance-related cognitive distortions moderated the relationship between upward media and peer comparisons. Additionally, they found that body checking behaviors and appearance-
related cognitive distortions moderated the effect that making peer comparisons, both upward and downward, had on body checking (Ridolfi et al., 2011). Further, appearance-related cognitive distortions only moderated the effect that social comparisons had on body checking behaviors but did not significantly moderate the relationship between making social comparisons and negative affect or the relationship between cognitive and affective facets of body dissatisfaction (Ridolfi et al., 2011).

**Objectification theory.**

Body checking behaviors have also been described using the term body surveillance in the social psychology literature within the framework of objectification theory and, as a result, it is important to review objectification theory research when investigating body checking and avoidance behaviors. Objectification theory posits that attending to physical appearance is necessary for social and professional mobility in Western societies because those who are deemed more attractive (i.e., those whose bodies are more consistent with the thin ideal) receive more favorable treatment than overweight/obese or unattractive individuals (Fredrickson & Roberts, 1997). In Western society, women’s bodies have often been treated as sexual objects to be valued and evaluated largely on the basis of physical attractiveness, and, according to objectification theory, women often learn to view themselves as objects to be observed, developing what is referred to as objectified body consciousness (Fitzsimmons-Craft, Bardone-Cone, & Kelly, 2011). Research on objectified body consciousness suggests that women come to internalize societal appearance-related expectations and use body surveillance techniques (i.e., body checking) to ensure that they comply with these societal expectations (McKinley & Hyde, 1996). Recent research has found that overweight men also face
weight-related societal discrimination (Carr & Friedman, 2005; Cossrow, Jefferey, & McGuire, 2001) and likely experience lower social and professional mobility as a result (Ball, Mishra, & Crawford, 2002; Magallares, Morales, & Rubio, 2011). Consequently, these men may also be more likely to attend to their physical appearance to avoid negative weight and shape-related social and professional consequences. Because men face increasing societal pressures to be lean and muscular, men may also engage in body surveillance in an effort to be consistent with the current societal appearance standards and avoid the negative consequences of failing to meet those standards.

Body surveillance is considered to be the primary manifestation of self-objectification and is associated with a range of negative consequences including depression (Tiggemann & Kuring, 2004), disordered eating (Calogero, 2009; Calogero, Davis, & Thompson, 2005; Slater & Tiggemann, 2010), decreased interoceptive awareness (Tylka & Hill, 2004), smoking (Fiissel & Lafreniere, 2006), desired change in body weight (Forbes, Jobe, & Revak, 2006), thin ideal internalization (Sinclair, 2006), nonsuicidal self-injury (Nelson & Muehlenkamp, 2012), body image avoidance (Nelson & Muehlenkamp), appearance anxiety (Slater & Tiggemann, 2010), and body shame (Calogero, 2004; Calogero, 2009; Noll & Fredrickson, 1998) in female adolescents and young adults. Calogero and Thompson (2009) conducted a path analysis in women and found that greater internalization of media-portrayed beauty ideals predicted more body surveillance, which, in turn, predicted increased body shame and body shame directly led to decreased sexual satisfaction. Other cross-sectional studies have also found support for the mediational role of self-objectification and its behavioral manifestation, body surveillance, in the relationship between thin ideal internalization and the outcomes of
body image dissatisfaction and disordered eating (Fitzsimmons-Craft et al., 2012; Myers & Crowther, 2007). Additionally, Tylka (2004) found that body surveillance moderated the relationship between body dissatisfaction and disordered eating. Greenwood (2009) found that after controlling for the effects of BMI and self-esteem, wishful identification with female TV characters (i.e., social comparison to media ideals) was a significant predictor of increased body surveillance in undergraduate women. Interestingly, perceived similarity to those female characters significantly predicted decreased body surveillance, whereas romantic attachment to male TV characters significantly predicted increased body surveillance (Greenwood, 2009).

Body surveillance and weight and shape concern reciprocally influenced one another in a sample of White female undergraduates; however, this relationship was not found in Black female undergraduates in the sample (Fitzsimmons & Bardone-Cone, 2011). However, a review of objectification theory research suggests that overall levels of body surveillance are predominantly similar in White and minority women (Moradi & Huang, 2008), although differences have been found in body surveillance among minority and non-minority low-income women and US born Latinas compared to those who immigrated to the US (Breitkopf, Littleton, & Berenson, 2007). Mercurio and Rumi (2011) found that body surveillance mediated the positive association between self-weighing and body dissatisfaction, when they examined normal weight female undergraduates who endorsed frequent self-weighing (response options from ‘1-3 times per month’ through ‘twice a day or more’) or infrequent self-weighing (‘at least once a year but not as often as once a month’ or ‘never’).
Calogero, Herbozo, and Thompson (2009) examined whether the valence of appearance related comments had an impact on body surveillance and body dissatisfaction in women and found that both appearance related compliments and criticism significantly predicted increased body surveillance and body dissatisfaction and body surveillance partially mediated the relationship between appearance related comments and body dissatisfaction. Furthermore, the mediation was moderated by trait self-objectification (Calogero et al., 2009). Fitzsimmons-Craft, Bardone-Cone, and Kelly (2011) examined aspects of objectified body consciousness in women with active eating disorders, those who had fully and partially recovered from an eating disorder, and healthy control women and found that fully recovered women and healthy controls had significantly lower levels of body surveillance and body shame than women with active eating disorders and those who were partially recovered, whose levels were comparable to one another.

**Objectification theory research in men.**

In comparison to the amount of research on body objectification in women, there is a dearth of research on this topic in men, the majority of existing studies are correlational, and there have been mixed findings (Daniel & Bridges, 2010; Michaels, Parent, & Moradi, 2012). In a path analysis conducted in men, self-objectification was a significant predictor of decreased body shame and a significant predictor of increased body surveillance, which, in turn, let to increased body shame, and body shame significantly predicted disordered eating (Calogero, 2009). Self-objectification also accounted for unique variance in disordered eating (Calogero, 2009). Research has also shown that heterosexual males score significantly lower than gay men, lesbian women,
and heterosexual women on measures of sexual objectification and lower than gay men and heterosexual women, but comparably to lesbian participants, on body surveillance, body shame, and disordered eating (Engeln-Maddox, Miller, & Doyle, 2011). In a mixed gender sample of undergraduates, body surveillance mediated the relationship between sexually objectifying media exposure and body shame and appearance anxiety (Aubrey, 2007). In a mixed gender sample of adolescents, although female participants had significantly higher body surveillance, body shame appearance anxiety, and disordered eating than male participants, the relationships between body surveillance and the other variables were also significant in boys (Slater & Tiggemann, 2010). However, the relationships between the variables were significantly stronger in girls than boys and body shame and appearance anxiety mediated the relationship between body surveillance and disordered eating in both boys and girls (Slater & Tiggemann, 2010).

Contrary to their hypothesis that self-objectification and body surveillance would mediate the relationship between the internalization of media-portrayed body ideals and the drive for muscularity in men, Daniel and Bridges (2010) found that body surveillance was a significant mediator of the relationship between media-portrayed body ideal internalization and body shame, but not on drive for muscularity, for which media internalization was the primary predictor. Additionally, they found puzzling results where the relationship between self-objectification and internalization of media ideals was negative rather than positive, as hypothesized (Daniel & Bridges, 2010). Similar to findings of Daniel and Bridges, Parent and Moradi (2011) found that body surveillance partially mediated the link between internalization of the media portrayed male body ideal and body shame but they did not find significant relationships between either body
surveillance or body shame and drive for muscularity, expectations of appearance and performance enhancing drug (APED) use, and APED-use (Parent & Moradi, 2011). In contrast, they found significant links between APED-use expectations and intention to use APEDs and between male body ideal internalization and APED-use expectations and APED-use intent, suggesting that internalization of the male body ideal is the only connection between variables associated with objectified body consciousness and drive for muscularity and APED-use attitudes and expectancies in men (Parent & Moradi, 2011). McKinley (2006) found that among male undergraduates, body surveillance was significantly negatively correlated with body esteem at the first assessment but the relationship was no longer significant at the second data collection session, whereas the relationship remained significant for female undergraduates. This finding may suggest that body surveillance is more neutral in valence for young men than it is for young women (Moradi & Huang, 2008).

Because little experimental research exists in male body objectification theory, Michaels et al. (2012) compared the effects that viewing media images of the male body ideal and viewing control images such as animals and landscapes had on body image. They found that, compared with participants who viewed the control images, men who viewed the male body ideal did not report increased body dissatisfaction, body surveillance, body shame, or social physique anxiety (Michaels et al., 2012). They also did not find a significant interaction between condition and sexual minority status, although there was a significant main effect of the latter, with gay men reporting significantly greater body dissatisfaction, body surveillance, and social physique anxiety than heterosexual men (Michaels et al., 2012). Objectification theory research in gay men
has predominantly shown similar results to those described in heterosexual women. Using path analysis in a sample of sexual minority men, Wiseman and Moradi (2010) found that internalization of the cultural standards of attractiveness partially mediated the relationship between sexual objectification experiences with body surveillance, body surveillance partially mediated the link between internalization of the male body ideal and body shame, and body shame partially mediated the relationship between body surveillance and disordered eating. Additionally, internalized societal messages of homophobia and childhood stigmatization for gender nonconformity were also significantly associated with these relationships (Wiseman & Moradi, 2010).

**Body checking and avoidance in men.**

Research suggests that body image dissatisfaction is increasingly common among young men, and that body dissatisfaction is associated with societal pressures to be both lean and muscular (Leit, Gray, & Pope, 2002). Much of the existing research addressing body checking has focused on women, but evidence indicating recent increases in appearance-related sociocultural pressures on men suggests the utility of evaluating body checking behaviors in both men and women. The current literature on body checking among men remains relatively small and is limited in terms of sample characteristics and methodology. Insights into the role of body checking in men are largely limited to a handful of mixed-gender studies in overweight or obese participants.

Generally, the findings of these studies indicate that overweight or obese men endorse body checking, and its frequency is significantly associated with overconcern with shape and weight, restraint, poorer weight loss outcome, greater fear of fat, body dissatisfaction, perceived struggle in weight loss treatment, and lower self-esteem and
body avoidance was significantly related to body checking behavior, self-esteem, fear of fatness, binge eating, body dissatisfaction, and overvaluation of shape and weight (Grilo et al., 2005; Latner, 2008; Reas, Grilo, Masheb, & Wilson, 2005). Although most studies have found significant relationships between body checking and avoidance, body dissatisfaction, and overvaluation of shape and weight in overweight and obese men and women with and without eating disorder psychopathology, Reas, White, and Grilo (2006) found that these variables were not significantly correlated with body checking in obese men who were seeking treatment for BED. However, the nonsignificant findings among male participants may be due to the limited sample of men in that study (n = 22; Reas et al., 2006). Striegel-Moore and colleagues (2009) examined gender differences in the prevalence of eating disorder symptoms, including body checking and avoidance behavior, in a large mixed gender community sample. They found that while statistically significant differences in disordered eating symptoms, such as loss of control over eating, binge eating, vomiting, fasting, body checking and body avoidance, were present, these differences were not large when considering effect sizes (Striegel-Moore et al., 2009). Additionally, men in the sample reported overeating significantly more often than women (Striegel-Moore et al., 2009). Females engaged in body checking significantly more than men with a moderate effect size, with 22.5% of female and 8.9% of male participants endorsing the behavior, whereas the effect size in reported body avoidance was small, with 11.3% of female and 4.4% of male participants endorsing the behavior (Striegel-Moore et al., 2009).

Walker et al. (2009) examined body checking behaviors in a nonclinical sample of normal weight male undergraduates and found that body checking was significantly
correlated with weight and shape concern, symptoms of muscle dysmorphia, depression, negative affect, and APED use. The authors also found that more typical muscle checking behaviors (e.g., looking at abdominal muscles in the mirror, comparing muscle size to others, comparing overall muscle mass to athletes or celebrities, checking biceps to ensure that muscle mass was not lost) were reported by approximately 15-35% of the sample (Walker et al., 2009). In a sample of APED-using men and women, body checking uniquely predicted a significant proportion of variation in scores on the Appearance and Performance Enhancing Drug Use Schedule (APEDUS; Hildebrandt, Langenbucher, Lai, Loeb, & Hollander, 2011). The Male Body Checking Questionnaire (MBCQ; Hildebrandt, Walker, Alfano, Delinsky, & Bannon, 2010) was the second best predictor of the APEDUS’s Body Image and Appearance Control subscale, accounting for 12.8% of unique variance, and the BCQ uniquely accounted for 9.8% of variance in the subscale (Hildebrandt et al., 2010).

The existing studies also share certain methodological limitations. For instance, the few studies of body checking conducted in samples with male participants have been cross-sectional, precluding the ability to make causal inferences. Additionally, studies that have examined body checking in mixed-gender samples often assessed this construct using only two items from the BSQ, item #15 = “Have you avoided wearing clothes which make you particularly aware of the shape of your body?” and item #30 = “Have you pinched areas of your body to see how much fat there is?” (Grilo et al., 2005; Latner, 2008; Reas et al., 2005; Striegel-Moore et al., 2009) and did not assess muscle dissatisfaction. Furthermore, BSQ item #30 assesses only fat-related checking and does
not address muscle-related checking, which is relatively common among nonclinical men (Walker et al., 2009).

In order to examine the direct effects of body checking on state body image and state muscle dissatisfaction, Walker, Murray, Lavender, and Anderson (2012) conducted an experiment based on the methodology of Shafran et al. (2007) where nonclinical male undergraduates were randomly assigned to a high body checking group, in which they were asked to focus their attention on typically disliked body parts, and a low body checking group, in which they were asked to focus on their bodies as a whole and describe themselves using neutral, nonjudgmental terms. Contrary to the authors’ hypotheses, there were no significant differences based on the condition to which participants were assigned (Walker et al., 2012). Both conditions led to significant decreases in state body image satisfaction directly following the mirror exposure followed by a nonsignificant increase toward baseline levels after a 10-min delay and to significantly increased state muscle dissatisfaction only after the 10-min delay, which was significantly greater both than muscle dissatisfaction at baseline and directly following the mirror exposure exercise (Walker et al., 2012). These findings suggest that one session of a mindfulness-based mirror exposure task is not adequate in producing lasting improvements in body image or muscle satisfaction among nonclinical men. Participants may have had difficulty following instructions to examine their bodies neutrally as a whole if they were used to critically monitoring their bodies and focusing on specific, disliked body parts (Walker et al., 2012). Although body checking is relatively common among normal weight nonclinical men (Walker et al., 2009), and a significant proportion of the participants reported wishing to lose body fat (47%) and
increase muscle mass (88.6%; Walker et al., 2012), the size of the effects of the body checking manipulation on body image satisfaction and muscle dissatisfaction were relatively small and would likely be greater among those with greater shape and weight concerns. Participants who were relatively satisfied with their bodies may have experienced improved body image satisfaction and decreased muscle dissatisfaction after checking individual body parts that are often areas of concern for men, such as pectoral muscles, abdominal muscles, and biceps, obfuscating results that might be expected in body dissatisfied men (Walker et al., 2012).

Mirror Exposure Treatments

Leading evidence-based treatments for ED (Fairburn, 2008), BDD (Rosen, 1995; Rosen, Reiter, & Orosan 1995), and body image disturbance (Cash, 2008; Cash & Smolak, 2011) include components designed to reduce compulsive body checking and avoidance behaviors based on exposure and response prevention techniques that originated in behavioral treatment for anxiety disorders (Wilson, 2005). Steinglass et al. (2011) suggest that exposure and response prevention could be helpful in treating AN, which is often refractory to treatment due to the extreme psychopathology often present and its ego-syntonic nature. They recommend using exposure and response prevention to help break the association between feared stimuli and anxiety, the association between rituals and anxiety-relief, and to disconfirm irrational beliefs regarding the feared stimuli (Steinglass et al., 2011). According to Steinglass and colleagues, “exposure and response prevention emphasizes the relationship between thoughts, feelings and behaviors, but shifts the emphasis of treatment to behavioral techniques. Notably, in phobic disorders and OCD, exposure and response prevention has been found to be a powerful way to
change both anxiety driven behaviors and irrational beliefs” (p. 140). Given the overlap between the ritualistic nature of body checking behaviors in individuals with eating disorders, BDD, and extreme body image dissatisfaction and anxiety disorders (Steinglass & Walsh, 2006), these treatment techniques warrant further attention in the body image and eating disorders literature (Delinsky & Wilson, 2006; Steinglass et al., 2011). Commonly used therapies for body image disturbance use mirror exposure exercises to address behavioral facets of body image disturbances (Cash, 2008; Rosen, 1997). Clinical practice also supports the use of mirror exposure exercises in body image treatments, with former inpatients reporting greatly valuing the mirror exercises and some patients reporting that mirror exercises were one of the most important facets of their treatment program (Probst et al., 1995; Probst et al., 2008).

There have been some mixed results regarding mirror exposure’s efficacy in reducing body image dissatisfaction, however Farrell and colleagues (2006) suggest that the duration of mirror exposure and the way it is conducted may be critical in whether or not it is effective, especially when taken along with the research showing that females with eating disorder psychopathology show initial increases in negative emotions (Tuschen-Caffier et al., 2003; Vocks, Wächter, et al., 2008) and negative body-related cognitions (Hilbert & Tuschen-Caffier, 2005) when exposed to their appearance. However, Vocks, Wächter, et al. (2008) found that after the first ten minutes during which negative emotions increased significantly in women with eating disorders, they significantly decreased with a moderate effect size during the remainder of a 40 min exposure session. Brief body exposure is likely to function similarly to body checking behavior, because emotional arousal increases and remains high throughout the duration
of the brief exposure just as it does when individuals scrutinize their bodies on their own. In order for exposure to feared stimuli to work, it needs to continue long enough for individuals to habituate to the stimuli and for their fear to decrease. Additionally, Wilson (1999b) suggested that mirror exposure is likely to be more successful if it facilitates change in critical body-related cognitions. In order to facilitate cognitive change, Wilson (1999b) proposed a mindfulness-based adaptation of mirror exposure in which the patient stands in front of a mirror and describes him or herself from head to toe in a non-judgmental manner. Thus far, this type of intervention has received limited empirical attention, but appears to be promising.

