BODY DISSATISFACTION AND AFFECT: THE EFFECTS OF MODE OF MIND INDUCTION AND THREE DIMENSIONAL BODY SHAPE EXPOSURE

By

Eduardo Roldan

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Abstract

The purpose of the present study was to investigate how specific mode of mind inductions, in conjunction with 3D and 2D body image exposure, impact body dissatisfaction (BD) and affect in 81 female undergraduates. The two mode of mind inductions examined were mindfulness-based focused breathing and rumination/worry. Participants were randomly assigned to either a focused breathing or rumination/worry induction, followed by life-sized body image exposure in either 2D or 3D. Results indicated that the most adversely affected individuals were those in the 3D-rumination/worry group. Participants in this group experienced significant increases in BD and negative affect (NA) as well as a significant reduction in positive affect (PA). While participants in general found body exposure to be aversive, those with high-dispositional body dissatisfaction expressed significantly higher levels of NA. Exploratory correlational analysis indicated that a possible link exists between BD and the subsequent increase in NA following body exposure. Findings of the present study suggest that being in a state of rumination/worry may exacerbate the negative reactions to body exposure. This phenomenon may be more pronounced in females high in dispositional BD.

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As Western culture's ideal female body has progressively become thinner over the last few decades (Cash, Morrow, Harbosky, & Perry, 2004; Monteath & McCabe, 1997; Slade, 1994), the population's actual weight has increased (Vanasse, Demers, Hemiari, & Courteau, 2006). As a result, there exists an increasingly larger disparity between the average female's body size and that of the idealized form (Garner, 1997; Spitzer, Henderson, & Zivian, 1999). Therefore, for a growing number of females the possibility of reaching a certain shape or weight is increasingly more difficult to do, especially via healthy means (Rodin, Silberstein & Striegel-Moore, 1984; Tiggemann & McGill, 2004). Potential consequences of this discrepancy between actual and desired weight and shape include body dissatisfaction (BD), negative affect, low self-esteem and possibly eating pathology (Cash & Deagle, 1997; Clark & Tiggemann, 2007; Groesz, Levine & Murnen, 2002). This phenomenon of being dissatisfied with one's own body is progressively becoming the norm for females in Western society (Rodin et al., 1984).

Reflective of this phenomenon, various studies and surveys have found a high level of BD among the female population. Cash and Henry (1995) surveyed 803 women across five regions of the United States. Their results revealed that nearly one-half of the sample experienced negative feelings about their appearance, and expressed concerns over being or becoming overweight. Over one-third were dissatisfied with their body images. In a subsequent survey, Garner (1997) found that 56% of 3,452 women sampled felt dissatisfied with their overall appearance. The majority (89%) of the respondents expressed a desire to lose weight. These findings are also consistent with other parts of the world, as Monteath and McCabe (1997) found that close to 40% of their Australian sample held negative feelings about body parts as well as their bodies as a whole.

This pressure to be thin is exacerbated by the inundation of messages that females receive from various sources. Females are exposed to various sociocultural demands to be thin from family, peers and the media (Clark & Tiggemann, 2007; Shroff & Thompson, 2006). In a meta-analytic study, Groesz, Levine and Murnen (2002) concluded that despite some conflicting findings, overall, participants viewing thin media images experience an increase in negative body image.

According to social comparison theory, the media impresses on females from an early age by presenting them with an image of what society deems attractive, which then motivates them to attempt to change to fit this ideal (Botta, 2003). Research indicates that these messages are indeed influencing children, as girls as young as 6 years of age have been found to rate their current size to be larger than their ideal weight (Lowes & Tiggemann, 2003). Thus, it is evident that girls can develop a negative body image as well as unhealthy body change attitudes and behaviours from an early age (Cahill & Mussap, 2007). This perceived pressure to be thin can intensify BD and can lead to dieting, negative affect, and eating pathologies (Stice, 2002). It has been postulated that this pressure to be thin causes females to internalize the thin ideal (Rodin et al., 1986; Stice, 2002), which plays a significant role in the development of BD and appearance evaluation (Cusumano & Thompson, 1997; Shroff & Thompson, 2006; Stice, 2002).

There is evidence that some individuals are more prone to compare their bodies to others. Females who are more likely to compare their bodies with those of others have been shown to be more reactive to images of the idealized female body (Durkin, Paxton & Sorbello, 2007). Furthermore, BD has been shown to be influenced by situational factors, which leads to a "state like" BD (Hargreaves & Tiggemann, 2002; Tiggemann, 2001). This phenomenon is more common in normal weight individuals more so than for underweight or overweight individuals

(Tiggemann, 2001). Tiggemann (2001) suggests that this is due to the more ambiguous nature of their body status, which results in it being more susceptible to situational cues.

Given the level of BD evident in women in society, it has been argued that eating disorders lie on a continuum with existing everyday body image concerns (Rodin et al., 1986; Tuschen-Caffier, Vogele, Bracht & Hilbert, 2003). Even in a non-clinical population, body image dysfunction can be problematic and has been linked to depression (Farrell, Shafran & Lee, 2006). Furthermore, body image disturbance is known to influence the severity of problematic eating patterns as well as being vital in the development of disordered eating (Cash & Deagle, 1997). As dysfunctional body image is a core feature of eating disorders, a critical level of BD or body image disturbance increases the likelihood of eating disorders occurring (Botta, 2003; Cash and Deagle, 1997).