In an inpatient sample of females with anorexia nervosa, Key and colleagues (2002) compared a group body image treatment that included homework assignments, as a control condition, to one with additional time spent on mirror exposure. The control group did not exhibit any significant differences before and after treatment, whereas the mirror exposure group showed significant decreases in body dissatisfaction, maturity fears, interoceptive awareness, and body image avoidance. The authors explained their significant results, suggesting that because the mirror exposure “used whole body image confrontation with verbal interaction and challenge by the therapist ... [it] produced a [more] powerful and immediate emotional experience ... when compared with other exposure exercises and prevented escape from that affect” (p. 189, Key et al., 2002). The mirror exposure treatment also increased the time patients spent in front of the mirror each week, adding additional challenges, such as wearing more form-fitting clothing over time, which helped increase patients’ sense of mastery (Key et al., 2002).
Hilbert and Tuschen-Caffier (2004) also compared treatment for eating disorders with and without an exposure component. They randomly assigned individuals with subclinical binge eating and body image dissatisfaction to either CBT with a cognitive restructuring component or CBT with a body exposure component (Hilbert & Tuschen-Caffier, 2004). Both treatment groups were the same number of sessions and required an equivalent amount of homework and were equally successful at improving body image disturbance both directly following treatment and at 4-month follow-up (Hilbert & Tuschen-Caffier, 2004).

A pilot study of an 8 session CBT-based body image group treatment for midlife body dissatisfied women that included mirror exposure and response prevention for body image avoidance, mindful eating, and body acceptance found significant improvements compared to women in a wait-list control group (McLean, Paxton, & Wertheim, 2009). McLean and colleagues found significant Time x Condition interactions with large effect sizes (Cohen’s $d$ ranged from 0.90-2.22) for changes in measures of body dissatisfaction, weight and shape concern, body image avoidance, appearance comparisons, internalization of societal beauty ideals, appearance importance, physical self-care, cognitive reappraisal, dietary restraint, external eating, and emotional eating directly following treatment. At 6-month follow-up, the main effect of time was statistically significant in the intervention group for all of the aforementioned measures except dietary restraint, and significant improvements represented large effects, with Cohen’s $d$ ranging from 0.59-1.21 (McLean et al., 2009). A majority of the intervention group demonstrated clinically significant change in body dissatisfaction (72%), weight and shape concern (63%), internalization of societal beauty ideals (53%), and emotional eating (63%)
directly following treatment and clinically significant change was demonstrated by a majority of participants at the 6-month follow-up assessment in body dissatisfaction (63%), external eating (53%), emotional eating (53%), and internalization of societal beauty ideals (56%; McLean et al., 2009).

Some studies have investigated the use of video feedback to provide eating disorder patients with novel visual feedback. Rushford and Ostermeyer (1997) reported that AN patients provided with video feedback experienced an 85% reduction in feelings of fatness and Fernandez and Vandereycken (1994) also found reduction in AN patients’ feelings of fatness following video feedback but the change was not clinically significant according to guidelines specified by Jacobson, Roberts, Berns, and McGlinchey (1999). Additionally, a number of research groups have been examining the utility of including virtual reality exposure to augment existing eating disorder and body image treatments with preliminary studies showing promise; however, more randomized controlled trials with greater sample sizes are required before firm conclusions can be made (for a comprehensive review, see Ferrer-García & Gutiérrez-Maldonado, 2012).

Legenbauer, Schutt-Stromel, Hiller, and Vocks (2011) used both mirror exposure and video feedback as part of a standalone 10 session body image treatment program administered to women with eating disorder diagnoses (43.9% AN, 41.5% BN, and 14.6% ED not otherwise specified). Participants showed significant improvements in body image cognitions, dysfunctional eating cognitions, and dietary restraint with medium to large effects sizes (Cohen’s $d$ ranged from .30-.86); however, the treatment did not significantly improve binge eating frequency (Legenbauer et al., 2011). This pilot study is noteworthy in that a body image treatment that involved (1) cognitive
restructuring regarding body-related core beliefs and behaviors; (2) mirror exposure and video feedback; (3) addressing body checking and avoidance behavior (Legenbauer et al., 2011). Additionally, the study’s findings were of note because the authors found that increasing positive body-related behaviors was also somewhat successful in decreasing disordered eating behaviors and cognitions, even though they were not a specific focus of treatment (Legenbauer et al., 2011).

Vocks, Busch, Schulte et al. (2010) compared brain activity of a small sample of women with AN using fMRI before and after a 10 session manualized body image treatment (Vocks & Legenbauer, 2005) that included components aimed at correcting body size overestimation, decreasing body avoidance, and modifying body-related cognitions. In comparison to pre-treatment body exposure (viewing photographs), activity in the extrastriate body area significantly increased in response to body exposure (Vocks, Busch, Schulte, et al.). Previous research had shown associations between activity in the extrastriate body area and body image disturbance in women with AN (Uher et al., 2005). Vocks, Busch, Schulte and colleagues also found significant changes in activity in areas that process reflective self-awareness and visuospatial processing and imagery in response to body exposure but did not find any significant changes in amygdala activity, which is associated with emotional processing, particularly negative emotions.

However, the video feedback studies (Fernandez & Vandereycken, 1994; Legenbauer et al., 2011; Rushford & Ostermeyer, 1997) and mirror exposure treatment components described by Key et al. (2002), Legenbauer et al. (2011), and Tuschen-Caffier et al. (2003) were not based on mindfulness and acceptance, which employs a
nonjudgmental framework when observing and describing the body. One study that did explore mindfulness-based mirror exposure (MME; Delinsky & Wilson, 2006) found that three sessions of MME yielded significant improvements in BC and avoidance, weight and shape concerns, body dissatisfaction, dieting, depression, and self-esteem in women directly following treatment and at six-month follow-up and was superior to a non-directive control treatment at follow-up in all but one of the aforementioned variables (dieting). Delinsky & Wilson (2010) described a BN case study that added four MME sessions to CBT-BN (Fairburn, Marcus, & Wilson, 1993) in which the patient’s BCQ and BSQ scores decreased significantly from pre- to post-treatment. The patient reported being able to see her body differently as a result of MME in that she had decreased checking behaviors, and, although she still reported dissatisfaction with certain body parts, she reported being able to focus less on body parts that she disliked (Delinsky & Wilson, 2010).

Shafran et al. (2009) also used the MME described by Delinksy and Wilson (2006) in a CBT treatment for extreme weight and shape concern. Shafran et al.’s treatment also included video feedback in exposure exercises aimed at reducing overestimation of body size using similar mindfulness techniques in which participants were asked to imagine they were viewing a stranger while viewing a video of themselves from all angles and describe the image in neutral language (Shafran et al., 2009). Compared to applied relaxation, CBT with MME was significantly more effective in reducing shape concern at post treatment and three month follow-up (Shafran et al., 2009). The CBT group also had significantly lower weight concern scores from baseline
to post-treatment, baseline to 1-week follow-up, and baseline to 12-week follow-up when compared to participants in the applied relaxation group (Shafran et al., 2009).

Tuschen-Caffier and colleagues (2003) developed a similar MME procedure that emphasizes describing parts of the body in a neutral, nonjudgmental manner as part of a manual for treatment of BN. Using that MME procedure (Tuschen-Caffier et al., 2003) in clinical and nonclinical female samples, researchers also found decreased frequency of negative cognitions from the first to the second MME session (Hilbert, Tuschen-Caffier, & Vögele, 2002) and a decrease in negative emotions (Vocks, Legenbauer, Wächter, Wucherer, & Kosfelder, 2007). In addition, one study found increased positive feelings and body satisfaction in obese adolescents participating in an inpatient weight loss program following MME compared to a control weight loss group that did not receive exposure sessions (Jansen et al., 2008).

Luethcke, McDaniel, and Becker (2011) compared three approaches to mirror exposure in a normal-weight nonclinical sample of female undergraduates. Participants were randomly assigned to receive two sessions of MME (based primarily on the procedure described by Delinsky and Wilson, 2006), nonjudgmental mirror exposure, or cognitive-dissonance based mirror exposure that were conducted by trained research assistants (Luethcke et al., 2011). Participants were provided written instructions on how to examine and comment on a number of body parts in a full-length mirror and completed the procedure in private but were audio recorded to assess compliance to condition-specific instructions (Luethcke et al., 2011). Participants in the MME condition were introduced to the concept of mindfulness and completed a guided breathing meditation exercise prior to their first mirror exposure session (Luethcke et al., 2011). Additionally,
they were asked to practice mindfulness while engaging in a daily activity between the first and second session (Luethcke et al., 2011). Participants in the nonjudgmental mirror exposure condition were instructed to make neutral or descriptive comments and asked to describe themselves as they would to somebody who was drawing them but could not see them (Luethcke et al., 2011). Participants in the MME condition were given the same instructions as those in the nonjudgmental mirror exposure conditions but were also instructed to focus on the present moment and to remain open-minded and accepting (Luethcke et al., 2011). Participants in the cognitive-dissonance based mirror exposure condition were asked to make positive comments about the appearance of each body part (Luethcke et al., 2011). Participants in all three conditions showed significant improvement over time in body checking and avoidance, symptoms of depression, satisfaction with body parts, overvaluation of shape and weight, and eating disorder symptoms; however, Time x Condition interactions were not statistically significant except for ratings of satisfaction with body parts, for which the cognitive-dissonance based mirror exposure yielded significantly greater improvement than the nonjudgmental mirror exposure and MME conditions (Luethcke et al., 2011). Mirror exposure gains were maintained at a one-month follow-up assessment (Luethcke et al., 2011).

**Proposed Research**

Repeated checking and avoidance of shape or weight are considered to be an expression of the core psychopathology of eating disorders and may maintain eating disorders and extreme body dissatisfaction (Shafran et al., 2004). Thus far, most studies examining these behaviors have used retrospective self-report measures or semi-structured client interviews (Cooper et al., 1987; Grilo et al., 2005; Reas et al., 2002;
Shafran et al., 2004) rather than examining the behaviors soon after they occur. As such, it is crucial to get more information regarding the actual day-to-day function of these otherwise private behaviors. Farrell et al. (2006) emphasized the importance of making experiments clinically meaningful by trying to make experimental manipulations parallel real-life experiences. Published research studies that used experimental manipulations of body checking were only conducted on one occasion (Shafran et al., 2007; Walker et al., 2012) as were those that manipulated individuals’ attention to liked and disliked body parts in body exposure sessions without directly instructing participants on how to examine their bodies (Smeets, Jansen et al., 2011; Smeets, Tiggemann et al., 2011). However, these behaviors are likely performed multiple times a day over days, weeks, months, and years. The incremental effects of body checking behaviors over time remain untested. Additionally, most research in mirror exposure has been conducted in female samples, so existing data are insufficient to determine its efficacy in men.

The purposes of this research are threefold. First, the study will determine the effects of repeated body checking behavior on mood, self-esteem, and body image over time, which has not yet been done. Second, the study will examine the effects of MME on the same variables. Despite being a promising treatment technique, MME has received relatively minimal empirical attention. Third, this study will provide important information about body checking and MME in males and females with high shape and weight concern. To date, male body checking research has been limited (Walker et al., 2009) and males were excluded from all but one study that used MME (Jansen et al., 2008), which only included eight males, only half of whom were in the treatment group that received MME. In other words, no published research has adequately assessed the
effects of repeated body checking or MME on mood, self-esteem, and body image in men. Additionally, few studies have examined muscle specific body checking behaviors (Walker et al., 2012).

This project offers information about the maintenance of eating and body-related problems, which are common in Western society, are often difficult to treat, and can have severe physical and emotional consequences. Not only will this project provide more information about an understudied treatment for body image problems, it will be one of the first examinations of MME in men. In addition, the study design is innovative in that it offers information about the effects of repeated body checking over time, as it occurs in real life, rather than only addressing body checking at one time point or using cross-sectional methods which do not allow causal inferences to be made. The study will allow for examination of gender differences in response to body checking and MME and will provide insight into their immediate effects and whether those effects persist over time. Only in designs such as the proposed study can hypotheses about body checking in men and women truly be tested and vital information for treatment-development be gathered. This study will provide necessary pilot data to inform body image interventions and will provide room for theoretical development in an area essential to treatment of eating disorders and body image dissatisfaction.

Method

Participants

Participants were recruited via the research pool, and flyers posted on the SUNY Albany campus and in the community. Research pool participants received course credits for their participation and the other participants were entered into a raffle for one of three
gift cards to a local shopping mall. Individuals who contacted the researcher ($N = 377$) were sent a link to complete an online survey of the Weight Concern and Shape Concern subscales of the EDE-Q (Fairburn & Beglin, 1994). Those who scored $\geq 1 SD$ above the norm for gender- and age-matched peers on either the EDE-Q shape concern or weight concern subscale were invited to participate. Of those eligible to participate ($N = 212$), 144 scheduled appointments. Of the 68 who did not schedule appointments, 15 indicated that they were no longer interested after hearing about the study procedure and the remaining 53 did not respond. Eleven participants did not attend their scheduled appointments. Of the 133 participants who attended scheduled appointments, 119 completed the in-laboratory and follow-up assessments, ten completed in-laboratory appointments but did not complete the follow-up questionnaire, and four stopped attending the study in the middle of their in-laboratory participation. One of the four participants who stopped attending study appointments reported that she was experiencing negative consequences from her participation in the study; the other three did not provide the researchers with an explanation.

Male participants were a $M (SD)$ age of 20.16 (7.5) years and had a $M (SD)$ BMI of 25.83 (5.1) kg/m$^2$. Female participants were a $M (SD)$ of 20.38 (4.2) years old and had a $M (SD)$ BMI of 25.30 (6.0) kg/m$^2$. The majority of participants reported their race/ethnicity as White/Caucasian (68.8%), with 12.0% identifying themselves as Asian, 8.0% as Black/African American/African, 4.0% as Latino(a)/Hispanic, 4.0% as more than one race, 1.6% as unknown/other, 0.8% as Native American, and 0.8% as Native Hawaiian/Pacific Islander. The demographics of the sample are comparable to other studies conducted in the university and at other universities in the Northeast.
Measures

Demographic data were collected from participants, including current height, weight, age, the gender with which participants identified, and indicators of socioeconomic status.

The Body Checking Questionnaire (BCQ; Reas, et al., 2002) is a 23-item self-report measure that asks participants to rate the frequency of specific body checking behaviors on a 5-point Likert-type scale from 1 (never) to 5 (very often). The global score ranges from 23-115, and higher global scores reflect greater psychopathology. Reas and colleagues (2002) found that the global BCQ scale has good test-retest reliability, with a Pearson’s $r$ of 0.94 after an average of two weeks. The scale has three subfactors, all of which have high test-retest reliability: overall appearance ($r = 0.94$), checking of specific body parts ($r = 0.91$), and idiosyncratic checking ($r = 0.90$). Reas and colleagues (2002) found that the BCQ had good convergent and discriminant validity and was able to discriminate between eating disorder patients and a non-clinical sample, between dieters and non-dieters, and between those identified as more and less concerned with body size, using a cut-off score of 110 on the BSQ. Reas et al. (2002) also reported high internal consistency for the global scale (Cronbach’s $\alpha = 0.92$) and three subfactors: overall appearance (Cronbach’s $\alpha = 0.88$), checking of specific body parts (Cronbach’s $\alpha = 0.92$), and idiosyncratic checking (0.83). Cronbach’s $\alpha$ for the BCQ in the current study was 0.93 at the baseline assessment. The BCQ was only given to female participants in the current study due to gender-specific differential item functioning on some items (Alfano, Hildebrandt, Bannon, Walker, & Walton, 2011).
The Male Body Checking Questionnaire (MBCQ; Hildebrandt et al., 2010) was developed to assess body checking behaviors that occur in men. The MBCQ was initially developed with 19-items, but evaluation in three separate samples led to the adoption of 16-item questionnaire with improved psychometric properties. The scale consists of four subscales: global muscle checking (GMC), which measures global aspects of muscle checking that involve both leanness/decreased body fat and increased muscle size, chest and shoulder checking (CSC) which measures checking behaviors directed to the chest and shoulder areas, other-comparative checking (OCC), which assesses how often participants compare themselves to others and seek reassurance, and body testing (BT), which assesses how often participants manipulate parts of their body to assess size and shape. Participants were asked to rate the frequency of each behavior on a 5-point Likert-type scale from 1 (*never*) to 5 (*very often*). The MBCQ has a range of 16-80, and higher scores reflect greater frequency of body checking behavior. The MBCQ has excellent internal consistency (Cronbach’s $\alpha = 0.94$; Walker et al., 2009). Cronbach’s $\alpha$ for the current study was 0.92 at baseline. Item development and factor structure are described in detail Hildebrandt et al. (2010). The MBCQ was only given to male participants in the current study due to gender-specific differential item functioning on a number of items (Alfano et al., 2011).

The Body Image Avoidance Questionnaire (BIAQ; Rosen et al., 1991) is a 19-item questionnaire that assesses avoidance of situations that provide information about body size and shape to the self or others. Participants were asked to rate the frequency of each behavior on a 6-point Likert-type scale from 0 (*never*) to 5 (*always*), with higher scores representing greater psychopathology (range: 0-95). Rosen and colleagues (1991)
reported that the internal consistency and test-retest reliability of the BIAQ were good (Cronbach’s $\alpha = 0.89$, $r = 0.87$, respectively). They also reported good convergent and discriminant validity. Factor analysis yielded four related subfactors: clothing, social activities, eating restraint, and grooming and weighing (Rosen et al., 1991). The BIAQ was able to distinguish between patients with bulimia nervosa and non-clinical participants and between participants with negative body image before and after a six-session cognitive behavioral intervention (Rosen et al., 1991). Items on the BIAQ predominantly demonstrated sex-based measurement invariance in a sample of French adolescents (Maiano, Morin, Monthuy-Blanc, & Garbarino, 2009). Cronbach’s $\alpha$ for the current study was 0.87 at baseline and 0.88 at one-week follow-up.

The Muscle Dysmorphic Disorder Inventory (MDDI; Hildebrandt, Langenbucher, & Schlundt, 2004) is a 13-item self-report questionnaire that uses a 5-point Likert-type scale ranging from 0 (never) to 4 (always), which was derived from the diagnostic criteria for muscle dysmorphism proposed by Pope, Gruber, and Choi (1997). The MDDI is comprised of three subscales: drive for size (DFS), which assesses desire to increase size and strength and belief that overall size, strength, and muscle size are less than desired, appearance intolerance (AI), which assesses negative beliefs regarding appearance and resultant avoidance and anxiety, and functional impairment (FI), which assesses the degree to which thoughts and feelings regarding the body interfere with daily functioning (Hildebrandt et al., 2004). The MDDI has good convergent validity, test-retest reliability ($r = 0.87$; Hildebrandt et al., 2004), and internal consistency (Cronbach’s $\alpha = .80$ for the full scale and 0.87, 0.81, and 0.81 for the DFS, AI, and FI subscales, respectively, Walker
et al., 2009). Only male participants completed the MDDI in the current study and Cronbach’s α was 0.72 at baseline and 0.74 at one-week follow-up.

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a widely used 36-item measure of eating disordered behavior that uses a 7-point forced-choice rating scale (0-6) with scores of four or higher considered to be in the clinical range. The EDE-Q has four subscales: restraint, eating concern, shape concern, and weight concern. Peterson et al. (2007) reported good internal consistency for the global score (Cronbach’s α = 0.90), restraint subscale (Cronbach’s α = 0.70), eating concern subscales (Cronbach’s α = 0.73), weight concern subscale (Cronbach’s α = 0.72) and shape concern subscale (Cronbach’s α = 0.83). The test-retest reliability of the EDE-Q is also high: the two week test-retest reliability was 0.92 for the weight concern subscale, 0.94 for the shape concern subscale, 0.87 for the eating concern subscale, and 0.81 for the restraint subscale (Luce & Crowther, 1999). With a longer interval, test-retest reliability of the EDE-Q is somewhat lower, but still acceptable: a median interval of 315 days yielded Pearson’s r of 0.79 for the global scale, 0.73 for the weight concern subscale and 0.75 for the shape concern subscale, 0.77 for the eating concern subscale, and 0.57 for the restraint subscale (Mond, Hay, Rodgers, Owen, & Beaumont, 2004). The EDE-Q also has good concurrent, predictive, convergent, and discriminant validity (Anderson, De Young, & Walker, 2009). For the current study, Cronbach’s α was 0.79 for the restraint scale, 0.85 for the shape concern scale, 0.78 for the eating concern scale, 0.75 for the weight concern scale, and 0.93 for the total scale at baseline.

The Body Image States Scale (BISS; Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002) is a six-item self-report scale that uses a 9-point Likert-type scale to
assess how the individual feels about his or her body “right now at this very moment.” Half of the items range from 1 (extremely dissatisfied) to 9 (extremely satisfied) and the other half of the items, which are reverse scored, range from 1 (extremely satisfied) to 9 (extremely dissatisfied). Items are averaged for a summary score with a range from 1-9 where lower total scores represent more negative body image states and higher total scores reflect more positive body image states. Cash et al. (2002) reported significant correlations between the BISS and trait measures of body image. They also reported sensitivity to change in the valence in evaluative scenarios in both men and women using the BISS; however, there was a significant interaction in which men displayed less sensitivity to negative body-related evaluative contexts than women (Cash et al., 2002). Internal consistency was adequate for the current study: Cronbach’s \( \alpha \) was 0.72 at baseline, 0.80 during laboratory appointments, and 0.84 at one-week follow-up.

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report measure designed to assess depressive symptoms. Items are scored on a Guttman scale from 0 to 3, with higher numbers reflecting greater depression levels. For example, the question assessing sadness has the following options: 0 (I do not feel sad), 1 (I feel sad much of the time), 2 (I am sad all the time), and 3 (I am so sad or unhappy that I can’t stand it). Items are summed for a total score ranging from 0-63. The BDI-II has good test-retest reliability, as well as good convergent and discriminant validity (Beck et al., 1996). The internal consistency of the BDI is sufficiently high, varying between \( \alpha = 0.74 \) and \( \alpha = 0.88 \) across samples. For the current study, internal consistency of the BDI-II was 0.86 at baseline. The test-retest reliability of the BDI is \( r = 0.75 \) for one week and \( r = 0.68 \) for two weeks (Hautzinger, Bailer, Worall, & Keller, 1995). The following norms
have been established for this questionnaire: Scores below 9 are regarded as healthy, and scores between 11 and 17 are viewed as slightly increased. In the clinical range, significant depressive symptoms are numerically expressed by values between 18 and 20 and depressive patients show values over 20 (Vocks, Stahn, Loenser, & Legenbauer, 2009).

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), a 20-item self-report measure of positive and negative affect, was used to assess how participants were feeling over the past month. The PANAS lists 10 adjectives associated with positive affect and 10 associated with negative affect using a 5-point Likert-type scale ranging from 1 (very slightly or not at all) to 5 (extremely). The positively valenced items are summed to make up a positive affect (PA) scale and the remaining items assess negative affect (NA), with higher scores indicating greater positive and negative affect, respectively. Watson et al. found that the scale has good internal consistency (Cronbach’s $\alpha$ = 0.84-0.90 for different time periods), test-retest reliability, and a distinct two-factor structure. For the current study, Cronbach’s $\alpha$ was 0.83 for PA and 0.82 for NA at baseline, 0.90 for PA and 0.89 for NA at 1 week follow-up, and 0.90 for PA and 0.88 for NA for in laboratory appointments.

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1979) is a 10-item Likert-type scale from 1 (strongly agree) to 4 (strongly disagree). Items are summed for a total score and higher scores represent higher self-esteem. The scale has adequate internal consistency and temporal consistency, with two-week test-retest reliability of $r = 0.85$-0.88 (Rosenberg). In addition good convergent and discriminant validity have been
reported (Rosenberg). In the current study, Cronbach’s $\alpha$ was 0.88 at baseline, 0.90 for in-laboratory appointment sessions, and 0.91 at the one week follow-up.

The Satisfaction and Dissatisfaction with Body Parts Scale (SDBPS; Berscheid, Walster, & Bohnstedt, 1973) measures the degree of dissatisfaction with 21 body parts on a 6-point Likert-type scale ranging from 1 (extremely satisfied) to 5 (extremely dissatisfied) and items are averaged for analysis. Higher scores reflect greater dissatisfaction with body parts. Although this scale has often been referred to simply as the Satisfaction with Body Parts Scale (e.g., Delinsky & Wilson, 2006), because higher scores represent increased dissatisfaction with body parts, the construct will be referred to as dissatisfaction with body parts in this paper. Additionally, for the current study, the item ‘legs and ankles’ was separated into two separate items, ‘legs,’ and ‘ankles,’ since individuals might feel very differently about their ankles than they do about other aspects of their legs, such as thighs, quadriceps, calves, etc. Thus, the current version comprised 22 items. The scale has sufficiently high convergent and predictive validity, internal consistency (Cronbach’s $\alpha = 0.94$), and test-retest reliability of $r = 0.90$ (Stice, 2001). For the current study, internal consistency was 0.90 at baseline, 0.89 during in-laboratory assessments, and 0.92 at one-week follow-up.

The Canada Fitness Survey (CFS; Canada Fitness Survey, 1983) questionnaire is designed to assess physical activity performed weekly, during the past month, and during the past year. The questionnaire contains questions about frequency, intensity, and duration of a number of different activities. For total activity, low to moderate test-retest correlations have been reported (Weller & Corey, 1998). They found slightly higher test-
retest correlations for males than females for all of the summary activity variables reported, except for time spent in yearly reported activity.

Procedure

Prior to their first appointment, participants who were eligible to participate in the study were given the link to an online survey that included the consent form and questionnaires on body image, self-esteem, depression, affect, body checking and avoidance behaviors, eating, exercise, and appearance- and performance-enhancing substance use ($N = 144$). The following two days, the participants also completed the brief body image, affect, and self-esteem measures in order to establish a baseline. Participants were randomly assigned to one of three conditions: (1) critical body checking for four days (CBC, $N = 39$); (2) mindfulness-based mirror exposure for four days (MME, $N = 48$); or (3) control condition, which involved high non-body related checking for four days (C, $N = 46$).

Those in the non-body related checking control condition were asked to edit typo-laden passages for ten minutes in a private room in the laboratory to control for any changes in body image, affect, or self-esteem that may come from intense scrutiny of something (i.e., checking behavior). Participants were scheduled to come into the laboratory on four consecutive days and followed the same procedure each time. They first completed a brief online survey regarding their mood, body image, self-esteem, and satisfaction with body parts, and then they completed the condition-specific assignment.

Participants in the CBC and MME groups listened to an audio recording giving them instructions about what body parts to check, how to manipulate those body parts (e.g., sucking in stomach, pinching fat, using a tape measure), and how to describe their
body (e.g., using neutral words only, describing disliked aspects of each body part). For the audio recordings, the instructions were read by a male researcher for male participants and read by a female researcher for female participants. During the body checking portion of the experiment in the laboratory, participants were alone in a private room with a full-length mirror and were asked to wear only a bathing suit, their undergarments, or other form-fitting clothing, but were reminded, both in the consent form and by the audio instructions, that they did not need to do anything that made them uncomfortable. Once they completed the mirror exposure portion of the experiment, participants re-dressed and completed the same brief online survey with a few extra questions added as a manipulation check to ensure that participants in each condition were performing only the types of behaviors requested.

Participants in the control condition were asked to read through passages for grammatical and spelling errors in order to account for any effects of non-body related critical scrutiny. The passages chosen were newspaper articles on relatively emotionally neutral topics that had nothing to do with body image, health, or fitness. Participants completed the same questionnaires before and after the control manipulation. During the passage editing procedure, participants were alone in the same room as those who were in the CBC and MME groups with the door closed and, thus, had the ability to look in the full-length mirror if they chose to.

Individuals in the CBC group were asked to examine individual parts of their bodies focusing on parts that are typically disliked. These body parts differed based on gender, with women’s body checking instructions focusing more on bottom, thighs, hips, stomach, and breasts, and men’s body checking instructions focusing more on shoulders
and abs, and on muscle size and definition. This procedure was designed to mimic *in vivo* body checking and the body parts and checking procedures included were based on the MBCQ (Hildebrandt et al., 2009) for men and the BCQ (Reas et al., 2002) for women. Research has shown that those who are high in body image dissatisfaction show initial increases in negative emotions and body-related cognitions after about 10 minutes of mirror exposure, and that these variables then decrease with continued duration of the exposure session (e.g., 40 minutes). Because these sessions are approximately 10 minutes in the current study, it is likely that participants in the CBC condition will remain focused on individual disliked body parts. As a result, it is expected that negative emotions and body-related cognitions will increase during this period, but participants will not be exposed to their bodies long enough to become habituated to it and for anxiety and negative affect to decrease. Because this is similar to the way in which individuals with high shape and weight concern check their body parts on a regular basis, it is unlikely that the procedure would increase distress much beyond normal levels. Additionally, research has shown that the increase in body dissatisfaction following the CBC condition is temporary (Shafran et al., 2007; Walker et al., 2012).

The MME procedure is based on the mindfulness-based mirror exposure developed by Wilson (2002) and described by Delinsky and Wilson (2006). In this procedure, participants are given information about how people often look at individual disliked body parts. Then the recording explains that in this exercise they will be asked to look at their bodies differently. Rather than focusing on specific disliked body parts, the participants are told that they will be examining their whole bodies and will be asked to describe body parts using neutral, nonjudgmental terms. The effects of the MME
condition are hypothesized to be different from typical body checking due to the guided instructions. Because participants will be instructed to look at themselves as a whole, and to describe themselves as they would a friend or stranger, they will experience their bodies differently from how they usually do. Over the course of the procedure, if the participant is following instructions, he or she should experience a gradual decrease in negative body image and negative body-related cognitions. Although some researchers consider it important to space exposure sessions out so that the newly conditioned associations will have time to consolidate, evidence has shown that massed exposure is as effective as graduated exposure for agoraphobia and simple phobia (Chambless, 1990). In order to determine whether or not consolidation effects were evident, participants were also asked to respond to the body image, affect, and self-esteem measures a week after their last session. For more information on the CBC and MME procedures, the transcripts of the audio recordings for the male CBC, female CBC, male MME, and female MME procedures are included in the Appendix.

Participants recruited from the psychology subject pool received 2.5 research credits in return for their participation if they completed all assessment points. Incremental credits were assigned for those who missed sessions or dropped out in the middle of the study. In addition, all research pool participants were entered into a raffle to win a $50 gift card to a local shopping mall. Participants recruited from fliers on campus and in the community were entered into a competition to win one of three prizes: first prize was a $200 mall gift card, second prize was a $100 mall gift card, and third prize was a $50 mall gift card. Participants were selected randomly and prizes were awarded at the completion of data collection.
All participants were given references for Thomas Cash’s (2008) empirically supported *Body Image Workbook* and referrals to local therapists as part of the consent form, in case they wished to learn more about improving their body image or to see a therapist. If participants experienced distress during the study, they were pointed to these resources and were reminded that they did not have to do anything that made them uncomfortable.

**Research Design**

Because each assessment is likely to be related to the previous assessment, participants’ responses are correlated with one another, or dependent, and the analysis needs to account for this. However, observations from different individuals are expected to be independent. Data were analyzed in SPSS using linear mixed models. A random effects model was used to account for the covariance of responses at each time point, because random effects models are flexible and parsimonious ways to model covariance and are particularly well suited to longitudinal data (Fitzmaurice, Laird, & Ware, 2004). Mixed models are also well suited for longitudinal data because they allow for missing data. Rather than excluding a participant who has missing data, analyses are conducted using each participant’s available data, reducing the need to impute values for missing data.

Separate models were run for each of the five dependent variables. Level 1 of the model represents within-subjects effects and Level 2 examines between-subjects effects. The first analysis for each model is an unconditional model, where no predictor variables (e.g., intervention effects) are specified (Raudenbush & Bryk, 2002). The second analysis in each model is a conditional model, which includes predictors. Group membership was
then used to predict the Level 1 intercepts and slopes. The following fit criteria were used to compare the null, or unconditional, model to the hypothesized model: Bayesian Information Criterion (BIC; Schwarz, 1978), Akaike Information Criterion (AIC; Akaike, 1973) and −2 Log Likelihood (−2LL), with smaller values representing better model fit. The −2LL value for the hypothesized model was subtracted from the −2LL value for the null model and a chi-square difference test was used to evaluate statistical significance of the hypothesized model. Post hoc planned comparisons were conducted to aid in interpretation of the results from mixed model analyses.

**Hypotheses.**

Hypotheses regarding the effects of condition are as follows: (1) Participants in the CBC condition will experience increased negative affect and dissatisfaction with body parts and decreased self-esteem, positive affect, and body image satisfaction (a) immediately following each CBC mirror exposure session; and (b) cumulatively over the four days of participation. (2) Participants in the MME condition will experience decreased negative affect and increased self-esteem, dissatisfaction with body parts, positive affect, and body image satisfaction (a) immediately following each MME session; and (b) cumulatively over the four days of participation. (3) Participants in the control condition will not experience significant changes in body image dissatisfaction, self-esteem, dissatisfaction with body parts, or affect either (a) immediately following the manipulation; or (b) cumulatively over the four days of participation.

Based on prior research, it is expected that there will be a significant main effect of gender on the dependent variables. Specifically, it is hypothesized that on average, women will demonstrate greater levels of negative affect and dissatisfaction with body
parts and lower levels of self-esteem, positive affect, and body image satisfaction than men.

Results

Participant Characteristics

Data were examined for multivariate outliers, skewness, kurtosis, and random response patterns. Data regarding the distributions of the primary outcome measures are presented in Table 1. Three cases were detected as multivariate outliers when age was included but two of these were not detected as multivariate outliers when age was excluded from the analysis suggesting that participants’ age did not affect their response patterns on other variables of interest. The other case identified as a multivariate outlier appeared to be a result of random responding and that participants’ responses were deleted. Data were examined for missing values. Measures had <5% missing values and were determined to be missing at random.

General linear models were used to determine whether the main outcome variables (RSE, PANAS, BISS, and SDBPS) differed significantly across baseline days and between conditions and gender. There were no significant differences between conditions at baseline or across the three baseline days. As expected, there were significant differences on all outcome variables for gender, with females displaying greater psychopathology across all measures. Because main outcome variables did not differ significantly over the baseline period, the data for these three days were averaged to yield a composite baseline score for the remaining analyses. After baseline data were merged, the final dataset included 1249 assessment points from 71 female and 62 male participants.
Participants were asked whether a number of items about their weight, shape, and body composition applied to them and were allowed to select as many or as few as they desired. As expected based on the lean, muscular male body ideal, male participants were primarily interested in increasing muscle mass (83.9%) and losing fat (82.3%), with barely any participants endorsing a desire to gain fat (3.2%) or decrease muscle mass (1.6%). A number of male participants endorsed that they thought they were overweight (35.5%) or flabby (50%), while a smaller percentage thought they were too skinny (16.1%) or underweight (8.1%). A relatively small percentage of men thought they were muscular (12.9%) and none of the men in the sample endorsed the item: “I like my body shape and size and do not want it to change.”

As expected based on the thin female body ideal, almost all female participants endorsed that they wished to lose fat (94.4%) and more than half also endorsed wanting to increase muscle mass (54.9%); whereas almost no participants endorsed a desire to gain fat (1.4%) or decrease muscle mass (2.8%). A significant proportion of women endorsed that they believed they were overweight (63.4%) or flabby (73.2%) with fewer endorsing the belief that they were muscular (9.9%) and very few endorsing that they were underweight (2.8%) or too skinny (2.8%). As was the case in the male sample, no female participants reported that they liked their body shape and size and did not want it to change.

State Body Image Satisfaction (BISS)

Hypotheses predicted that state body image satisfaction would be reactive to the manipulation such that both men and women in the CBC condition would experience decreased BISS scores directly following each CBC procedure and over the course of the
week in comparison to the control group. In contrast, it was predicted that participants in the MME condition would show the opposite results, with increased BISS scores directly following the procedure and over the course of the week compared to those in the control condition. Additionally, based on prior research showing that women have worse state body image than men, it was hypothesized that men’s BISS scores would be higher than women’s in the current sample.

The results show that when the intervention effect was not considered in the unconditional or null model, initial BISS scores were lower than nonclinical norms, $\beta_0 = 4.16$, showing that the sample had worse body image than the general population. Additionally, BISS scores were significantly different from zero, Wald $z = 47.15$, $p < .001$. There was also significant variation in initial intercept, $\sigma^2_v = 0.97$, $p < .001$. Results for the unconditional model are presented in Table 2. Because the null model suggested a significant amount of variability was present in BISS scores both within and between-individuals, level 2 factors of condition, time, gender, and their interactions were included in the model. The full model showed that condition was not a significant predictor of BISS scores, nor were there significant Gender x Time, Condition x Time, Condition x Gender, or Condition x Gender x Time interactions on BISS scores. Based on fit criteria, the full model was a worse fit than a more parsimonious model that included fewer factors. The best model fit included gender and time, both of which were significant predictors of BISS scores. A chi-square difference test showed that the model that included gender and time as fixed effects (-2LL = 3232.90) was a significantly better fit than the null model (-2LL = 3268.05), $\chi^2 = 35.15$, $p < .001$. Results from the conditional model are presented in Table 3.
Post hoc planned comparisons were conducted to examine differences between averaged pre-manipulation and post-manipulation BISS scores. It was predicted that participants in the CBC group would have significantly lower BISS scores directly following the manipulation, whereas participants in the MME group would have significantly higher post-manipulation BISS scores. Gender differences were also examined. When daily scores were averaged, the Condition x Gender interaction significantly affected BISS scores from pre- to post-manipulation, $F = 3.26, p = .04$, and there was a significant interaction between condition and pre- to post-manipulation BISS scores, $F = 6.77, p = .002$ (see Figure 1). Women in the CBC group exhibited greater decreases in BISS scores than men, pre-CBC female $M (SD) = 4.21 (1.18)$ to post-CBC female $M (SD) = 3.42 (1.06)$ and pre-CBC male $M (SD) = 4.73 (0.70)$ to post-CBC male $M (SD) = 4.53 (0.83)$, respectively. In the MME group, contrary to initial hypotheses, rather than increasing as predicted, men’s scores decreased slightly from pre-manipulation, $M (SD) = 4.52 (1.50)$, to post-manipulation, $M (SD) = 4.35 (35)$, and women’s scores remained stable from pre-manipulation, $M (SD) = 4.04 (1.12)$, to post-manipulation, $M (SD) = 4.0 (1.13)$. As predicted, in the control group, scores from pre- to post-manipulation remained stable in men, pre-C $M (SD) = 4.21 (1.18)$ to post-C $M (SD) = 3.42 (1.06)$, and women, pre-C $M (SD) = 4.52 (1.12)$ to post-C $M (SD) = 4.43 (0.79)$, (see Figure 1).