Body Image

Due to the high level of body image concerns among females in Western society, there has been a considerable amount of research attention on body image, both empirically and clinically (for a review see Cash & Pruzinsky, 2002). Body image has been defined as a multidimensional concept that is comprised of self-perceptions and attitudes concerning one's physical appearance, including the size, shape and form of one's physical form (e.g., Botta, 2003; Cash & Brown, 1987; Cash et al., 2004; Cusumano & Thompson, 1997; Slade, 1988). Body image is thought to be "influenced by a variety of historical, cultural and social, individual and biological factors" (Slade, 1988, p. 502). Early research focused on perceptual body distortion, which involves a person having difficulty accurately gauging his or her body size. Patients with eating pathology commonly overestimate the size of their body (Cash & Deagle, 1997; Skrzypek et al., 2001). However, inconsistent results have caused interest in this area to

diminish. Recently, research has focused on cognitive-evaluative dissatisfaction, where an individual may have an accurate perception of their size, but judge their shape, size or appearance in a negative manner (Cash & Brown, 1987; Skrzypek et al., 2001). Consequently, having a negative body self-image can initiate a lifetime struggle with various harmful consequences such as disordered eating, depression, social anxiety, poor self-esteem and diminished quality of life (Cash et al., 2004). Furthermore, body image concerns play a prominent role in the maintenance of eating disorders by encouraging food restriction and dieting (Stice, 2001; Tuschen-Caffier et al., 2003). While the focus of research has shifted, findings showing that individuals with higher levels of body size distortion are more likely to relapse following treatment (Cash & Brown, 1987; Cash & Deagle, 1997; Farrell, Lee & Shafran, 2005), highlight the value of continued interest into perceptual body distortion.

Given the mounting evidence demonstrating the importance of attitudinal aspects on body image, many of the empirically tested treatments for body image disturbance include aspects that target these attitudes and cognitions. Cognitive behavioral therapy (CBT) targets these disturbances by attempting to restructure maladaptive thoughts, change behaviours that emphasize these thoughts, and train the individual to see themselves as others see them (Cash, 2001; Farrell et. al, 2006). In a study looking at college women with high levels of BD, Butters and Cash (1987) found that women randomly assigned to a CBT program improved their affective body image, had decreased maladaptive body image cognitions as well as enhanced social self-esteem when compared to control subjects. In a more recent study, Peterson et al., (2004) investigated changes in body image characteristics of 109 females with bulimia nervosa (BN) enrolled in a 12-week CBT group, compared to 82 female controls. The findings indicated that at baseline, the BN patients reported greater BD and higher levels of body size

overestimation than the controls. Following the 12-week program, the BN participants showed markedly lower levels of self-reported attitudinal disturbance and size overestimation. Therefore, these studies highlight the benefits of focusing on individuals' attitudes and cognitions in challenging their disturbed body image.

Body Exposure

One way that these attitudes and cognitions are challenged within CBT is body exposure. In this technique, participants are shown an image of their body using one of many possible methods, such as mirrors, cameras or virtual reality apparatuses. Research indicates that prolonged body image exposure induces negative cognitions and emotions in both control and eating disordered patients, with higher levels in the latter (Hilbert, Tuschen-Caffier & Voegele, 2002; Tuschen-Caffier et al., 2003). Tuschen-Caffier and co-workers (2003) found that having both BN and control participants describe their own bodies using an exposure manual activated appearance schema. The manual was composed of questions designed to concentrate participants' focus on specific body areas and overall physical appearance. The views expressed by the patients with BN were more negative and thus resulted in greater levels of negative emotions following both video confrontation and imagery tasks, concerning their bodies. In a previous study, Hilbert and colleagues (2002) reported that following mirror exposure, individuals with Binge Eating Disorder had lower levels of mood and appearance self-esteem than controls. The researchers found that following a second session of body exposure, these declines in mood and appearance self-esteem were not as pronounced as previous, and negative cognitions occurred less than during the initial session. A recent study demonstrated that negative emotions and cognitions diminish during the course of one body exposure session (Vocks, Legenbauer, Wachter, Wucherer & Kosfelder, 2007).

A potential explanation for elevated levels of negative thoughts and emotions during body exposure is the possible activation of self-schemas and selective attention to self-perceived defects. Jansen, Nederkoorn and Mulkens (2005) exposed eating symptomatic and control groups to pictures of their own bodies in addition to control bodies. During the exposure, the researchers monitored participants' eye movement in order to be able to measure where individuals focused. The results indicated that in symptomatic participants, the tendency was to focus on self-described 'ugly' parts of their own bodies and on more attractive parts of the control bodies. The opposite was true for controls, in that they tended to focus on attractive parts of themselves and 'ugly' parts of others. Unlike previous research, this study found no effect of exposure on mood and emotions in the control group. However, this could be due to the relative short time that these participants were exposed to their own body compared to previous studies. Therefore, it is possible that throughout the exposure, individuals with negative views of themselves are more likely to concentrate on negative aspects of appearance and do so relatively quickly. This is especially important due to the findings that selective attention can serve to maintain the eating disorder symptoms by fostering biases about the self (Shafran, Fairburn, Robinson & Lask, 2004).