Additionally, post hoc planned comparisons compared scores on the outcome measures from the baseline period, the last laboratory assessment (directly following the procedure), and the follow-up assessment for men and women. For women in the CBC group, there were significant increases in BISS scores from the last laboratory session, $M$
(SD) = 3.78 (1.39), to follow up, $M (SD) = 4.35 (1.32)$. For women in the MME group, there was a significant increase in BISS scores from baseline, $M (SD) = 3.80 (1.16)$, to follow up, $M (SD) = 4.63 (1.55)$. Men in the control group had significant increases in BISS scores from baseline, $M (SD) = 4.27 (1.16)$, to the last session, $M (SD) = 4.57 (1.05)$, and men in the MME group had significant increases in BISS scores from baseline, $M (SD) = 4.03 (1.31)$ to follow-up, $M (SD) = 4.44 (1.44)$. There were no significant changes in BISS scores for women in the control group or men in the CBC group (see Figure 2).

**Dissatisfaction with Body Parts (SDBPS)**

Hypotheses predicted that dissatisfaction with body parts would be reactive to the manipulation such that both men and women in the CBC condition would experience increased SDBPS scores directly following each CBC procedure and over the course of the week in comparison to the control group. In contrast, it was predicted that participants in the MME condition would show the opposite results, with decreased SDBPS scores directly following the procedure and over the course of the week compared to those in the control condition. Additionally, based on prior research showing that women are more dissatisfied with their bodies than men, it was hypothesized that men’s overall SDBPS scores would be lower than women’s in the current sample.

The results show that when the intervention effect was not considered in the unconditional or null model, initial SDBPS scores were similar to those in a sample with high shape and weight concern (Delinsky & Wilson, 2006), $\beta_0 = 3.31$, and were significantly different from zero, $Wald z = 56.52, p < .001$. There was also significant variation in initial intercept, $\sigma^2_{v0} = 0.45, p < .001$. Results for the unconditional model
are presented in Table 4. Because the null model suggested a significant amount of variability was present in SDBPS scores, both within and between-individuals, level 2 factors of condition, time, gender, and their interactions were included in the model. Similar to BISS results, the full model showed that condition was not a significant predictor of SDBPS scores, nor were there significant Gender x Time, Condition x Time, Condition x Gender, or Condition x Gender x Time interactions on SDBPS scores. Based on fit criteria, the full model was a worse fit than a simpler model that included fewer factors. The best model fit included gender and time, both of which were significant predictors of SDBPS scores. A chi-square difference test showed that the model that included gender and time as fixed effects (-2LL = 829.81) was a significantly better fit than the null model (-2LL = 925.59), $\chi^2 = 95.78$, $p < .001$. Results from the conditional model are presented in Table 5.

Post hoc planned comparisons were conducted to examine average differences between pre-manipulation and post-manipulation SDBPS scores. It was predicted that participants in the CBC group would have significantly higher SDBPS scores directly following the manipulation, whereas participants in the MME group would have significantly lower post-manipulation SDBPS scores. Gender differences were also examined. When daily scores were averaged, there was a significant interaction between condition and pre- to post-manipulation SDBPS scores, $F = 6.70$, $p = .002$. As predicted, women in the CBC group exhibited increased SDBPS scores, pre-CBC $M (SD) = 3.42 (0.65)$ to post-CBC $M (SD) = 3.75 (0.53)$, as did men’s scores, pre-CBC $M (SD) = 3.00 (0.66)$ to post-CBC $M (SD) = 3.20 (0.77)$ (see Figure 3). In the MME group, contrary to initial hypotheses, rather than decreasing as predicted, men’s scores increased slightly
from pre-manipulation, $M (SD) = 3.22 (1.00)$, to post-manipulation, $M (SD) = 3.32 (1.09)$, whereas women’s scores decreased slightly from pre-manipulation, $M (SD) = 3.52 (0.73)$, to post-manipulation, $M (SD) = 3.43 (0.73)$ as predicted (see Figure 3). As predicted, in the control group, scores from pre- to post-manipulation remained stable in both men, pre-C $M (SD) = 3.04 (0.64)$ to post-C $M (SD) = 3.04 (0.64)$, and women, pre-C $M (SD) = 3.50 (0.67)$ to post-C $M (SD) = 3.45 (0.74)$, (see Figure 3).

Post hoc planned comparisons that examined change in SDBPS scores over time showed that women in the CBC condition had significantly lower scores at follow up, $M (SD) = 3.44 (0.75)$, than at the last laboratory session, $M (SD) = 3.51 (0.71)$. Women in the MME condition also had significantly lower SDBPS scores at the last session, $M (SD) = 3.10 (0.88)$, and at follow up, $M (SD) = 3.07 (0.88)$, compared to their baseline scores, $M (SD) = 3.62 (0.62)$. There were no significant changes over time in SDBPS scores in women in the control group or for men in any group (see Figure 4).

**Self-Esteem (RSES)**

Hypotheses predicted that self-esteem would be reactive to the manipulation such that both men and women in the CBC condition would experience decreased RSES scores directly following each CBC procedure and over the course of the week in comparison to the control group. In contrast, it was predicted that participants in the MME condition would show the opposite results, with increased RSES scores directly following the procedure and over the course of the week compared to those in the control condition. Additionally, based on prior research showing that female undergraduates have worse self-esteem than men, it was hypothesized that men’s RSES scores would be higher than women’s in the current sample.
The results show that when the intervention effect was not considered in the unconditional or null model, initial RSES scores were significantly different from zero, $\beta_0 = 17.42$, Wald $z = 40.00$, $p < .001$. There was also significant variation in initial intercept, $\sigma^2_v = 24.96$, $p < .001$. Results for the unconditional model are presented in Table 6. Because the null model suggested a significant amount of variability was present in RSES scores, both within and between-individuals, level 2 factors of condition, time, gender, and their interactions were included in the model (see Table 7). The full model showed that condition was not a significant predictor of RSES scores, nor was there a significant Condition x Gender interaction on RSES scores. Based on fit criteria the full model was a better fit than simpler models with fewer factors. There was a significant main effect of gender such that men scored higher on the RSES than women. There was also a significant Condition x Time interaction such that participants in both the CBC and MME conditions had higher RSES scores over time than participants in the C group. Post hoc analyses comparing the CBC to the MME condition did not yield a significant difference in the degree to which self-esteem improved over time, Wald $z = −0.26$, $p = .29$. Although not statistically significant, there was a trend toward men exhibiting higher RSES over time compared to women (Wald $z = 1.71$, $p = 0.09$). Overall, the three-way Condition x Gender x Time interaction was not statistically significant, $F(2, 80.93) = 3.06$, $p = .05$, but when broken down, the three way interaction between Gender x Time x CBC as compared to C was statistically significant (see Table 6), with male participants in the CBC condition showing significantly decreased RSES scores over time. A chi-square difference test showed that the full model ($-2LL = 6116.19$) was a significantly better fit than the null model ($-2LL = 6196.29$), $\chi^2 = 80.1$, $p < .001$. 
Post hoc analyses were conducted to examine average differences between pre-
manipulation and post-manipulation RSES scores. It was predicted that participants in the
CBC group would have significantly lower RSES scores directly following the
manipulation, whereas participants in the MME group would have significantly higher
post-manipulation RSES scores. Gender differences were also examined. When daily
RSES scores were averaged, there was a significant interaction between condition and
pre- to post-manipulation scores, $F = 4.56, p = .01$. Women in the CBC group exhibited a
slight decrease in RSES scores, pre-CBC $M (SD) = 16.88 (4.74)$, to post-CBC, $M (SD) =$
16.13 (4.95), to a similar degree as men’s RSES scores from pre-CBC, $M (SD) = 19.60$
(4.85), to post-CBC, $M (SD) = 19.13 (5.76)$. Contrary to initial hypotheses, rather than
increasing as predicted, men’s RSES scores remained stable from pre-MME, $M (SD) =$
17.78 (6.56), to post-MME, $M (SD) = 17.70 (7.32)$, and, supporting hypotheses, women’s
scores RSES increased somewhat from pre-MME, $M (SD) = 15.17 (5.29)$, to post-MME,$M (SD) = 15.85 (5.29)$. As predicted, in the control group, RSES scores from pre- to post-
manipulation remained stable in women, pre-C $M (SD) = 16.14 (3.91)$, to post-C, $M (SD) =$
16.75 (4.17). In contrast to hypotheses, men’s RSES scores increased from pre-C, $M$
$(SD) = 18.92 (5.40)$, to post-C, $M (SD) = 20.07 (3.59)$, and this increase was a similar
degree to the RSES score increase seen in men in the MME condition (see Figure 5).

Post hoc planned comparisons examining change over time in RSES scores found
significant increases in RSES scores from baseline, $M (SD) = 18.94 (5.43)$, to follow-up,$M (SD) = 20.67 (4.41)$, for men in the control group. Additionally, there were significant
increases from baseline, $M (SD) = 14.98 (5.52)$, to the last session, $M (SD) = 16.95$
(5.78), and from baseline to follow up, $M (SD) = 16.91 (5.14)$, for women in the MME
group. There were no significant changes for women in the CBC and control groups and no significant changes for men in the CBC and MME groups (see Figure 6).

**Negative Affect (NA)**

Hypotheses predicted that negative affect would be reactive to the manipulation such that both men and women in the CBC condition would experience increased NA scores directly following each CBC procedure and over the course of the week in comparison to the control group. In contrast, it was predicted that participants in the MME condition would show the opposite results, with decreased NA scores directly following the procedure and over the course of the week compared to those in the control condition. Additionally, it was hypothesized that men’s overall NA scores would be lower than women’s in the current sample.

The results show that when the intervention effect was not considered in the unconditional or null model, initial NA scores were moderate, $\beta_0 = 1.97$ (possible range 1-5), and were significantly different from zero, $Wald z = 37.59, p < .001$. There was also significant variation in initial intercept, $\sigma^2_{\gamma_0} = 0.35, p < .001$. Results for the unconditional model are presented in Table 8. Because the null model suggested a significant amount of variability was present in NA scores both within and between-individuals, level 2 factors of condition, time, gender, and their interactions were included in the model. The full model showed that gender was not a significant predictor of NA scores, nor were there significant Gender x Time, Condition x Time, or Condition x Gender interactions on NA scores. However, in the full model, the three-way Condition x Gender x Time interaction was significant on NA scores, $F(2, 101.27) = 5.63, p = .005$, with males in the CBC condition exhibiting greater increases in negative affect than
women over time in comparison to controls. Additionally, in the full model, there was a significant Condition x Time interaction, with those in the CBC group showing significantly decreased negative affect over time (Wald $z = -3.27$, $p = .001$) compared to participants in the control group. There was a trend toward similar findings in the MME group compared to controls, with lower negative affect scores over time (Wald $z = -1.94$, $p = .06$).

Nevertheless, based on fit criteria the full model was a worse fit (e.g., $-2LL = 1810.18$) than a more parsimonious model that included fewer factors. The best model fit included condition and time, both of which were significant predictors of NA scores (see Table 9). Examining the parameter estimates showed that, in accordance with initial hypotheses, participants in the CBC condition scored significantly higher than those in the control condition on negative affect (Wald $z = 2.61$, $p = .01$). Although not statistically significant, contrary to initial predictions, there was also a trend toward increased negative affect in the MME condition compared to control (Wald $z = 1.89$, $p = .06$). Post hoc analyses showed that there were no significant overall differences between participants in the CBC and MME conditions (Wald $z = 0.69$, $p = .50$). A chi-square difference test showed that the model that included condition and time as fixed effects ($-2LL = 1788.16$) was a significantly better fit than the null model ($-2LL = 1825.55$), $\chi^2 = 37.39$, $p < .001$. Results from the conditional model are presented in Table 9.

Post hoc analyses were conducted to examine average differences between pre-manipulation and post-manipulation NA scores. It was predicted that participants in the CBC group would have significantly higher NA scores directly following the manipulation, whereas participants in the MME group would have significantly lower
post-manipulation NA scores. Gender differences were also examined. When daily scores were averaged, there was a significant interaction between condition and pre- to post-manipulation NA scores, $F = 4.63, p = .01$, and gender significantly moderated that interaction, $F = 5.34, p = .006$. Women in the CBC group exhibited a greater increase in NA scores from pre-CBC, $M (SD) = 2.00 (0.72)$, to post-CBC, $M (SD) = 2.25 (0.79)$, compared to the degree of increase in men’s NA scores from pre-CBC, $M (SD) = 2.00 (0.85)$, to post-CBC, $M (SD) = 2.07 (0.70)$. Contrary to initial hypotheses, rather than decreasing as predicted, men’s NA scores increased slightly from pre-MME, $M (SD) = 1.78 (0.67)$, to post-MME, $M (SD) = 1.88 (0.91)$, and, supporting hypotheses, women’s NA scores decreased from pre-MME, $M (SD) = 2.26 (0.81)$, to post-MME, $M (SD) = 1.99 (0.85)$. As predicted, in the control group, women’s scores from pre- to post-manipulation remained relatively stable, pre-C $M (SD) = 1.82 (0.50)$ to post-C $M (SD) = 1.78 (0.55)$. In contrast to hypotheses, men’s NA scores decreased from pre-C $M (SD) = 1.65 (0.65)$ to post-C $M (SD) = 1.38 (0.59)$ (see Figure 7).

Post hoc comparisons comparing NA at baseline, the last session, and follow up in men and women showed significant decreases in NA in men in the MME group from baseline, $M (SD) = 2.42 (0.62)$, to the last session, $M (SD) = 1.88 (0.80)$, and from baseline to follow up, $M (SD) = 1.97 (0.73)$. Women in the MME group showed similar results, with significantly decreased NA scores between baseline, $M (SD) = 2.60 (0.66)$, and the last session, $M (SD) = 1.83 (0.94)$, and between baseline and follow up, $M (SD) = 1.91 (0.78)$. Additionally men in the control group reported significantly lower NA at the last session, $M (SD) = 1.45 (0.55)$, than at baseline, $M (SD) = 2.09 (0.66)$, and women in the control condition reported significantly higher NA scores at follow up, $M (SD) = 2.09$.
(0.64), than at the last session, $M (SD) = 1.87 (0.59)$. There were no significant changes in NA for men or women in the CBC group (see Figure 8).

**Positive Affect (PA)**

Hypotheses predicted that positive affect would be reactive to the manipulation such that both men and women in the CBC condition would experience decreased PA scores directly following each CBC procedure and over the course of the week in comparison to the control group. In contrast, it was predicted that participants in the MME condition would show the opposite results, with increased PA scores directly following the procedure and over the course of the week compared to those in the control condition.

The results show that when the intervention effect is not considered in the unconditional or null model, initial PA scores were moderate, $\beta_0 = 2.10$ (possible range: 1-5), and were significantly different from zero, Wald $z = 38.91, p < .001$. There was also significant variation in initial intercept, $\sigma^2_{\nu_0} = 0.50, p < .001$. Results for the unconditional model are presented in Table 10. Because the null model suggested a significant amount of variability was present in PA scores both within and between-individuals, level 2 factors of condition, time, gender, and their interactions were included in the model. The full model showed that neither condition nor time were significant predictors of PA scores, nor were there significant Gender x Time, Condition x Time, Condition x Gender, or Condition x Gender x Time interactions on PA scores.

Based on fit criteria the full model was a worse fit than a more parsimonious model that included fewer factors. The best model fit included only gender as a fixed effect, and, beyond the variance in PA scores accounted for by the intercept, gender was the only
significant predictor of PA scores in the full model, with men’s PA scores higher than women’s as predicted. A chi-square difference test showed that the best-fitting model (-2LL = 1679.12) was a significantly better fit than the null model (-2LL = 1716.51), $\chi^2 = 37.39$, $p < .001$. Results from the conditional model are presented in Table 11.

Post hoc analyses were conducted to examine average differences between pre-manipulation and post-manipulation PA scores. It was predicted that participants in the CBC group would have significantly lower PA scores directly following the manipulation, whereas participants in the MME group would have significantly higher post-manipulation PA scores. Gender differences were also examined. When daily scores were averaged, there were no significant interactions, condition did not have a significant effect on immediate changes in PA scores, and gender was the only significant main effect, $F = 10.24$, $p = .002$. Scores on the PA from men and women are presented in Figure 9.

Post hoc planned comparisons examining PA at baseline, following the last session, and at follow up found significantly lower PA scores in men in the CBC condition at follow up, $M (SD) = 2.29 (0.69)$, compared to baseline, $M (SD) = 2.67 (0.54)$, supporting initial hypotheses. Women in the CBC group experienced significantly lower PA at the last session, $M (SD) = 2.02 (0.79)$, compared to baseline, $M (SD) = 2.48 (0.64)$, in the predicted direction, but significantly higher PA scores at follow up, $M (SD) = 2.27 (0.91)$, compared to the last session, in contrast to initial predictions. Women in the MME group reported significantly lower PA scores at the last session, $M (SD) = 2.15 (0.60)$, than at baseline, $M (SD) = 2.47 (0.60)$, contrary to initial predictions. There were no significant changes in PA scores for men or women in the control group, as predicted.
There were also no significant changes for men in the MME group, contrary to the study hypotheses (see Figure 10).