Exposure therapy in body image disturbance may function as a corrective feedback mechanism. According to this information-processing theory, exposure allows an individual to accept the way they look and to correct distorted perceptions (Hilbert et al., 2002; Vocks et al., 2007). Moreover, exposure is theorized to attend to the cognitive aspects of body image disturbance by making negative thoughts and emotions salient, and thereby allowing them to be deemphasized or changed. Finally, exposure is thought to alleviate some body image disturbance features through habituation, and thus blunting the feelings of disgust, tension and

anxiety that participants feel as a result of viewing their own image (Hilbert et al., 2002; Vocks et al., 2007).

Mindfulness

Researchers highlight the need for more efficacious treatments of body image disturbance, citing the relatively moderate effectiveness of CBT (Delinsky & Wilson, 2006). Currently, only between 30 and 50 % of patients with BN who undergo CBT treatment stop bingeing and purging (Wilson, 2004). Delinsky and Wilson (2006) speculate that CBT is more successful in dealing with behaviors rather than targeting body image disturbances. A method suggested as possibly being of use is a mindfulness based approach to body image therapy.

Mindfulness has been defined as "a moment-to-moment perception of phenomena and the allowance of it to register with full awareness without the influence of cognitive shortcuts or distortions, desire, or expectations" (Stewart, 2004, p. 784). Mindfulness based therapies have been shown to be beneficial for a variety of issues including anxiety (Kabat-Zinn et al., 1992; Miller, Fletcher, & Kabat-Zinn, 1995), recurrent depression (Segal, Williams & Teasdale, 2002), and even parent training (Dumas, 2005). Stewart (2004) describes individuals with body image disturbances as suffering from biased information processing that results in a distorted reality. Therefore, by practising mindful ways to viewing oneself, individuals can be free of the negative automatic thoughts previously experienced and allow themselves to be neutral and accepting (Stewart, 2004).

Delinsky and Wilson (2006) attempted a mindfulness-inspired method of mirror exposure (ME) where participants are encouraged to view themselves in a nonjudgmental, holistic fashion that acknowledges existing emotional reactions to exposure. The study involved comparing the effect of this type of exposure to a more nondirective (ND) method in 45 women with extreme

weight and shape concerns. The results indicated that when compared to the ND therapy, this type of ME produced significant improvements in weight and shape concerns, BD, dieting, depression and self-esteem.

Likewise, Shafran and colleagues (2007) also found temporary reductions in feelings of fatness in participants asked to view themselves in a neutral way during mirror exposure. In an extension to this study, Riendeau (2007) examined the effects of 3D body image exposure and a nonjudgmental self-description instructional set on BD and self-reported mood in female university students. The results demonstrated that the effect of the manipulations was dependent on participants' dispositional level of shape concern. For individuals with low shape concerns, exposure to 3D images produced significantly lower BD compared to their 2D counterparts. However, for individuals with high shape concerns, BD decreased significantly only for those who simply viewed their images with no instructions. Overall, the findings of the study indicated that 3D body exposure significantly reduced feelings of BD and that the nonjudgmental condition improved BD only in the 2D state. Riendeau speculated that the novelty of the 3D exposure might have reduced the effectiveness of the mindful instructional set.

One of the earliest skills required in mindfulness training is that of focused breathing (Stewart, 2004). Breathing serves as an anchor that allows one to experience the present and functions as a means to control one's attention (Segal et al., 2002; Williams, Teasdale, Segal & Kabat-Zinn, 2007). Individuals are taught to use their breathing in order to help control their emotions and master the fostering of mindfulness. Arch and Craske (2006) tested the effect of mindfulness based focused breathing on the emotional reactions of participants exposed to affectively valenced picture slides. Participants were randomly assigned to one of three conditions of 15 min recorded instructions: focused breathing, worry and unfocused attention.

The focused breathing group listened to a mindfulness induction session. The participants in the worry induction condition were directed to think about different domains in their lives and worry about them, while participants in the unfocused attention group were directed to let their minds wander. Results indicated that, following induction, the unfocused and worry groups responded negatively to neutral slides. Conversely, the focused breathing individuals displayed a consistent positive response throughout. The focused breathing group also reported significantly lower negative affect and overall emotional volatility in response to post-induction slides than the worry group. The authors interpreted these results as indicating that the participants in the focused breathing group displayed more adaptive responses to negative stimuli.

Rumination/Worry

A worrisome state provides an effective contrast to that of a mindful one. Williams et. al. (2007) describe worrying as a 'doing mode', in that people are cognitively preoccupied with attempting to change their internal state rather than cultivating a mindfulness state of awareness. Thus, worry serves to interfere with one's ability to achieve a true mindfulness state. Research has demonstrated that worry produces depressed affect and anxiety (Mclaughlin, Mennin & Farach, 2007) as well as directing individuals' attention towards threatening stimuli (MacLeod, Mathews & Tata, 1986). A recent study by Mclaughlin, Borkovec and Sibrava (2007) demonstrated that both worry and rumination inductions resulted in increases in negative affect and decreases in positive affect. Further, the authors note that while worry caused more anxiety, rumination resulted in higher levels of depression.