**Discussion**

Although hypotheses predicted significant differences in the effects of the CBC and MME conditions on all outcome variables over time, the only variable for which there was a significant Condition x Time interaction in the best fitting conditional model was self-esteem. It was hypothesized that the CBC condition would have a negative impact on body image satisfaction immediately and would have a cumulative effect over time compared to controls, whereas those in the MME condition would experience improved body image satisfaction immediately and over time compared to controls. For the best fitting model, there was a main effect of time and of gender on body image satisfaction, such that men had greater body image satisfaction ratings than females, regardless of condition, and body image satisfaction tended to increase over time, although this effect was relatively small.

Post hoc analyses examining pre- and post-CBC scores for all laboratory appointments showed that body image satisfaction was significantly lower directly following the CBC manipulation in female participants, as had been predicted, whereas men’s scores remained stable. Contrary to initial hypotheses, no significant two or three-way interactions appeared to be present, suggesting that the conditions’ effects on body image satisfaction did not differ significantly in males and females over time. Post hoc analyses that looked at baseline, day 4 post-manipulation, and follow-up time points with gender collapsed showed a significant quadratic relationship between condition and time on BISS scores. Rather than demonstrating cumulative decreases in body image
satisfaction over time, at the one-week follow-up assessment participants in the CBC condition demonstrated significantly greater body image satisfaction in comparison to directly after their last CBC manipulation in the laboratory, although results at follow-up did not significantly differ from baseline. This suggests that repeated scrutiny of typically disliked body parts by men and women with high shape and weight concern may not have a cumulative effect, worsening body image satisfaction over time, as has been posited by leading researchers in the cognitive behavioral treatment of eating disorders (Fairburn et al., 2003; Shafran et al., 2004; Shafran et al., 2007).

Post hoc analyses that looked at baseline, day 4 post-manipulation, and follow-up time points showed a significant increase in body image satisfaction from baseline to the last laboratory assessment point and from baseline to follow-up for participants in the MME condition, as predicted. However, contrary to predictions, post-hoc comparisons of average pre- and post-MME sessions showed that the procedure did not have an immediate impact on body image satisfaction.

Contrary to hypotheses that there would be no changes in the body image satisfaction of individuals in the control group, post hoc analyses examining baseline, day 4 post-manipulation, and follow-up time points collapsed for gender showed a significant increase in body image satisfaction from baseline to the last laboratory appointment and from baseline to follow-up. However, as predicted, the average pre- to post-manipulation body image satisfaction did not change for individuals in the control condition. It is possible that demand characteristics of the study were responsible for these improvements in body image satisfaction. If participants believed that their manipulation was supposed to improve their body image satisfaction, they may have either felt better
as a result of the placebo effect or they may have reported feeling better to please or help the researcher.

It was hypothesized that the CBC condition would increase dissatisfaction with body parts immediately and would have a cumulative effect over time compared to controls, whereas those in the MME condition would experience decreased dissatisfaction with body parts immediately and over time compared to controls. For the best fitting model, there were significant main effects of time and gender with males having significantly lower scores than females, indicating greater overall satisfaction with their body parts, regardless of condition. Additionally, corresponding with improvement in state body image satisfaction over time regardless of condition, dissatisfaction with body parts decreased significantly over time, although the degree of change between each time point was also very small. Contrary to initial hypotheses, no significant two- or three-way interactions appeared to be present, suggesting that the conditions’ effects on dissatisfaction with body parts did not differ significantly in males and females over time.

Post-hoc comparisons examining the direct effects of the procedures on dissatisfaction with body parts showed that when collapsed for gender, participants reported significantly greater dissatisfaction with their body parts directly following the laboratory CBC procedures, as predicted. When examined separately for men and women, only women showed significant increases in dissatisfaction with body parts from pre- to post-CBC. However, when examined over time, in contrast to predictions that dissatisfaction with body parts would increase, there were no cumulative effects of the CBC condition from baseline to the last laboratory appointment or from baseline to follow-up. Similar to the results found with ratings of body image satisfaction, these
results suggest that the negative impact of body checking may not be long lasting in individuals with high shape and weight concern, as researchers have theorized.

Contrary to initial hypotheses predicting decreased dissatisfaction with body parts directly following the MME procedure, there were no significant changes from averaged pre-MME to post-MME scores. However, in accordance with initial hypotheses, there were positive effects of MME on dissatisfaction with body parts over time. When collapsed for gender, dissatisfaction with body parts was significantly lower at the last laboratory appointment than at baseline and continued to be significantly lower than baseline dissatisfaction with body parts at follow-up. There were no significant differences in dissatisfaction with body parts between the last laboratory appointment and follow-up. As predicted, there were no significant direct or cumulative effects of the control condition on dissatisfaction with body parts.

It was hypothesized that the CBC condition would lower self-esteem immediately and would have a cumulative effect over time compared to controls, whereas those in the MME condition would experience improved self-esteem immediately and over time compared to controls. For the full model, which was the best fitting model for the self-esteem outcome variable, there was a significant main effect of gender, with men in the sample reporting greater overall self-esteem than women. In contrast to findings with body image satisfaction and dissatisfaction with body parts, the main effect of time was not significant. The interaction between gender and time was not statistically significant; however, there was a trend toward males experiencing a greater degree of improvement in self-esteem over time than women. There were also significant interactions between condition and time, the results of which were partially supportive of initial hypotheses.
Contrary to initial predictions that self-esteem would decrease over time in the CBC condition, the CBC group’s ratings of self-esteem actually increased over time compared to those in the control condition. In contrast, post hoc analyses examining average pre- and post-manipulation scores showed the expected decrease in self-esteem directly following the CBC procedure. Again, findings for self-esteem showed that although scrutiny of typically disliked body parts immediately decreased self-esteem, as expected, body checking did not cause any lasting decreases in self-esteem. In fact, the best fitting linear mixed model showed no significant differences between the CBC and MME conditions over time on self-esteem.

As predicted, those in the MME condition experienced significantly greater improvement in self-esteem ratings over time compared to those in the control condition. Post hoc analyses showed that participants in the MME group reported significant increases in self-esteem from baseline to the last laboratory appointment and from baseline to the follow-up appointment, when collapsed across gender. When examined individually, only females in the MME group showed significant increases in self-esteem and males in the MME group showed no significant changes in self-esteem among baseline, last day in the laboratory, and follow up assessments. As was the case with body image satisfaction and dissatisfaction with body parts, there were no immediate changes in self-esteem from pre- to post-manipulation in post hoc analyses of the MME condition.

Contrary to original hypotheses, post hoc comparisons showed that participants in the control condition reported significantly greater self-esteem from baseline to the last laboratory assessments, when collapsed for gender. Examining male and female participants in the control condition separately showed that men’s self-esteem scores
were significantly higher from baseline to the one-week follow up assessment and there was a trend toward higher scores from baseline to the last session. In contrast, women in the control group evidenced no significant changes in self-esteem over time. Post hoc comparisons also showed that there were no direct effects of the control condition on self-esteem, as hypothesized. Additionally, there was a significant three way interaction between CBC and control, gender, and time such that in comparison to females, males in the CBC condition experienced greater decreases in self-esteem over time, when compared to those in the control condition. This three-way interaction appeared to be present because while self-esteem remained stable in men in the CBC group over time, it actually improved in those in the control group.

It was hypothesized that the CBC condition would experience increased negative affect immediately following each procedure and would show increased negative affect over time compared to controls, whereas those in the MME condition would experience decreased negative affect immediately and over time compared to controls. For the best fitting model, there was a significant main effect of time, with participants’ negative affect decreasing somewhat over time, regardless of gender or condition. Additionally, there was a significant main effect of condition, with participants in the CBC condition evidencing significantly greater negative affectivity than those in the control condition. However, there were no significant differences between individuals in the CBC and MME groups with regard to their levels of negative affect.

Post hoc comparisons showed that when collapsed for gender, participants in the CBC group had significantly reduced negative affect from baseline to the last laboratory appointment and from baseline to the one-week follow up, which was in the opposite
direction from what was expected. When examined separately, the decreased negative affect from baseline to the last session and baseline to follow up was only significant for women in the CBC condition, while men’s negative affect remained relatively stable for all time points.

Although negative affect decreased over time for those in the CBC group, an effect that was opposite to what was predicted, when post hoc comparisons examined the average pre- to post-manipulation changes in negative affect, negative affect increased significantly as predicted. When males and females in the CBC group were examined separately, women experienced significantly higher negative affect directly following the manipulation supporting the hypothesis, whereas men’s negative affect remained stable directly following the CBC procedures.

Post hoc planned comparisons showed that there were significant reductions in negative affect from baseline to the last session and from baseline to follow up and remained stable from the last session to follow up for individuals in the MME group, as predicted. When men and women were examined separately, the same results were found for both sexes. Pre- to post-manipulation post hoc comparisons collapsed for gender yielded no significant changes in negative affect directly following the MME procedures. However, examining men and women separately showed that men’s negative affect remained stable directly following the MME procedures, whereas women’s negative affect decreased significantly directly following the MME procedures, as hypothesized. These results were similar to the pattern seen in negative affect reactivity to the CBC procedure where men’s levels of negative affect were less reactive than women’s to mirror exposure.
In contrast to initial hypotheses that those in the control condition would not experience any significant changes in negative affect, post hoc comparisons found that negative affect decreased significantly from baseline to the last session and from baseline to follow up, when collapsed across gender. Examining both men and women separately, men had significant decreases in negative affect from baseline to the last laboratory appointment and from baseline to the one-week follow up. Although there was a trend toward decreased negative affect from baseline to the last session for women in the control group, it was not statistically significant. In women, negative affect increased significantly from the last session to the follow up assessment in control women. When collapsed for gender, there was a significant decrease in negative affect directly following the control manipulations. Examining both men and women separately, men had significant decreases in negative affect directly following control manipulations contrary to initial predictions, whereas women’s negative affect remained stable directly after editing written text for mistakes as predicted.

It was hypothesized that the CBC condition would experience decreased positive affect immediately following each procedure and would also show decreased positive affect over time compared to controls, whereas those in the MME condition would experience increased positive affect immediately and over time compared to controls. The best fitting model had a significant main effect of gender in the predicted direction. Men exhibited greater positive affect than women in the sample, regardless of condition.

Post hoc comparisons showed significant decreases in positive affect from baseline to the last CBC session and from baseline to follow up, when collapsed across gender. Examining men and women in the CBC group separately showed that for men,
only the decrease from baseline to follow up was statistically significant. In contrast, for women, there was a significant decrease in positive affect from baseline to the last CBC session and a significant increase in positive affect from the last session to follow up. For women, the difference between baseline and follow up was not significant, suggesting that for women, the negative impact of CBC on positive affect was not long-lasting, contrary to initial hypotheses. Examining pre- to post- manipulation effects in the CBC group, there were no significant changes directly following the CBC procedures, on average. This was also true in both men and women when separate analyses were conducted.

For participants in the MME condition, post hoc comparisons showed significant decreases in positive affect from baseline to the last session, which was in the opposite direction from the original hypothesis. When men and women were examined separately, there were no significant changes in positive affect for men in the MME group among the baseline, final in-laboratory, and follow-up assessments. In contrast, the decrease in positive affect from baseline to the last session was statistically significant. Examining pre- to post- manipulation effects in the MME group, there were no significant changes directly following the MME procedures, on average. This was also true in both men and women when separate analyses were conducted. This did not support the hypothesis that MME would have a positive effect on positive affect directly after the procedure.

For participants in the control condition, there were no significant direct effects of the control procedure on positive affect in men or women. Additionally, when men and women were examined separately at baseline, the last session, and follow up there were no significant changes over time in positive affect in either men or women in the control
group. However, when the control group was analyzed including both male and female
participants, there was a significant decrease in positive affect from baseline to the last
session and from baseline to follow up.

Overall, the CBC condition appeared to have the expected negative consequences
in the variables of interest directly following the body checking procedure. However,
contrary to predictions and the cognitive behavioral rationale for body checking’s role in
the maintenance of body image dissatisfaction (Fairburn et al., 2003; Shafran et al., 2004;
Shafran et al., 2007), there were no long term decrements in any of the variables
measured and, in a number of cases, there was actually significant improvement over
time. It was hypothesized that CBC would lead to negative changes directly following
each body checking session on the variables examined. When gender was collapsed there
were significant differences pre- to post-CBC for dissatisfaction with body parts, self-
esteem, and negative affect in the predicted directions. However, when separate
comparisons were conducted in men and women, the men did not exhibit any direct
effects of the CBC condition for any of the outcome variables examined contrary to
expectations, whereas women reported decreased body image satisfaction and self-esteem
and increased dissatisfaction with body parts and negative affect immediately following
CBC sessions, as hypothesized.

Additionally, it was hypothesized that the CBC condition would lead to long-
lasting negative effects in the outcome variables examined. Contrary to hypotheses, in
general, the CBC condition led to either no significant changes over time or significant
positive effects from baseline to follow-up assessment points. Specifically, there were no
significant changes in body image satisfaction or dissatisfaction with body parts over
time for CBC participants when collapsed for gender. When men and women in the CBC group were examined separately there were no significant changes in men’s body image satisfaction or their dissatisfaction with body parts over time. In contrast, women in the CBC group showed significant improvement in body image satisfaction and decreased dissatisfaction with body parts from the last laboratory session to the one-week follow up, contrary to the expected results. There were no significant changes over time in self-esteem for participants in the CBC condition; however, there was a trend toward improvement from baseline to follow-up in women, which was significant in the main analyses and, again, was not in the expected direction. For negative affect, when collapsed across gender, there was a significant decrease from baseline to the last session and from baseline to follow up for participants in the CBC group. When the effect of CBC on negative affect was analyzed separately for men and women, this relationship was significant only in women. Again, rather than increasing negative affect over time as hypothesized, participants in the CBC condition, especially the female participants, actually experienced significant improvements in negative affect over time. The only variable that showed significant change over time in the expected direction for participants in the CBC group was positive affect. When collapsed across gender, there was a significant decrease in positive affect from baseline to the last session and from baseline to follow up. When men and women were examined separately, men in the CBC group showed a significant decline in positive affect from baseline to follow-up, as hypothesized. Although women in the CBC group showed a significant decrease in positive affect from baseline to the last session as expected, they then showed a significant increase in positive affect from the last session to the follow up appointment.
There were no significant differences between baseline and follow-up scores, suggesting that even though the CBC condition led to decreased positive affect while participants were actively engaging in the body checking manipulation, these effects were temporary in women, as positive affect returned to baseline levels once the women were no longer completing the laboratory body checking manipulation.

It was hypothesized that MME would lead to cumulative positive changes in the outcome variables examined over time. Overall, as predicted, results showed that MME had long-lasting positive effects on body image satisfaction, dissatisfaction with body parts, self-esteem, and negative affect, particularly among female MME participants. These findings support other research that has reported positive results from MME in women that persisted beyond the end of treatment (Delinsky & Wilson, 2006; Luethcke et al., 2011; Shafran et al., 2009). It was also hypothesized that MME would lead to positive changes directly following each procedure on the variables examined. In contrast to initial predictions, participants in the MME condition did not show direct effects of the manipulation for any variables except for negative affect, for which only females showed significant direct improvement following the MME procedures.

It was hypothesized that the control condition would not have a significant impact on the outcome variables either directly following or over time; however, these hypotheses were only partially supported. When examining the average scores directly before and directly after the control procedure, there were no significant direct effects of the procedure on the outcome variables of interest when collapsed for gender or when men and women were examined separately with one exception. When collapsed for gender, participants in the control condition had significant decreases of negative affect.
directly following the control procedure. Examining these for men and women separately showed that significant decreases in negative affect directly following the control procedure were only present in male participants. In sum, as predicted, there were no significant direct effects of the control procedure on body image satisfaction, dissatisfaction with body parts, self-esteem, or positive affect.

The results of the post hoc comparisons examining the outcome variables over time for control participants were more variable. In the control group, when collapsed across gender, there was a significant increase in body image satisfaction from baseline to the last session and from baseline to follow up. When men and women were examined separately, men’s body image satisfaction increased significantly from baseline to the last session and there were no significant changes in body image satisfaction for women in the control group. Similarly, when examined together, control participants showed significantly higher self-esteem at the last session compared to their baseline scores. Examining men and women separately showed that only men in the control group had significant increases in self-esteem from baseline to follow up. There were also significant changes in negative affect over time in control participants, with significantly lower negative affect from baseline to the last session, from the last session to follow up, and from baseline to follow-up. In male control participants, there were significant decreases in negative affect from baseline to the last session and from baseline to follow up. In contrast, in control women, there was a significant increase in negative affect from the last session to the follow up session. In the control group, there were significant decreases in positive affect from baseline to the last session and from baseline to follow up. When men and women’s positive affect were analyzed separately, neither men’s nor
women’s positive affect changed significantly over time, although there was a trend toward a decrease in positive affect from baseline to the last session in men in the control group. As predicted, there were no significant changes in dissatisfaction with body parts over time in male or female participants. Overall results suggest that participants in the control group, particularly male participants, experienced improvements in body image satisfaction, self-esteem, and negative affect over time. Positive affect was the only variable on which scores suggested a worse outcome over time rather than no change or improvement. In contrast, when examined separately women’s scores were not reactive to the control procedure over time, as hypothesized.

Overall, women were more reactive to the two experimental manipulations (CBC and MME) and, other than increased self-esteem for female CBC participants over time, the significant results were all in the predicted directions in women. Similarly, women’s response to the control procedure was also predominantly null as hypothesized, excluding a significant increase in negative affect over time. Interestingly, negative affect decreased over time in men in the control group. One possible reason that women in the control group experienced increased negative affect over time is that there was some reactivity to completing daily questionnaires about body image satisfaction and related variables, which likely resulted in increased preoccupation with body and weight related thoughts. Women ruminate on negative thoughts and feelings far more than men do in response to stressors (Nolen-Hoeksema, 2001). Additionally, a great deal of evidence indicates that those who ruminate in response to stressors are at increased risk of developing depressive symptoms (Nolen-Hoeksema, Larson, & Grayson, 1999). Were the women in the control group, who had a high baseline level of shape and weight concern, continuing to ruminate
on their body dissatisfaction after completing body image related questionnaires, it may explain their increased negative affect over time.

In contrast, men are more likely to respond to stressors with either problem focused coping or distraction (Nolen-Hoeksema, 2001), and both males and females believe that men should cope with problems by distracting themselves rather than by ruminating (Broderick & Korteland, 2002). There are two reasons why this may underlie the improvement seen in men in the control group with regards to negative affect, self-esteem, and body image satisfaction over time. The men in the sample were most likely used to using distraction as a coping skill and were less likely to ruminate than the female participants. Because distraction can be a more successful coping strategy, men may have experienced benefits from the control condition, as it offered non-body related activities and content on which they could focus. Also, because study descriptions were somewhat vague regarding the expected outcomes for the different conditions so as not to influence the results, the men may have believed that the control condition was intended to improve their mood and body image satisfaction because they believe distraction is an effective coping skill. If they believed that the control condition was intended to cause improvement, they may have subconsciously or knowingly responded in that way.

Women in the sample had higher average baseline body dissatisfaction and shape and weight concern than the men, which may also have been a factor in the gender differences in reactivity to the experimental conditions. Additionally, the CBC conditions differed based on typically disliked body parts common to males and females and checking behaviors reported by males and females. As a result, the CBC condition for men included both muscle and fat checking behaviors. Comparing physical activity and
body image variables in a sample of physically active men and women with a wide range of variation in age, Davis and Cowles (1991) found that young men who exercised more reported greater body satisfaction and greater body focus. In contrast, young women who report greater body focus typically report lower body satisfaction. This suggests that young men who exhibit high body focus, with which there is considerable conceptual overlap with the concept of overconcern with shape and weight, may actually exhibit greater body satisfaction, especially if they engage in regular exercise. In the current study, participants were recruited based on EDE-Q shape concern and weight concern scores rather than based on measures of body dissatisfaction; however, those constructs are typically highly correlated. It is possible that men may be more likely to score high on the weight and shape concern subscales of the EDE-Q at both high and low extremes of body dissatisfaction, which could have obscured findings in the study that might have been evident were participants specifically recruited based on their levels of body dissatisfaction. This line of inquiry merits further study.

Limitations and Future Directions

The findings of the current study should be interpreted in light of certain limitations. First, the sample used was a convenience sample that predominantly consisted of undergraduate psychology students and individuals in the university community. Attempts to recruit individuals from outside the university community were largely unsuccessful. Results may not generalize to older individuals, clinical samples, those with differing education levels, or those from different geographical regions. Additionally, because the sample was predominantly comprised of freshman psychology
undergraduates participating for research credits, participants may not have been as likely to take the study seriously as a treatment-seeking sample.

Second, participants may have had difficulty following instructions to examine their bodies neutrally as a whole if they were used to critically monitoring their bodies and focusing on specific, disliked body parts. These concerns could be addressed in future research by including a training session to model nonjudgmental observation, which would increase confidence in the experimental manipulation. Alternatively, it may also be more successful if a researcher is present to help guide MME sessions and ensure that participants are remaining nonjudgmental and staying in the present moment.

However, in spite of the limitations of the current study, this study adds important information to body image and eating disorder literatures. This research is the first to utilize an experimental design to examine the direct effects of a repeated body checking behavior manipulation in both men and women. It is also the first study to examine the effects of body checking behavior and MME in men with high shape and weight concern. Additionally, to the author’s knowledge, it is only the second to examine the direct effects of body checking and MME in men and to include muscle checking behavior specifically. The study design was innovative in that it allowed for both direct and cumulative effects of the body exposure sessions to be examined, an ecologically valid method that is essential in determining the function of checking and avoidance behavior and the processes of change involved in new and existing treatment techniques.

The findings also highlight the need for further research into treatment techniques aimed at reducing critical body checking in men and women. It is likely that more extensive training and practice in mindfulness techniques (including facets of attention
control, present-moment awareness, and nonjudgmental observation) are required in order for such interventions to be effective in improving men’s and women’s body image. Although participants were high in shape and weight concern, they were drawn from a general university sample and were predominantly nonclinical; however, some participants reported a substantial degree of eating, exercise, and body related psychopathology. Research examining the effects of MME in clinical samples is limited to date and is an important direction for future study. Measuring eating disordered participants’ cognitions and affect directly after each MME session would help shed light on the change processes in vivo, and provide ecologically valid information.

Conclusions

Given the prevalence of body dissatisfaction among college-age men and women, which puts individuals at risk of developing eating disorders, dieting, and unhealthy weight control behaviors, the need for empirically supported body image dissatisfaction treatments and prevention programs is particularly salient. Empirically supported treatments for eating disorders are better at reducing negative behaviors than they are at decreasing negative body image and overconcern with shape and weight, which often endure following treatment and significantly increase the risk of relapse (Fairburn et al., 1993). Leading experts in the field of eating disorders have described the degree of change in body image following CBT for eating disorders as “modest,” highlighting the need for improved body image treatments (Delinsky & Wilson, 2006; Rosen, 1995).

Although body checking and avoidance behaviors have been addressed in CBT treatments for eating disorders (Fairburn, 2008), body dysmorphic disorder (BDD; Rosen, 1995; Rosen et al., 1995), and extreme body image dissatisfaction (Cash, 2008;
Cash & Smolak, 2011), and are implicated in theoretical accounts of eating disorder and body image dissatisfaction maintenance (Fairburn et al., 2003; Wilson 1999b), until recently there was little research on the topic. Body checking and avoidance behaviors are common among those suffering from eating disorders and extreme body image dissatisfaction (Shafran et al., 2004) and have also been reported with less frequency in nonclinical samples (Shafran et al., 2007; Walker et al., 2009) and are associated with a range of negative behavioral, emotional, and cognitive outcomes. Nonetheless, body checking and avoidance behaviors have only begun to be researched as an important target of treatment within the last decade (Fairburn, 2008). Specifically, few studies have used experimental means to examine the direct effects of body checking manipulations, and, although individuals with disordered eating and body image dissatisfaction typically engage in body checking behaviors on a regular basis over long periods of time, existing studies have only studied the effects of manipulating body checking on one occasion (Shafran et al., 2007; Walker et al., 2009),

Body checking and avoidance behaviors appear to function similarly to checking and fixing behaviors present in anxiety disorders, which have been successfully treated with exposure and response prevention. Given the overlap between the ritualistic nature of body checking behaviors in individuals with eating disorders, BDD, MD, and extreme body image dissatisfaction, adopting similar treatment techniques may be a powerful means of decreasing both checking behaviors and their negative cognitive and emotional sequelae. Additionally mindfulness and acceptance based treatments such as Acceptance and Commitment Therapy, Dialectical Behavior Therapy, Mindfulness-Based Cognitive Therapy, and Mindfulness-Based Stress Reduction have received considerable empirical
support in the treatment of anxiety and depression, borderline personality disorder, and in preventing relapse in major depression. Given the considerable rates of comorbidity between eating disorders and anxiety disorders, depression, and borderline personality disorders, adopting similar treatment techniques may also be beneficial in the treatment of severe body image dissatisfaction and eating disorders. Recently researchers have incorporated aspects of mindfulness and acceptance into mirror exposure exercises for the treatment of body image dissatisfaction and eating disorders (Delinsky & Wilson, 2006; Tuschen-Caffier et al., 2003). Although the body of literature on MME is nascent, it appears to be a promising treatment technique and merits further study. Studies examining the use of MME in men are notably absent from the literature.

The present study sought to address the gaps in the body checking and avoidance literature by comparing an experimental manipulation of body checking over time in male and female participants with high shape and weight concern. Further, the present study examined MME in both men and women with high shape and weight concern in a study design that allowed the direct and cumulative impact of the treatment technique to be assessed. The results bring into question theoretical accounts of eating disorder maintenance that cite body checking as a possible etiological and maintenance of body image dissatisfaction in that there were no long-lasting negative effects and even some changes in the positive direction over time for women in the CBC condition.

It is possible that these unexpected findings relate to the sample characteristics. Participants with high shape and weight concern were selected and, as a result, are likely to already regularly engage in body checking and avoidance behaviors. Thus, a ceiling effect may have been present with regards to long-term effects of critical body checking.
Using a sample with a wide range of baseline body image dissatisfaction for a similar study would help determine the underlying reason for the current findings. Nonetheless, the present findings support results of temporary negative effects of a CBC manipulation in nonclinical women (Shafran et al., 2007) and nonclinical men (Walker et al., 2012). Additionally, the procedure involved a 10-min session rather than multiple very brief mirror exposures over the course of a day, and as such, is somewhat different from typical \textit{in vivo} body checking experiences. It is possible that a longer duration body image exposure, regardless of the instructions given on how to look at one’s body, can effect positive change over time. More research needs to compare the effects of brief vs. longer CBC sessions.

The results of the current study contribute to growing literature on body checking and avoidance and to the literature on body dissatisfaction in men. This study lends further support to the use of MME, at least in young women with high shape and weight concern. Additionally, there were positive results for women assigned to the MME condition despite the minimal nature of the procedure, which could easily be incorporated into self-help body image programs and implemented online. Given the prevalence of body image dissatisfaction in young women, an easily accessible online self-help body image treatment program could help a large number of young women in a cost- and time-effective manner.
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Table 1

Distribution data for primary outcome measures

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<th>Measure</th>
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<th>SD</th>
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Table 2

Null model for BISS results

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<th>Parameter</th>
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<th>p</th>
<th>95% Confidence Interval</th>
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<th>Upper Bound</th>
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<td>$\beta_0$</td>
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<td>$\sigma^2$</td>
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<td>$\sigma^2_v0$</td>
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<td>1.25</td>
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Note. BISS = Body Image States Scale; $\beta_0$ = intercept; -2LL = 3295.07, AIC = 3299.07, BIC = 3309.33
Table 3

Conditional model of BISS with time and gender effects

<table>
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<tr>
<th>Parameter</th>
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</tr>
<tr>
<td>$\beta_1$</td>
<td>0.04</td>
<td>0.17</td>
<td>4.44</td>
<td>&lt; .001</td>
<td>0.02 0.05</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>M v. F</td>
<td>0.57</td>
<td>3.40</td>
<td>.001</td>
<td>0.24 0.90</td>
</tr>
<tr>
<td>$\sigma^2_\epsilon$</td>
<td>0.55</td>
<td>0.02</td>
<td>22.35</td>
<td>&lt; .001</td>
<td>0.51 0.60</td>
</tr>
<tr>
<td>$\sigma^2_{v0}$</td>
<td>0.85</td>
<td>0.11</td>
<td>7.41</td>
<td>&lt; .001</td>
<td>0.65 1.11</td>
</tr>
<tr>
<td>$\sigma^2_{v0v1}$</td>
<td>0.01</td>
<td>0.008</td>
<td>1.26</td>
<td>.21</td>
<td>-.005 0.02</td>
</tr>
<tr>
<td>$\sigma^2_{v1}$</td>
<td>0.003</td>
<td>0.001</td>
<td>3.04</td>
<td>.002</td>
<td>0.002 0.006</td>
</tr>
</tbody>
</table>

Note. BISS = Body Image States Scale; $\beta_0$ = intercept; $\beta_1$ = Time; $\beta_2$ = Gender; -2LL = 3232.90, AIC = 3240.90, BIC = 3261.41
Table 4

Null model for SDBPS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>3.31</td>
<td>0.06</td>
<td>56.52</td>
<td>&lt; .001</td>
<td>3.20</td>
<td>3.43</td>
<td></td>
</tr>
<tr>
<td>$\sigma^2$</td>
<td>0.08</td>
<td>0.003</td>
<td>23.60</td>
<td>&lt; .001</td>
<td>0.07</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>$\sigma^2_{\nu0}$</td>
<td>0.45</td>
<td>0.06</td>
<td>8.02</td>
<td>&lt; .001</td>
<td>0.36</td>
<td>0.58</td>
<td></td>
</tr>
</tbody>
</table>

Note. SDBPS = Satisfaction with Body Parts Scale; $\beta_0$ = intercept; -2LL = 925.59, AIC = 929.59, BIC = 939.85
Table 5

*Conditional model of SDBPS with time and gender effects*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>Wald z</th>
<th>p</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>3.48</td>
<td>0.08</td>
<td>44.81</td>
<td>&lt; .001</td>
<td>3.32 - 3.63</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>-0.009</td>
<td>0.004</td>
<td>-2.35</td>
<td>.02</td>
<td>-0.02 - -0.001</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>M v. F</td>
<td>-0.30</td>
<td>-2.69</td>
<td>.008</td>
<td>-0.52 - -0.08</td>
</tr>
<tr>
<td>$\sigma^2_v0$</td>
<td>0.07</td>
<td>0.003</td>
<td>21.88</td>
<td>&lt; .001</td>
<td>0.06 - 0.07</td>
</tr>
<tr>
<td>$\sigma^2_v0v1$</td>
<td>0.006</td>
<td>0.002</td>
<td>2.23</td>
<td>.03</td>
<td>0.001 - 0.01</td>
</tr>
<tr>
<td>$\sigma^2_v1$</td>
<td>0.001</td>
<td>0.0003</td>
<td>4.46</td>
<td>&lt; .001</td>
<td>0.001 - 0.002</td>
</tr>
</tbody>
</table>

*Note.* SBPS = Satisfaction with Body Parts Scale; $\beta_0$ = intercept; $\beta_1$ = Time; $\beta_2$ = Gender; $-2\text{LL} = 829.81$, $\text{AIC} = 837.81$, $\text{BIC} = 858.32$
Table 6

Null model for RSES

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>17.42</td>
<td>0.44</td>
<td>40.00</td>
<td>&lt; .001</td>
<td></td>
<td>16.56</td>
<td>18.28</td>
</tr>
<tr>
<td>$\sigma^2$</td>
<td>5.59</td>
<td>0.24</td>
<td>23.60</td>
<td>&lt; .001</td>
<td></td>
<td>5.15</td>
<td>6.08</td>
</tr>
<tr>
<td>$\sigma^2_{v0}$</td>
<td>24.96</td>
<td>3.13</td>
<td>7.98</td>
<td>&lt; .001</td>
<td></td>
<td>19.52</td>
<td>31.91</td>
</tr>
</tbody>
</table>

*Note. RSES = Rosenberg Self-Esteem Scale; $\beta_0$ = intercept; -2LL = 6196.29, AIC = 6200.29, BIC = 6210.55*
Table 7

*Conditional model for RSES with effects of time, gender, condition, and their interactions*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>Wald z</th>
<th>p</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td>$\beta_0$</td>
<td>16.42</td>
<td>1.02</td>
<td>16.09</td>
<td>&lt; .001</td>
<td>14.40</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>-0.08</td>
<td>0.07</td>
<td>-1.15</td>
<td>.25</td>
<td>-0.22</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>3.10</td>
<td>1.44</td>
<td>2.16</td>
<td>.03</td>
<td>0.26</td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>-0.22</td>
<td>1.44</td>
<td>-0.15</td>
<td>.88</td>
<td>-3.06</td>
</tr>
<tr>
<td>$\beta_4$</td>
<td>0.20</td>
<td>0.10</td>
<td>2.10</td>
<td>.04</td>
<td>0.01</td>
</tr>
<tr>
<td>$\beta_5$</td>
<td>-0.61</td>
<td>2.13</td>
<td>-0.29</td>
<td>.78</td>
<td>-4.83</td>
</tr>
<tr>
<td>$\beta_6$</td>
<td>0.17</td>
<td>0.10</td>
<td>1.71</td>
<td>.09</td>
<td>-0.03</td>
</tr>
<tr>
<td>$\beta_7$</td>
<td>-0.35</td>
<td>0.14</td>
<td>-2.44</td>
<td>.02</td>
<td>-0.64</td>
</tr>
</tbody>
</table>

Note. RSES = Rosenberg Self-Esteem Scale; $\beta_0$ = intercept; $\beta_1$ = Time; $\beta_2$ = Gender; $\beta_3$ = Condition; $\beta_4$ = Condition x Time; $\beta_5$ = Condition x Gender; $\beta_6$ = Gender x Time; $\beta_7$ = Condition x Gender x Time; -2LL = 6116.19, AIC = 6124.19, BIC = 6144.67
Table 8

Null model for NA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>Wald z</th>
<th>p</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>1.97</td>
<td>0.05</td>
<td>37.59</td>
<td>&lt; .001</td>
<td>1.86</td>
</tr>
<tr>
<td>$\sigma^2$</td>
<td>0.18</td>
<td>0.008</td>
<td>23.69</td>
<td>&lt; .001</td>
<td>0.17</td>
</tr>
<tr>
<td>$\sigma^2_{\alpha_0}$</td>
<td>0.35</td>
<td>0.05</td>
<td>7.73</td>
<td>&lt; .001</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Note: NA = Negative Affect; $\beta_0$ = intercept; -2LL = 1825.55, AIC = 1829.55, BIC = 1839.80
Table 9

*Conditional model of NA with time and condition effects*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>Wald z</th>
<th>p</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>1.83</td>
<td>0.09</td>
<td>20.93</td>
<td>&lt; .001</td>
<td>1.65</td>
<td>2.00</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>-0.02</td>
<td>0.004</td>
<td>-4.71</td>
<td>&lt; .001</td>
<td>-0.03</td>
<td>-0.01</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>CBC v. C</td>
<td>0.33</td>
<td>0.13</td>
<td>2.61</td>
<td>.01</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>MME v. C</td>
<td>0.23</td>
<td>0.12</td>
<td>1.89</td>
<td>.06</td>
<td>-0.01</td>
</tr>
<tr>
<td>$\sigma^2$</td>
<td>0.17</td>
<td>0.008</td>
<td>22.26</td>
<td>&lt; .001</td>
<td>0.15</td>
<td>0.18</td>
</tr>
<tr>
<td>$\sigma^2_{v0}$</td>
<td>0.34</td>
<td>0.05</td>
<td>7.56</td>
<td>&lt; .001</td>
<td>0.26</td>
<td>0.44</td>
</tr>
<tr>
<td>$\sigma^2_{v0v1}$</td>
<td>-0.002</td>
<td>0.003</td>
<td>-0.70</td>
<td>.48</td>
<td>-0.007</td>
<td>0.003</td>
</tr>
<tr>
<td>$\sigma^2_{v1}$</td>
<td>0.0008</td>
<td>0.0003</td>
<td>2.87</td>
<td>&lt; .001</td>
<td>0.0004</td>
<td>0.002</td>
</tr>
</tbody>
</table>

*Note.* NA = Negative Affect; $\beta_0$ = intercept; $\beta_1$ = Time; $\beta_2$ = Condition; -2LL = 1788.16, AIC = 1796.16, BIC = 1816.66
Table 10

Null model for PA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>Wald z</th>
<th>p</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>2.41</td>
<td>0.06</td>
<td>38.91</td>
<td>&lt; .001</td>
<td>2.29</td>
<td>2.53</td>
</tr>
<tr>
<td>$\sigma^2$</td>
<td>0.16</td>
<td>0.007</td>
<td>23.58</td>
<td>&lt; .001</td>
<td>0.15</td>
<td>0.17</td>
</tr>
<tr>
<td>$\sigma^2_{v0}$</td>
<td>0.50</td>
<td>0.06</td>
<td>7.86</td>
<td>&lt; .001</td>
<td>0.39</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Note. PA = Positive Affect; $\beta_0$ = intercept; -2LL = 1716.51, AIC = 1720.51, BIC = 1730.76
Table 11

*Conditional model of PA with gender effects*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>SE</th>
<th>Wald z</th>
<th>p</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>2.10</td>
<td>0.08</td>
<td>26.912</td>
<td>&lt; .001</td>
<td>2.03</td>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>$\beta_1$ M v. F</td>
<td>0.46</td>
<td>0.12</td>
<td>3.94</td>
<td>&lt; .001</td>
<td>0.23</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>$\sigma^2$ v0</td>
<td>0.15</td>
<td>0.007</td>
<td>22.02</td>
<td>&lt; .001</td>
<td>0.13</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>$\sigma^2$ v0v1</td>
<td>0.44</td>
<td>0.06</td>
<td>7.74</td>
<td>&lt; .001</td>
<td>0.34</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>$\sigma^2$ v1</td>
<td>0.002</td>
<td>0.003</td>
<td>0.50</td>
<td>.62</td>
<td>-0.005</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>$\sigma^2$ v1</td>
<td>0.001</td>
<td>0.0003</td>
<td>3.18</td>
<td>&lt; .001</td>
<td>0.0006</td>
<td>0.002</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* PA = Positive Affect; $\beta_0 =$ intercept; $\beta_1 =$ Gender; -2LL = 1679.12, AIC = 1687.12, BIC = 1707.63
Figure 1. Averaged body image satisfaction from pre- and post-manipulation assessments. BISS = Body Image States Scale. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. *** $p < .001$. 