The Present Study

The present study sought to expand on the findings of Riendeau (2007) who found that 3D exposure was more effective than 2D in lowering BD levels in a sample of female university

students. Consistent with these findings, it was anticipated that the novelty of seeing oneself in 3D would reduce the usually negative responses to body exposure. However, unlike the Riendeau study that asked participants to view themselves neutrally, the present study employed a mindfulness based focused breathing induction similar to that used by Arch and Craske (2006). They found that a recorded focused breathing induction produced lower negative affect and overall emotional volatility in response to negatively valenced picture slides when compared to unfocused attention and instructions to engage in worry. In explaining the results of their study, Arch and Craske proposed the notion that mindfulness increases willingness to tolerate uncomfortable situations and emotional acceptance. Research has shown that viewing one's image can be anxiety provoking and produce negative emotions. Considering Arch and Craske's finding that focused breathing lessens the negative response to viewing distressing stimuli, it was hypothesized that participants assigned to a focused breathing instructional set would subsequently express lower levels of body dissatisfaction and negative affect compared to participants instructed to engage in rumination/worry. Given the findings of Riendeau (2007), it was further hypothesized that participants exposed to their body image in 3D while engaging in focused breathing would subsequently report the lowest level of negative reactivity to their body image compared to participants viewing their images in 2D.

Method

Participants

Eighty-four female students enrolled in psychology courses at Lakehead University were recruited. Two participants did not return for a required laboratory session and so were removed from any analysis. In addition, one participant who failed to follow the instructions during the second session was subsequently eliminated from any analysis. In total, 81 participants

completed the study. All participants were credited with one bonus percentage toward their final mark in either Introductory Psychology or an upper level psychology course. The participants ranged in age from 18 to 54 years with a mean of 21.7 years (*SD*=6.52). The sample was predominantly Caucasian (76%) with the remainder being Native Canadian (8%) and other (15%). In addition, 86% of the sample was single, 13% were married or common law, with one individual divorced or separated.

Materials

Visual Analogue Scales (VAS, Appendix A). VASs are simple tools used to measure subjective experience. VASs have been found to be valid and reliable across both clinical and research settings (McCormack, Horne, & Sheather, 1988). VASs usually consist of a 10 cm line anchored at both ends with verbal descriptions or numbers representing the two extremes of the dimension being measured. Participants are required to mark a line at the appropriate point between the two extremes as a representation of how they are feeling. Generally, the line is divided into a 100-point scale using mm. The scales are then quantified by measuring the distance from the minimal end point to the mark made by the participant. The present study used three VASs constructed by Shafran and colleagues (2007). The VASs were used as operational measures of state BD. Participants were asked: "At this moment in time: How concerned are you about your body shape? (0 = *not at all concerned* to 100 = *extremely concerned*), How dissatisfied are you with your body? (0 = *not at all dissatisfied* to 100 = *extremely dissatisfied*), and On an emotional level how 'fat' do you feel? (0 = *not at all 'fat'* to 100 = *extremely 'fat'*)" (Shafran et al., p. 115).

Eating Disorder Examination – Questionnaire Version (EDE-Q; Fairburn & Bèglin, 1994; Appendix B). This 36-item self-report questionnaire is based on the Eating Disorder

Examination (EDE; Cooper & Fairburn, 1987) which assesses a person's state over the preceding 28 days. The items are used to generate the EDE-Q subscales of Restraint, Eating Concern, Shape Concern, and Weight Concern. The questionnaire requires minimal time to complete and uses a 7-point (0-6) forced-choice rating format for the subscales. Eating disorder psychopathology is assessed by measuring the frequency of specific behaviours over the preceding 4 weeks (Shafran et al., 2007). Overall, the EDE-Q has good reliability and validity (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004). This questionnaire served to provide information about participants' dispositional BD by combining the two subscales Shape Concerns and Weight Concerns.

Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988, Appendix C*).* This tool is a 20-item scale measuring positive affect (PA) and negative affect (NA). PA conveys the extent to which an individual feels enthusiastic, alert and active. Conversely, NA represents the feelings of subjective distress that include states such as anger, disgust, guilt and fear. Both the PA and NA scales are composed of 10 descriptors. Participants are asked to report how intensely they experience each affective state "at this moment" from 1 (*very slightly or not at all*) to 5 (*extremely*). The 10-item scales (PA and NA) have been found to be internally consistent and have excellent convergent and discriminant correlations with lengthier measures of the underlying mood factors (Watson et al., 1988). As well, the measure is both reliable and valid (Crawford & Henry, 2004). The PANAS was used in the present study to gauge any changes in affect from pre- to post-experimental manipulations.

Experimental Manipulations

Instructional sets to induce the two modes of mind were pre-recorded. While the study by Arch and Craske (2006) used 15-min recorded instructions for both the mindfulness and worry

inductions, subsequent studies have demonstrated that a 10-min induction is sufficient to induce a state of worry and or rumination (McLaughlin, Borkovec and Sibrava, 2007; McLaughlin, Mennin & Farach, 2007). As there were 10-min mindfulness focused breathing exercises commercially available, this was the length of recorded induction used in the study. The beginning of both instructional sets, and the directions on how to refocus in the case of inattention, were matched across the two recordings.

Focused Breathing (Appendix D). The focused breathing induction consisted of the "Mindfulness of the Breath" session from the book *The Mindful Way Through Depression: Freeing Yourself From Chronic Unhappiness* (Williams, et al., 2007). The session was originally 10:28 min in length, however since it is part of a series of recordings, any mention of other sessions in the series were edited out. In addition, other areas of the recording were edited out without affecting the integrity of the induction. The final induction was 10 min in length. During the focused breathing recording, participants were directed to draw their attention and awareness to any sensations they experience at the moment, with a particular emphasis on the act of breathing.