<table>
<thead>
<tr>
<th>Pre-Manipulation</th>
<th>Post-Manipulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BISS Scores</td>
<td></td>
</tr>
<tr>
<td>CBC-M</td>
<td></td>
</tr>
<tr>
<td>MME-M</td>
<td></td>
</tr>
<tr>
<td>C-M</td>
<td></td>
</tr>
<tr>
<td>CBC-F</td>
<td></td>
</tr>
<tr>
<td>MME-F</td>
<td></td>
</tr>
<tr>
<td>C-F</td>
<td></td>
</tr>
</tbody>
</table>
Figure 2. Body image satisfaction at baseline, post-manipulation on last laboratory session, and one-week follow up. BISS = Body Image States Scale. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. **p < .01. *p < .05.
Figure 3. Averaged dissatisfaction with body parts from pre- and post-manipulation assessments. SDBPS = Satisfaction and Dissatisfaction with Body Parts Scale. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. ** p < .01.
Figure 4. Dissatisfaction with body parts at baseline, post-manipulation on last laboratory session, and one-week follow up. SDBPS = Satisfaction and Dissatisfaction with Body Parts Scale. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. * $p < .05$. *** $p < .001$. 
Figure 5. Averaged self-esteem from pre- and post-manipulation assessments. RSES = Rosenberg Self-Esteem Scale. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. * $p < .05$. *** $p < .001$. 
Figure 6. Self-esteem at baseline, post-manipulation on last laboratory session, and one-week follow up. RSES = Rosenberg Self-Esteem Scale. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. * $p < .05$. *** $p < .001$. 
Figure 7. Averaged negative affect from pre- and post-manipulation assessments. NA = Negative Affect. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. * $p < .05$. ** $p < .01$. 

**Table 1.** Summary of averaged negative affect (NA) scores from pre- and post-manipulation assessments across different conditions. The table shows the mean NA scores for each condition, with comparisons to the control group. The asterisks (*) and double asterisks (**) indicate statistical significance at the $p < .05$ and $p < .01$ levels, respectively.
Figure 8. Negative affect at baseline, post-manipulation on last laboratory session, and one-week follow up. NA = Negative Affect. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. * $p < .05$. ** $p < .01$. *** $p < .001$. 
Figure 9. Averaged positive affect from pre- and post-manipulation assessments. PA = Positive Affect. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male.
Figure 10. Positive affect at baseline, post-manipulation on last laboratory session, and one-week follow up. PA = Positive Affect. CBC = critical body checking. MME = mindfulness-based mirror exposure. C = control. F = female. M = male. * $p < .05$. ** $p < .01$. *** $p < .001$. 
Appendix

<table>
<thead>
<tr>
<th>BDI-II</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: ___________________________</td>
<td>Marital Status: _______</td>
</tr>
<tr>
<td>Occupation: ___________________________</td>
<td>Education: ___________________________</td>
</tr>
</tbody>
</table>

**Instructions**: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully and then pick out the one statement in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

<table>
<thead>
<tr>
<th>1. Sadness</th>
<th>6. Punishment Feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 I do not feel sad.</td>
<td>0 I don't feel I am being punished.</td>
</tr>
<tr>
<td>1 I feel sad much of the time.</td>
<td>1 I feel I may be punished.</td>
</tr>
<tr>
<td>2 I am sad all the time.</td>
<td>2 I expect to be punished.</td>
</tr>
<tr>
<td>3 I am so sad or unhappy that I can't stand it.</td>
<td>3 I feel I am being punished.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Pessimism</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 I am not discouraged about my future.</td>
<td>0 I feel the same about myself as ever.</td>
</tr>
<tr>
<td>1 I feel more discouraged about my future than I used to be.</td>
<td>1 I have lost confidence in myself.</td>
</tr>
<tr>
<td>2 I do not expect things to work out for me.</td>
<td>2 I am disappointed in myself.</td>
</tr>
<tr>
<td>3 I feel my future is hopeless and will only get worse.</td>
<td>3 I dislike myself.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Past Failure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 I do not feel like a failure.</td>
<td>0 I don't criticize or blame myself more than usual.</td>
</tr>
<tr>
<td>1 I have failed more than I should have.</td>
<td>1 I am more critical of myself than I used to be.</td>
</tr>
<tr>
<td>2 As I look back I see a lot of failures.</td>
<td>2 I criticize myself for all of my faults.</td>
</tr>
<tr>
<td>3 I feel I am a total failure as a person.</td>
<td>3 I blame myself for everything bad that happens.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Loss of Pleasure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 I get as much pleasure as I ever did from the things I enjoy.</td>
<td>0 I don't have any thoughts of killing myself.</td>
</tr>
<tr>
<td>1 I don't enjoy things as much as I used to.</td>
<td>1 I have thoughts of killing myself, but I would not carry them out.</td>
</tr>
<tr>
<td>2 I get very little pleasure from the things I used to enjoy.</td>
<td>2 I would like to kill myself.</td>
</tr>
<tr>
<td>3 I can't get any pleasure from the things I used to enjoy.</td>
<td>3 I would kill myself if I had the chance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Guilty Feelings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 I don't feel particularly guilty.</td>
<td>0 I don't cry anymore than I used to.</td>
</tr>
<tr>
<td>1 I feel guilty over many things I have done or should have done.</td>
<td>1 I cry more than I used to.</td>
</tr>
<tr>
<td>2 I feel quite guilty most of the time</td>
<td>2 I cry over every little thing.</td>
</tr>
<tr>
<td>3 I feel guilty all the time.</td>
<td>3 I feel like crying, but I can't.</td>
</tr>
</tbody>
</table>
### 11. Loss of Interest
0  I have not lost interest in other people or activities.
1  I am less interested in other people or things than before.
2  I have lost most of my interest in other people or things.
3  It's hard to get interested in anything.

### 12. Indecisiveness
0  I make decisions about as well as ever.
1  I find it more difficult to make decisions than usual.
2  I have much greater difficulty in making decisions than I used to.
3  I have trouble making any decisions.

### 13. Worthlessness
0  I do not feel I am worthless.
1  I don't consider myself as worthwhile and useful as I used to.
2  I feel more worthless as compared to other people.
3  I feel utterly worthless.

### 14. Loss of Energy
0  I have as much energy as ever.
1  I have less energy than I used to have.
2  I don't have enough energy to do very much.
3  I don't have enough energy to do anything.

### 15. Changes in Sleeping Pattern
0  I have not experienced any change in my sleeping patterns.
1a  I sleep somewhat more than usual.
1b  I sleep somewhat less than usual.
2a  I sleep a lot more than usual.
2b  I sleep a lot less than usual.
3a  I sleep most of the day.
3b  I wake up 1-2 hours early and can't get back to sleep.

### 17. Changes in Appetite
0  I have not experienced any change in my appetite.
1a  My appetite is somewhat less than usual.
1b  My appetite is somewhat greater than usual.
2a  My appetite is much less than before.
2b  My appetite is much greater than usual.
3a  I have no appetite at all.
3b  I crave food all of the time.

### 18. Concentration Difficulty
0  I can concentrate as well as ever.
1  I can't concentrate as well as usual.
2  It's hard to keep my mind on anything for very long.
3  I find I can't concentrate on anything.

### 20. Tiredness or Fatigue
0  I am no more tired or fatigued than usual.
1  I get more tired or fatigued more easily than usual.
2  I am too tired or fatigued to do a lot of the things I used to do.
3  I am too tired or fatigued to do most of the things I used to do.

### 21. Loss of Interest in Sex
0  I have not noticed any recent change in my interest in sex.
1  I am less interested in sex than I used to be.
2  I am much less interested in sex now.
3  I have lost interest in sex completely.
The Body Image States Scale
For each of the items below, check the box beside the one statement that best describes how you feel RIGHT NOW, AT THIS VERY MOMENT. Read the items carefully to be sure the statement you choose accurately and honestly describes how you feel right now.

1. Right now I feel…
   - **Extremely dissatisfied** with my physical appearance
   - **Mostly dissatisfied** with my physical appearance
   - **Moderately dissatisfied** with my physical appearance
   - **Slightly dissatisfied** with my physical appearance
   - **Neither dissatisfied nor satisfied** with my physical appearance
   - **Slightly satisfied** with my physical appearance
   - **Moderately satisfied** with my physical appearance
   - **Mostly satisfied** with my physical appearance
   - **Extremely satisfied** with my physical appearance

2. Right now I feel…
   - **Extremely satisfied** with my body size and shape
   - **Mostly satisfied** with my body size and shape
   - **Moderately satisfied** with my body size and shape
   - **Slightly satisfied** with my body size and shape
   - **Neither dissatisfied nor satisfied** with my body size and shape
   - **Slightly dissatisfied** with my body size and shape
   - **Moderately dissatisfied** with my body size and shape
   - **Mostly dissatisfied** with my body size and shape
   - **Extremely dissatisfied** with my body size and shape

3. Right now I feel…
   - **Extremely dissatisfied** with my weight
   - **Mostly dissatisfied** with my weight
   - **Moderately dissatisfied** with my weight
   - **Slightly dissatisfied** with my weight
   - **Neither dissatisfied nor satisfied** with my weight
   - **Slightly satisfied** with my weight
   - **Moderately satisfied** with my weight
   - **Mostly satisfied** with my weight
   - **Extremely satisfied** with my weight
4. Right now I feel…
- Extremely physically attractive
- Mostly physically attractive
- Moderately physically attractive
- Slightly physically attractive
- Neither attractive nor unattractive
- Slightly physically attractive
- Moderately physically attractive
- Mostly physically attractive
- Extremely physically attractive

5. Right now I feel…
- A great deal worse about my looks than I usually feel
- Much worse about my looks than I usually feel
- Somewhat worse about my looks than I usually feel
- Just slightly worse about my looks than I usually feel
- About the same about my looks as usual
- Just slightly better about my looks than I usually feel
- Somewhat better about my looks than I usually feel
- Much better about my looks than I usually feel
- A great deal better about my looks than I usually feel

6. Right now I feel that I look…
- A great deal better than the average person looks
- Much better than the average person looks
- Somewhat better than the average person looks
- Just slightly better than the average person looks
- About the same about my looks as usual
- Just slightly worse than the average person looks
- Somewhat worse than the average person looks
- Much worse than the average person looks
- A great deal worse than the average person looks
Body Checking Questionnaire

Circle the number which best describes how often you engage in these behaviors:

1. I check to see if my thighs spread when I’m sitting down.
   
   Never    Rarely    Sometimes    Often    Very often

2. I pinch my stomach to measure fatness.
   
   Never    Rarely    Sometimes    Often    Very often

3. I have special clothes which I try on to make sure they still fit.
   
   Never    Rarely    Sometimes    Often    Very often

4. I check the diameter of my wrist to make sure it’s the same size as before.
   
   Never    Rarely    Sometimes    Often    Very often

5. I check my reflection in glass doors or car windows to see how I look.
   
   Never    Rarely    Sometimes    Often    Very often

6. I pinch my upper arms to measure fatness.
   
   Never    Rarely    Sometimes    Often    Very often

7. I touch underneath my chin to make sure I don’t have a “double chin.”
   
   Never    Rarely    Sometimes    Often    Very often

8. I look at others to see how my body size compares to their body size.
   
   Never    Rarely    Sometimes    Often    Very often

9. I rub (or touch) my thighs while sitting to check for fatness.
   
   Never    Rarely    Sometimes    Often    Very often

10. I check the diameter of my legs to make sure they’re the same size as before.
    
    Never    Rarely    Sometimes    Often    Very often

11. I ask others about their weight/clothing size so I can compare my weight/size.
    
    Never    Rarely    Sometimes    Often    Very often

12. I check to see how my bottom looks in the mirror.
    
    Never    Rarely    Sometimes    Often    Very often

13. I practice sitting/standing in various positions to see how I look in each position.
    
    Never    Rarely    Sometimes    Often    Very often

14. I check to see if my thighs rub together.
    
    Never    Rarely    Sometimes    Often    Very often

15. I try to elicit comments from others about how fat I am.
    
    Never    Rarely    Sometimes    Often    Very often

16. I check to see if my fat jiggles.
    
    Never    Rarely    Sometimes    Often    Very often
17. I suck in my gut to see what it is like when my stomach is completely flat.
   Never   Rarely   Sometimes   Often   Very often

18. I check to make sure my rings fit the same way as before.
   Never   Rarely   Sometimes   Often   Very often

19. I look to see if I have cellulite on my thighs when I am sitting.
   Never   Rarely   Sometimes   Often   Very often

20. I lie down on the floor to see if I can feel my bones touch the floor.
   Never   Rarely   Sometimes   Often   Very often

21. I pull my clothes as tightly as possible around myself to see how I look.
   Never   Rarely   Sometimes   Often   Very often

22. I compare myself to models on TV or in magazines.
   Never   Rarely   Sometimes   Often   Very often

23. I pinch my cheeks to measure fatness.
   Never   Rarely   Sometimes   Often   Very often
## PANAS

INSTRUCTIONS: This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now. Use the following scale to record your answers.

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<tr>
<td></td>
<td>Very slightly or not at all</td>
<td>A little</td>
<td>Moderately</td>
<td>Quite a bit</td>
<td>Extremely</td>
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</table>

1. _______ Interested
2. _______ Distressed
3. _______ Excited
4. _______ Upset
5. _______ Strong
6. _______ Guilty
7. _______ Scared
8. _______ Hostile
9. _______ Enthusiastic
10. _______ Proud
11. _______ Irritable
12. _______ Alert
13. _______ Ashamed
14. _______ Inspired
15. _______ Nervous
16. _______ Determined
17. _______ Attentive
18. _______ Jittery
19. _______ Active
20. _______ Afraid
Body Image Avoidance Questionnaire

Circle the response that best describes how often you engaged in these behaviors since the last time you responded to these questions on the palm pilot.

1. I wore baggy clothes. True False
2. I wore clothes I did not like. True False
3. I wore darker colored clothing. True False
4. I wore a special set of clothing, e.g. my “fat clothes.” True False
5. I restricted the amount of food I eat. True False
6. I only ate fruits, vegetables, and other low calorie foods. True False
7. I fasted for a day or longer. True False
8. I did not go out socially because I would be “checked out.” True False
9. I did not go out socially because the people I was with would discuss weight. True False
10. I did not go out socially because the people I was with are thinner than me. True False
11. I did not go out socially because it involved eating. True False
12. I weighed myself. True False
13. I was inactive. True False
14. I looked at myself in the mirror. True False
15. I avoided physical intimacy. True False
16. I wore clothes that would divert attention from my weight. True False
17. I avoided going clothes shopping. True False
18. I didn’t wear “revealing” clothes (e.g. bathing suits, tank tops, or shorts). True False
19. I got dressed up or made up. True False
Male Body Checking Questionnaire

1. I check the hardness of my biceps to ensure I have not lost any muscle.
   
   1 2 3 4 5

2. I look at my abdominal muscles (6-pack) in the mirror.

   1 2 3 4 5

3. I flex my biceps when looking in the mirror to ensure symmetry of my muscles.

   1 2 3 4 5

4. I compare the size of my muscles to others.

   1 2 3 4 5

5. I compare my overall leanness or muscle definition to others.

   1 2 3 4 5

6. I compare my overall muscle mass to athletes or celebrities.

   1 2 3 4 5

7. I compare my leanness or muscle definition to athletes or celebrities.

   1 2 3 4 5

8. I pinch the fat around my abdomen and back (e.g. love handles) to determine my leanness.

   1 2 3 4 5

9. I compare the leanness or definition of my chest muscles with others.

   1 2 3 4 5

10. I compare the size of my chest muscles with others.

    1 2 3 4 5

11. I compare the broadness of my shoulders with others.

    1 2 3 4 5

12. I flex my muscles when looking in the mirror to find lines or striations in the muscle.

    1 2 3 4 5

13. I take measurements of my muscles with a tape measure.

    1 2 3 4 5

14. I push my fat around or pull my skin back to accentuate the muscle underneath.

    1 2 3 4 5

15. I will check the size and shape of my muscles in most reflective surfaces (e.g. car
windows, shopping store windows, mirrors, etc).

16. I pinch or grab my muscles to check their size and density.
ROSENBERG SELF-ESTEEM SCALE

Please circle the number that best indicates how you feel about yourself.

1 = strongly agree
2 = agree
3 = disagree
4 = strongly disagree

1. On the whole, I am satisfied with myself.  
2. At times, I think I am no good at all.  
3. I feel that I have a number of good qualities.  
4. I am able to do things as well as most other people.  
5. I feel I do not have much to be proud of.  
6. I certainly feel useless at times.  
7. I feel that I’m a person of worth, at least on an equal plane with others.  
8. I wish I could have more respect for myself.  
9. All in all, I am inclined to feel that I am a failure.  
10. I take a positive attitude toward myself.
**Satisfaction and Dissatisfaction with Body Parts Scale**

Please circle the number that corresponds to how satisfied you are with the following aspects of your appearance using the following scale:

1 = extremely satisfied  
2 = quite satisfied  
3 = any satisfaction  
4 = any dissatisfaction  
5 = quite dissatisfied  
6 = extremely dissatisfied

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**Male Critical Body Checking Procedure**

In this procedure you are being asked to stand in front of a full-sized mirror, in the privacy of this room. Your task is to observe and describe your body. When you are asked to describe something or speak, please do so out loud, but quietly, so that you can hear yourself but so that people in other rooms would not be able to hear you.