Rumination/Worry (Appendix E). The rumination/worry recorded induction was adapted from the scripts used by Arch and Craske (2006) and Mclaughlin, et.al., (2007). The recording instructed participants to ruminate about a past mistake or failure for the first 5 min of the recording, and to think about a future worrisome topic for the final 5 min of the recording. The researcher narrated the recording.

Procedure

Participants were recruited through various means. Some participants had participated in previous research and had agreed to be contacted about future potential studies. Other

participants were sent an email via the Introductory Psychology directory with the pertinent information for the study. Finally, a subset of participants was recruited from actual classes within the psychology department. All participants were instructed to read a brief explanation of the study and to complete a screening questionnaire (Appendix F) via an internet link to SurveyMonkey™. Eligible participants were then contacted via email about setting up the first appointment at the laboratory. Through the screening questions, participants who were currently undergoing treatment for an eating, anxiety, or a mood disorder were excluded from participation on ethical grounds. The first appointment was scheduled and participants were told to wear everyday clothes. The idea was to have pictures taken of participants that would represent how they most commonly view themselves. Upon arrival to the laboratory, participants were presented with a cover letter (Appendix G) and asked to fill out a consent form and demographic questionnaire (Appendix H), the PANAS, the three BD VASs, and the EDE-Q. Following the completion of this package, participants had nine portrait photos taken of them for each pose: full portrait, seated portrait, and head and shoulders portrait, each taken at specific angles to the cameras: 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°, and 360°. The photographs were taken using two 8.0 megapixel Cannon EOS Digital Rebel XT cameras. The cameras were mounted 88 mm apart center to center of the lenses. The photographs were rendered to 3D portraits using an IBM® IntelliStation M Pro workstation and StereoPhoto Maker software (Suto, 2006), which functions as a stereo image editor. Following the taking of pictures, a second appointment to visit the laboratory was scheduled within 1 week's time. The average time between appointments was 6.8 days.

Participants were randomly assigned to one of four experimental conditions: 2D-focused breathing; 2D-rumination/worry; 3D-focused breathing; 3D-rumination/worry. Three conditions

each contained 20 participants, while the 3D-focused breathing had 21. During the second visit, each participant was given a brief explanation as to how the session would run. The participant was then seated 3.35 m in front of a projection screen. The participant was fitted with special eyewear and given noise-canceling headphones over which all of the instructions would be given for the session. The experimenter then exited the room, leaving the participant set for the start of the recording. Once in the adjoining room, the experimenter started the induction and monitored the proceedings in order to start the body exposure slideshow at the appropriate time. During the recording, there was a picture of a neutral object (lamp) so that participants could acclimatize viewing an image with the eyewear. Following the end of the induction, the experimenter commenced the slideshow of the 27 photographs projected in either 2D or 3D. The photographs were projected in full size onto the screen using the InFocus™ video projector. Participants in the 3D condition viewed their photographs using Real D CrystalEyes®. CrystalEyes® is a lightweight, wireless set of liquid crystal shutter eyewear for stereo imaging. The shutter eyewear is activated by an infrared emitter that connects to the IBM® IntelliStation M Pro workstation. Participants in the 2D condition also wore the same eyewear with the shutter function turned off, thus resulting in a 2D image presentation. The portraits were presented to the participant for 6 sec each, which with the addition of the starting slide of the lamp, meant that the slideshow lasted 2 min 48 sec. Immediately following the body image exposure, participants were asked to complete the three BD VASs, the PANAS and a measure gauging how much they followed the recorded instructions. The package was placed on a small table next to the participants with an attached lamp in order to assist them while filling out the questionnaires. Once completed, participants notified the experimenter via a two-way radio. Participants were then debriefed about their experience and thanked for their participation

Image Production. A 3D image is produced by presenting a slightly different image to each eye. Rather than seeing two different images, the visual cortex fuses the disparate images into a single image, with the magnitude of retinal disparity defining level of stereoscopic depth. In the present study, each of the participant's poses is taken from two cameras, which provide the slightly different perspectives of the same image. These images are then combined to create a 3D representation. One technique that is used to create this stereoscopic image is anaglyph glasses. In this method, left and right images are superimposed using different colours (Lunar Planetary Institute, 1999). The colour filters ensure that each eye only receives one of the two disparate images, thus providing stereoscopic fusion. A problem associated with anaglyph glasses is ghosting, in which part of one image may filter with the other creating a double image, thus diminishing the 3D effect (Stereographics Corp, 1997).

Unlike the Riendeau (2007) study that used the anaglyph glasses, participants in the present study used Real D CrystalEyes® wireless liquid crystal shutter eyewear. The shutter eyewear is activated by an infrared emitter that connects to the IBM® IntelliStation M Pro workstation. Through this method, the left and right images were alternated rapidly on the screen at 120 frames per second. The eyewear shutter works at a rate faster than human perception and serves to alternate the left and right images into each eye at a rapid pace. The results is that each eye receives its appropriate image, the left eye only sees the left view and the right eye the right view (Stereographics Corp, 1997). The brain then fuses the disparate images into one fused stereographic image. The shutter technology has advanced to the point that ghosting is virtually eliminated and thus provides a clearer and more distinct 3D image. The 3D images in the study had a combination of parallax values. Therefore, parts of the images had zero parallax (no disparity), meaning that the viewer's eyes converged on the plane of the screen. The images also

had negative parallax (crossed disparity) and positive parallax (uncrossed disparity) values. The parts of the image with negative parallax values appear to be closer than the plane of the screen, while those with positive parallax appear to be behind the screen (Stereographics Corp, 1997).