You will find out that the experience may be different from what happens when you have looked in mirrors at home and elsewhere. In these prior situations the exposure was typically brief and irregular. It is understandable that you might be apprehensive about this procedure. You may experience some initial anxiety and discomfort, but any anxiety and discomfort is temporary and likely will not be as discomforting as you may anticipate.

You were asked to come to the session wearing revealing clothing or to be willing to take off clothes so that you can look in the full-length mirror wearing only your underwear or shorts. Please take off your clothes at this time, including your socks and stand in front of the mirror so that you can see your whole body from head to toe. You only need to undress to the degree that you feel comfortable. A researcher will make sure that nobody enters the room while you are in it. At the end of the procedure, we will ask you to re-dress, open the door, and let the researcher know that you are done.

While you are getting undressed, I will give you some more information about what you will be asked to do. I am going go through a number of parts of your body and ask you to look for information regarding your size, weight, and shape.

Let’s begin.

1) What size and shape is your face and neck? Are your cheeks chubby? Please pinch your cheeks to determine their fatness. Please bend your head forward to exaggerate the skin and fat under your chin and grab that fat to determine whether or not you have a double chin.
2) What do your upper arms look like? Are your biceps muscular? Please make a muscle and feel it to ensure that you have not lost any muscle. Please examine the diameter of your bicep to make sure that it is still the same size. You may use the measuring tape if you like.

3) Are your biceps symmetrical? Please flex both biceps in the mirror and make sure that they are the same size and shape.

4) Please look at your torso in the mirror. Do you have “love handles” or fat around your sides in between your waist and hip height? Please grab your flesh in the “love handle” area to determine how much fat you have.

5) Please suck in your stomach and tighten your abdominal muscles so that you look more thin and toned. Look at yourself in a profile view. Now face the mirror, with your stomach sucked in and abdominal muscles tightened and see what you look like from the front.

6) Please flex your pectoral, or chest, muscles. Determine their hardness, size, and symmetry

7) Think about a male friend who has a good body. How does your body look in comparison?

   First, please describe any differences in muscle size.

   Now, please describe any differences in leanness or muscle definition.

   Describe the differences between his chest, shoulders, and arms and yours?

   Describe the differences between his abs and yours?

8) Now, please think of an athlete or celebrity whose physique you admire.

   First, describe how his overall muscle mass compares to yours.

   Now, describe how his leanness and muscle definition compares to yours.

   Describe the differences between his chest, shoulders, and arms and yours?

   Describe the differences between his abs and yours?
Now, I’m going to ask you to describe your overall appearance, and what you dislike about it. Describe what parts of your body do you dislike the most and then describe why you dislike those body parts. If you could change that body part or body parts, please describe how that would improve your overall appearance?
**Male Mindfulness-Based Mirror Exposure Procedure**

In this procedure you are being asked to stand in front of a full-sized mirror, in the privacy of this room. Your task is to observe and describe your body - your whole body from head to toe - in non-judgmental terms. Think about how you would describe yourself, objectively and realistically, to a blind person.

You will be encouraged to experience your feelings without trying to block them or distract yourself. The purpose of this procedure is not to avoid or try to suppress your feelings. You will find out that the experience may be different from what has happened when you have looked in mirrors at home and elsewhere. In these prior situations the exposure was typically brief and irregular. You may have focused only on your "hot spots," namely, those parts of your body you dislike. Also, you may have been self-critical when looking in the mirror.

Here, in this study, exposure will be systematic and cover your entire body, "hot spots" and all. And you will learn to stop being so self-critical. You will be surprised at how different the experience will be from what you associate with looking in a mirror. You will learn that it is okay to have negative thoughts about your body. Many men have these thoughts because of the emphasis on appearance in our culture. But you will learn to keep these negative thoughts short-lived and self-limiting. The trick is not to let them overwhelm you, to take over your mind so that all you can think of is how much you dislike your body.

It is understandable that you might be apprehensive about this procedure. You will experience some initial anxiety and discomfort. But you need to know the following: First, the anxiety and discomfort is likely to be temporary. It goes away as you get used to this procedure. Second, it is quite likely that the experience will not be as discomforting as you anticipate. Third, and most important, this is the best way of learning to come to terms with your body weight and shape. Clinical research has clearly
demonstrated the benefits of dealing directly with your body in this fashion.

You were asked to come to the session wearing revealing clothing or to be willing to take off clothes so that you can look in the full-length mirror wearing only your underwear or shorts. Please take off your clothes at this time, including your socks and stand in front of the mirror so that you can see your whole body from head to toe. You only need to undress to the degree that you feel comfortable. A researcher will make sure that nobody enters the room while you are in it. At the end of the procedure, we will ask you to re-dress, open the door, and let the researcher know that you are done.

While you are getting undressed, I will give you some more information about what you will be asked to do. I am going to talk you through a number of parts of your body and give you suggestions of nonjudgmental descriptions you may use to describe yourself. These words should focus on shape, length, width, symmetry, color, and function. We will go through each body part, and you will repeat the statement using the chosen adjective, as though you are describing yourself to a blind person or are describing a character in a novel. Do not use positive or negative descriptions such as “ugly,” “disgusting,” “buff,” or “hot. Use neutral words to describe yourself. Although you do not have to speak very loudly, we ask that you do repeat the statements out loud. You should be ready by now. Let’s begin.

1) What does your hair look like? Is it curly, straight, thick, fine, long, short, angled, layered, or spiky? What color is it? Please describe your hair now starting with “My hair is…” and using one or more adjectives, either ones I just read or another descriptive, nonjudgmental word.

2) What kind of skin tone do you have? Is it fair, medium, or dark? Do you have freckles? Please describe your skin tone now, starting with: “My skin is…”

3) What color are your eyes? What shape are they? Are they round, big, expressive, bright, or almond-shaped? Please repeat: “My eyes are” and describe them
4) What does your nose look like? Is it straight, curved, long, short, narrow, broad, or rounded? Please repeat: “My nose is”

5) What does your mouth look like? Is it expressive, small, or large? Are your lips thick or thin? Is your smile big, small, or toothy? Please repeat “My mouth is:” and describe.

6) What do your teeth look like? Are they long, short, broad, narrow, pointy, straight, or evenly spaced? Do you have any gaps in your teeth? Please repeat: “My teeth are:”

7) What does your chin look like? Is it round, square, pointed, dimpled, short, or long? Please repeat and describe: “My chin is…”

8) What does your neck look like? Is it short, long, muscular, or lean? Please repeat and describe: “My neck is”

9) What do your shoulders look like? Are they straight, rounded, square, wide, or narrow? Please repeat and describe: “My shoulders are”

10) What do your upper arms look like? Are they short, long, muscular, rounded, lean, or solid? Please repeat and describe: “My upper arms are:”

11) What do your hands and fingers look like? Are your hands large, small, sinewy, broad or narrow? Please repeat and describe: “My hands are:” Are your fingers long, short, thick, or slender? Please repeat: “My fingers are:” Are your fingernails long, short, narrow, wide, trimmed, or chewed? Please repeat: “My fingernails are:”

12) What does your chest look like? Is it small, large, lean, sinewy, muscular, hairy, or smooth? Please repeat and describe: “My chest is:” Are your nipples small, large, pink, tan, or brown? Please describe: “My nipples are:”

13) What does your torso look like? Is it straight, narrow, round, short, long, or lean? Please repeat and describe: “My torso is:”

14) What does your butt look like? Does it stick out, is it round, straight, flat, small, muscular, or well-proportioned? Please repeat: “My butt looks:”

15) What do your legs look like? Are your thighs rounded, straight, long, short, muscular,
lean, wide, or narrow? Are your calves muscular, slender, wide, or narrow? Are your legs hairy or smooth? What does the hair on your legs look like?

Please repeat and describe: “My legs are:”

16) What do your feet look like? Are they arched, flat, wide, narrow, long, or short? Are your toes long or short? Are your toenails long, short, wide, or narrow? Please repeat and describe: “My feet are:”

17) Now, I’m going to ask you to describe your overall appearance, as you would to a blind person or as you would describe a character in a book. Are you tall, short, sturdy, lithe, narrow, wide, slender, lean, round, sleek, strong, well-proportioned, graceful, symmetrical? What does your whole body enable you to do? Does it help you play a sport, run, swim, bicycle, play an instrument, do a hobby, write, read, enjoy food, work, or go out with your friends? Please describe your overall appearance and what your body enables you to do without being critical or focusing on any specific parts that you dislike.
Female Critical Body Checking Procedure

In this procedure you are being asked to stand in front of a full-sized mirror, in the privacy of this room. Your task is to observe and describe your body. When you are asked to describe something or speak, please do so out loud, but quietly, so that you can hear yourself but so that people in other rooms would not be able to hear you. Here, in this study, exposure will be systematic and cover your entire body, "hot spots" and all. The majority of women have negative thoughts about parts of their body because of the emphasis on appearance in our culture.

You will find out that the experience may be different from what happens when you have looked in mirrors at home and elsewhere. In these prior situations the exposure was typically brief and irregular. It is understandable that you might be apprehensive about this procedure. You may experience some initial anxiety and discomfort, but any anxiety and discomfort is temporary and likely will not be as discomforting as you may anticipate.

You were asked to come to the session wearing form-fitting or revealing clothing or to be willing to take off clothes so that you can look in the full-length mirror wearing only your underwear or a bathing suit. Please take off your clothes at this time, including your socks and stand in front of the mirror so that you can see your whole body from head to toe. You only need to undress to the degree that you feel comfortable. A researcher will make sure that nobody enters the room while you are in it. At the end of the procedure, you will be asked to re-dress, open the door, and let the researcher know that you are done.

While you are getting undressed, I will give you some more information about what you will be asked to do. I am going go through a number of parts of your body and ask you to look for information regarding your size, weight, and shape. Let’s begin.
1) What size and shape is your face and neck? Are your cheeks chubby? Please pinch your cheeks to determine their fatness. Please describe your cheeks beginning: “My cheeks are…”

Please bend your head forward to exaggerate the skin and fat under your chin and grab that fat to determine whether or not you have a double chin. Is there anything you like or dislike about your face and neck? Please describe your chin and neck, starting with: “My chin and neck are…”

2) Is your face round, square, oval, or heart-shaped? Is there anything you dislike about your face shape? Please describe the shape of your face.

3) Is your skin tone dark, light, olive, creamy, uneven, wrinkled, blotchy, or blemished? Is there anything you dislike about your skin? Please describe the skin on your face.

4) What do your upper arms look like? Are they skinny, flabby, soft, or firm? Do they have any blemishes? Is there anything you dislike about your upper arms? Please describe your upper arms, beginning: “My upper arms are…”

5) What is your chest like? Is there anything you like or dislike about your chest? Please describe your chest.

6) Please look at your torso in the mirror. Do you have “love handles” or fat around your sides in between your waist and hip height? Please grab your flesh in the “love handle” area to determine how much fat you have. Please describe this experience.

7) Please suck in your stomach and tighten your abdominal muscles so that you look more thin and toned. Look at yourself in a profile view. Then stick your stomach out and examine it from profile view. Please look at your stomach in profile view when you are relaxed, neither sucking it in nor sticking it out. Please feel your stomach to determine its size and feel, and describe what your stomach looks and feels like in profile view.

8) Now face the mirror, with your stomach sucked in and abdominal muscles tightened and see what you look like from the front. Then stick your stomach out and examine it
while you are facing the mirror. Please look at your stomach while you are directly facing the mirror when you are relaxed, neither sucking it in nor sticking it out. Please feel your stomach to determine its size and feel and describe what your stomach looks and feels like from the front.

9) Now look down. What does your stomach look like when you are looking directly at it rather than in the mirror? Please describe what you see when you look down at your stomach.

10) What do your thighs look like? Are they fat, thin, muscular, curvy, dimpled? Is there anything you dislike about your thighs? Please pinch your thighs to determine their size and feel. Please describe your thighs.

11) What does your butt look like? Does it stick out, is it round, curvy, straight, flabby, dimpled, or flat? Is there anything you dislike about your butt? Please repeat: “My butt looks:”

12) Think about a female friend who has a good body. How does your body look in comparison?

   First, please describe any differences in muscle tone.
   Now, please describe any differences in weight, shape, and height.
   Describe the differences between her chest and yours.
   Describe the differences between her butt and yours.
   Describe the differences between her thighs and yours.
   Describe the differences between her abs and yours.

13) Now, please think of an athlete or celebrity whose physique you admire.

   First, please describe any differences in muscle tone between her and you.
   Now, please describe any differences in weight, shape, and height between her and you.
   Describe the differences between her chest and yours.
Describe the differences between her butt and yours.

Describe the differences between her thighs and yours.

Describe the differences between her abs and yours.

14) Now, I’m going to ask you to describe your overall appearance, and what you dislike about it. Describe what parts of your body do you dislike the most and then describe why you dislike those body parts. If you could change that body part or body parts, please describe how that would improve your overall appearance.
Female Mindfulness-Based Mirror Exposure Procedure

In this procedure you will be asked to stand in front of a full-sized mirror, in the privacy of a therapy room with only your female therapist present. Your task is to observe and describe your body - your whole body from head to toe - in non-judgmental terms. Think about how you would describe yourself, objectively and realistically, to a blind person.

You will be encouraged to experience your feelings without trying to block them or distract yourself. The purpose of this procedure is to learn to experience and cope with your feelings directly rather than avoiding them or trying to suppress them.

You will find out that the experience is very different from what has happened when you have looked in mirrors at home and elsewhere. In these prior situations the exposure was typically brief and irregular. You probably focused only on your "hot spots," namely, those parts of your body you dislike. Also, chances are that you have been very self-critical in looking in the mirror.

Here, in this study, exposure will be systematic and cover your entire body, "hot spots" and all. And you will learn to stop being so self-critical. You will be surprised at how different the experience will be from what you associate with looking in a mirror. You will learn that it is okay to have negative thoughts about your body. The majority of women have these thoughts because of the emphasis on appearance in our culture. But you will learn to keep these negative thoughts short-lived and self-limiting. The trick is not to let them overwhelm you, to take over your mind so that all you can think of is how much you dislike your body.

It is understandable that you might be apprehensive about this procedure. You will experience some initial anxiety and discomfort. But you need to know the following: First, the anxiety and discomfort is likely to be temporary. It goes away as you get used to this procedure. Second, it is quite likely that the experience will not be as discomforting as you anticipate. Third, and most important, this is the best way of
learning to come to terms with your body weight and shape. Clinical research has clearly demonstrated the benefits of dealing directly with your body in this fashion.

You were asked to come to the session wearing form-fitting or revealing clothing or to be willing to take off clothes so that you can look in the full-length mirror wearing only your underwear or a bathing suit. Please take off your clothes at this time, including your socks and stand in front of the mirror so that you can see your whole body from head to toe. You only need to undress to the degree that you feel comfortable. A researcher will make sure that nobody enters the room while you are in it. At the end of the procedure, you will be asked to re-dress, open the door, and let the researcher know that you are done.

While you are getting undressed, I will give you some more information about what you will be asked to do. I am going to talk you through a number of parts of your body and give you suggestions of nonjudgmental descriptions you may use to describe yourself. These words should focus on shape, length, width, symmetry, color, and function. We will go through each body part, and you will repeat the statement using the chosen adjective, as though you are describing yourself to a blind person or are describing a character in a novel. Do not use positive or negative descriptions such as “ugly,” “disgusting,” “thin,” or “hot. Use neutral words to describe yourself. Although you do not have to speak very loudly, we ask that you do repeat the statements out loud. You should be ready by now. Let’s begin.

1) What does your hair look like? Is it curly, straight, thick, fine, long, short, angled, layered, or spiky? What color is it? Please describe your hair now starting with “My hair is…” and using one or more adjectives, either ones I just read or another descriptive, nonjudgmental word.

2) What kind of skin tone do you have? Is it fair, medium, or dark? Do you have freckles? Please describe your skin tone now, starting with: “My skin is…”
3) What color are your eyes? What shape are they? Are they round, big, expressive, bright, or almond-shaped? Please repeat: “My eyes are” and describe them.

4) What does your nose look like? Is it straight, curved, long, short, narrow, broad, or rounded? Please repeat: “My nose is”

5) What does your mouth look like? Is it expressive, small, or large? Are your lips thick or thin? Is your smile big, small, or toothy? Please repeat “My mouth is:” and describe.

6) What do your teeth look like? Are they long, short, broad, narrow, pointy, straight, or evenly spaced? Do you have any gaps in your teeth? Please repeat: “My teeth are:”

7) What does your chin look like? Is it round, square, pointed, dimpled, short, or long? Please repeat and describe: “My chin is…”

8) What does your neck look like? Is it short, long, muscular, or lean? Please repeat and describe: “My neck is”

9) What do your shoulders look like? Are they straight, rounded, square, wide, or narrow? Please repeat and describe: “My shoulders are”

10) What do your upper arms look like? Are they short, long, muscular, rounded, lean, or soft? Please repeat and describe: “My upper arms are:”

11) What do your hands and fingers look like? Are your hands large, small, sinewy, broad or narrow? Please repeat and describe: “My hands are:” Are your fingers long, short, thick, or slender? Please repeat: “My fingers are:” Are your fingernails long, short, narrow, wide, squared, rounded, trimmed, or chewed? What color are your fingernails? Please repeat: “My fingernails are:”

12) What does your chest look like? Is it small, large, round, or flat? Please repeat and describe: “My chest is:”

13) What does your torso look like? Is it straight, narrow, round, short, long, or lean? Please repeat and describe: “My torso is:”

14) What does your butt look like? Does it stick out, is it round, curvy, straight, or flat?
Please repeat: “My butt looks:”

15) What do your legs look like? Are your thighs curved, straight, long, short, muscular, lean, wide, or narrow? Please repeat and describe: “My thighs are:”
Are your calves muscular, slender, wide, or narrow? Please repeat and describe: “My calves are:” Are your ankles wide, narrow, short or long? Please repeat and describe: “My ankles are:”

16) What do your feet look like? Are they arched, flat, wide, narrow, long, or short? Are your toes long or short? Are your toenails long, short, wide, or narrow? Please repeat and describe: “My feet are:”

17) Now, I’m going to ask you to describe your overall appearance, as you would to a blind person or as you would describe a character in a book. Are you tall, short, sturdy, lithe, narrow, wide, slender, lean, round, sleek, strong, well-proportioned, graceful, symmetrical? What does your whole body enable you to do? Does it help you play a sport, run, swim, bicycle, play an instrument, do a hobby, write, read, enjoy food, work, or go out with your friends? Please describe your overall appearance and what your body enables you to do without being critical or focusing on any specific parts that you dislike.