The 2D image, on the other hand, presented participants with only one camera perspective of each pose. Specifically, the image taken from the right camera was used for all 2D slideshows.

Results

The data from the questionnaires was entered into the Statistical Package for Social Sciences (SPSS) v16. Upon entry into the program, the data was reviewed using the DESRIPTIVES option of SPSS. The data was reviewed to ensure that no entry errors had been performed. Missing data was replaced with prorated item values within each of two individual cases missing one or two EDE-Q items. One participant incorrectly completed the PANAS and was therefore unavailable for analysis of the PANAS data.

Constructing the State Body Dissatisfaction Dependent Variable

The first three VASs ('At this moment in time: How concerned are you about your body shape?', 'How dissatisfied are you with your body?', 'On an emotional level how 'fat' do you feel?') were analyzed using SPSS for internal consistency. At pre-exposure, the items were highly correlated with inter-item correlations ranging from .79-.84 and with an index of internal consistency of Cronbach's α= .93. Further, at post-exposure, the correlations ranged from .88-.91 with Cronbach's α=.96. A single state body dissatisfaction (BD) measure was then calculated for both pre- and post-exposure by averaging the three VASs at each time point.

Constructing the Dispositional Body Dissatisfaction Grouping Independent Variable

The 13 EDE-Q items comprising the Weight Concerns and Shape Concerns subscales were summed to produce an overall item mean as a measure of dispositional BD. This measure was internally consistent in the present sample, with Cronbach's $\alpha = .93$ over the 13 items. Using a median split of 1.538 on the scale resulted in low- and high-dispositional BD groups containing 40 and 41 participants, respectively.

State Body Dissatisfaction Response

Table 1 displays mean ($\pm SE$) state BD scores. Does exposure to one's photographic images produce different effects upon subsequent reports of BD as a function of the three independent variables of instruction, image dimensions and dispositional BD? To address this question, a one-within (Exposure: pre vs. post), three-between (Instruction: focused breathing vs. rumination/worry; Dimension: 2D vs. 3D; Dispositional BD: low vs. high) ANOVA was carried out. There was a significant three-way interaction involving Exposure x Dimension x Instruction, $F(1, 73) = 4.33$, $p = .041$, $\eta^2 = .056$. The Dimension x Instruction interaction involving change scores (Δ, post- minus pre-exposure) is depicted in Figure 1. The simple effect of exposure on BD within each of the four experimental conditions was statistically significant for only the 3D-rumination/worry group, $F(1, 19) = 7.60$, $p = .013$, $\eta^2 = .286$. Thus, it would appear that rumination/worry leads to an exacerbation of BD when one is viewing their image in 3D but not in 2D.

Table 1.

Body Dissatisfaction (*M*± *SE*) Pre- and Post-Image Exposure as a Function of Instructional Set and Image Dimension

	Instructional Set							
	Focused Breathing				Rumination/Worry			
	Pre		Post		Pre		Post	
Image Dimension	*M*	*(SE)*	*M*	*(SE)*	*M*	*(SE)*	*M*	*(SE)*
2D	37.6	(4.4)	40.6	(5.0)	38.3	(4.7)	37.7	(5.3)
3D	43.3	(4.3)	40.7	(4.9)	38.0	(4.5)	48.8	(5.1)

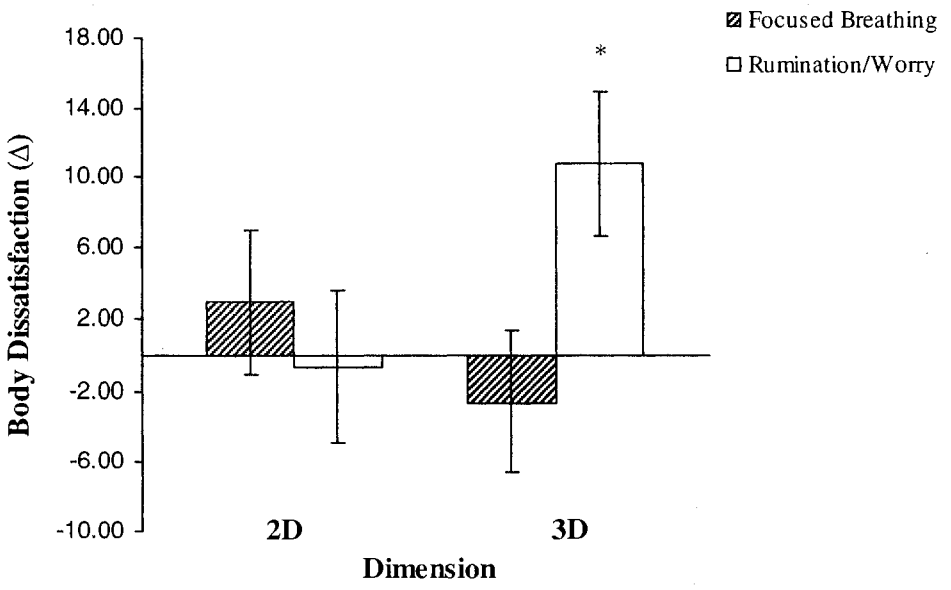

Figure 1. Mean change (Δ) on 100mm Visual Analogue Scales in body dissatisfaction (±*SE)* pre- to post-exposure for focused breathing and rumination/worry conditions after viewing 2D versus 3D images. * $p < .05$

Affective Response

Table 2 displays mean (±*SE)* PA and NA scores. Regarding PA, the one-within, three-between ANOVA produced a significant exposure main effect, $F(1, 72) = 12.69$, $p < .001$, $\eta^2 = .150$. Participants' PA scores dropped from pre- to post-exposure, *M*s (*SE)* = 28.2 (0.8) and 25.3 (0.9). Figure 2 depicts the magnitude of change (Δ) in PA for each of the four experimental conditions. The simple effect of exposure on PA was statistically significant for only the 3D-rumination/worry group, $F(1, 19) = 17.45$, $p < .001$, $\eta^2 = .479$.

Using the same analytical strategy for NA also revealed a significant exposure main effect, $F(1, 72) = 25.17$, $p < .001$, $\eta^2 = .259$, as well as an Exposure x Dispositional BD interaction, $F(1, 72) = 9.61$, $p = .003$, $\eta^2 = .118$. The simple effect of exposure on NA was trending for low dispositional BD participants, $F(1, 38) = 3.75$, $p = .06$, $\eta^2 = .090$, pre- to post-exposure *M*s (*SE)* = 12.9 (0.6) and 14.5 (1.2), respectively. The same simple effect achieved significance for high dispositional BD participants with an effect size considered to be large, $F(1, 40) = 23.51$, $p < .001$, $\eta^2 = .370$, pre- to post-exposure *M*s (*SE)* = 15.1 (0.6) and 21.6 (1.1), respectively. This result suggests that women find body image exposure to be aversive, particularly if one is predisposed to dispositional body dissatisfaction.

Figure 3 displays the magnitude of change (Δ) in NA from pre- to post-exposure for the four experimental conditions. The simple effect of exposure on NA was statistically significant for the 3D-rumination/worry group, $F(1, 19) = 16.62$, $p < .001$, $\eta^2 = .467$, and the 2D-rumination/worry group $F(1, 19) = 6.25$, $p = .022$, $\eta^2 = .248$, with a trend for the 2D-focused breathing group $F(1, 19) = 3.91$, $p = .063$, $\eta^2 = .171$. Collectively, results indicate that the 3D-rumination/worry group was most adversely affected among the experimental groups by way of

Table 2.

Affect (*M*± *SE*) Pre- and Post-Image Exposure as a Function of Instructional Set and Image Dimension

	Instructional Set							
	Focused Breathing				Rumination/Worry			
	Pre		Post		Pre		Post	
Image Dimension	*M*	*(SE)*	*M*	*(SE)*	*M*	*(SE)*	*M*	*(SE)*
2D								
PA	27.0	(1.6)	24.2	(1.2)	29.4	(1.3)	26.3	(1.8)
NA	14.9	(0.8)	18.7	(1.6)	13.7	(0.9)	16.9	(1.7)
3D								
PA	26.0	(1.7)	25.1	(1.8)	29.9	(1.4)	24.4	(2.1)
NA	13.2	(0.8)	15.5	(1.6)	14.3	(0.8)	21.1	(1.6)

Note. PA= positive affect subscale of the PANAS. NA= negative affect subscale of the PANAS.

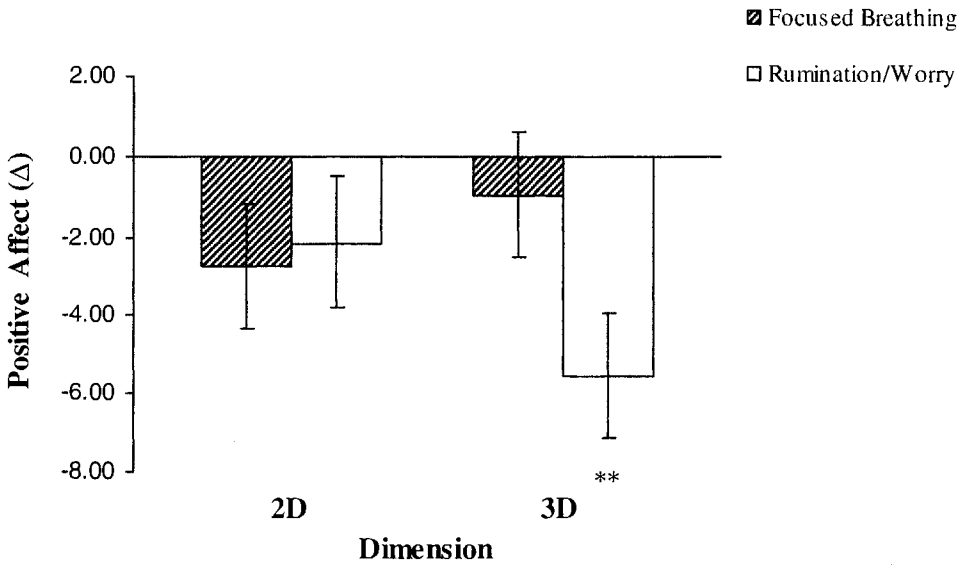

Figure 2. Mean change (Δ) in positive affect (±*SE)* pre- to post-exposure for focused breathing and rumination/worry conditions after viewing 2D versus 3D images.

** $p < .001$

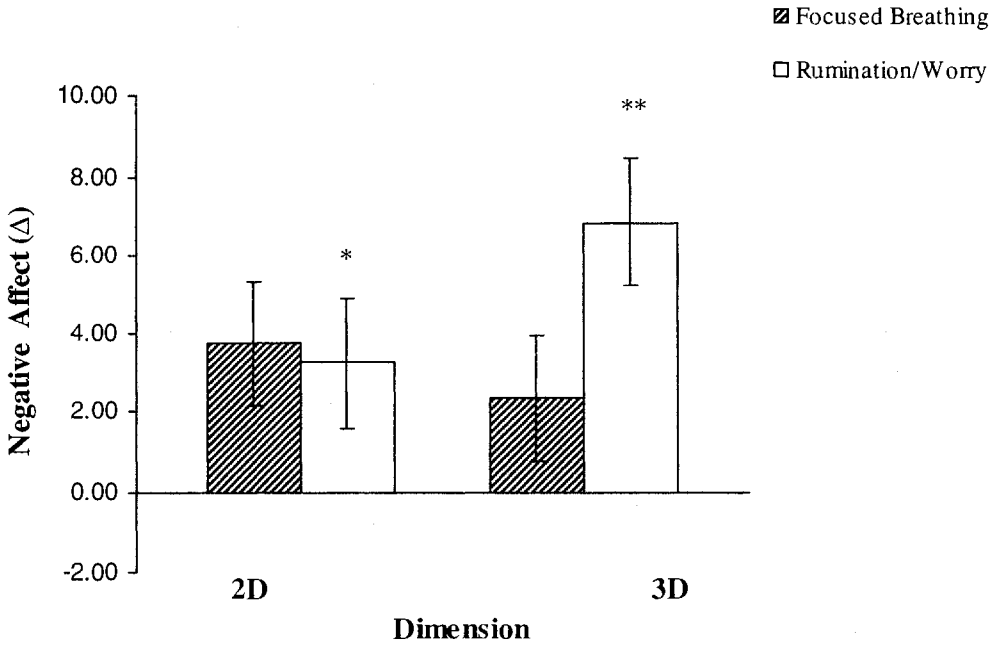

Figure 3. Mean change (Δ) in negative affect (±*SE)* pre- to post-exposure for focused breathing and rumination/worry conditions after viewing 2D versus 3D images.

* $p < .05$, ** $p < .001$

exacerbations on state measures of body dissatisfaction and negative affect, with concomitant diminution in positive affect.

Manipulation Check

Included in the methodology was the instruction for participants to indicate on the 100mm VAS 'How much of the previous 10 min did you follow the recorded instructions?' ranging from 0 (*none of the time*) to 100 (*all of the time*). Results of the three-between ANOVA analytical strategy failed to uncover any main or interaction effects. Overall, the $M\ (SE) = 80.2$ (2.2) suggesting that participants were rather adherent to assigned instructional recordings to engage in rumination/worry or focused breathing.

Exploratory Correlation Analysis

Pearson product moment correlation coefficients were calculated for the entire sample ($N = 81$) on the three dependent variables (BD, PA, NA) at both pre- and post-exposure as well as respective change scores on these variables. Noteworthy is the strong magnitude of the positive correlation between BD and NA at post-exposure relative to the much weaker correlation at pre-exposure, $rs = .63, p < .001$ and $.21, p < .06$, respectively. There is virtually no association between BD and PA at both pre- and post-exposure, $r = -.06$ in both cases. These results suggest BD is uniquely related to the negative valence in affect and that the association is much more likely to reveal its strength in the context of being exposed to one's body image.

Also noteworthy is the strong correlation between change scores in BD and change scores in NA, $r = .45, p < .001$, whereas the association with changes in PA is negligible, $r = -.21, p < .07$.

Discussion

The purpose of the present study was to investigate how women reacted to specific mode of mind inductions in conjunction with 2D or 3D body image exposure. Consistent with Riendeau's (2007) findings, it was predicted that participants would have the least negative responses to body exposure in the novel 3D condition. In addition, it was also hypothesized that participants in the focused breathing mode of mind condition would have subsequent lower levels of negative affect (NA) and body dissatisfaction (BD) following the body exposure, while those in the rumination/worry condition would experience heightened levels of both NA and BD. Contrary to predictions, results indicated that viewing one's 3D image in combination with a rumination/worry induction resulted in a significant increase in BD. The discrepancy between these results and that of Riendeau (2007) could be a result of various factors. Firstly, the 3D technology differed between both studies as Riendeau used red/cyan anaglyph glasses while participants in the present study wore crystal shutter eyewear to produce the 3D effect. The shutter eyewear allows for the 3D image to be much clearer and defined than that viewed by the anaglyph glasses. As previously mentioned, anaglyph glasses are more susceptible to colour ghosting which results in a diminished 3D effect (Lunar Planetary Institute, 1999). Shutter eyewear, on the other hand, virtually eliminates ghosting and thus provides an undistorted and clearer image. Further Riendeau had speculated that the novelty of seeing one's image in 3D may have served to minimize the negative responses normally experienced during body exposure. However, participants in the present study wore the eyewear throughout the procedure and thus had over 10 min to become acclimatized to the 3D image, as there was a picture of an object (lamp) on the screen in front of them while they listened to the mode of mind induction. This raises the possibility that the novelty of the 3D images was not as great in the present study

as for those participants in the Riendeau study, whose initial exposure to a 3D image was the first picture of themselves.

As predicted, body exposure adversely influenced both positive and negative affect. On average, positive affect (PA) decreased regardless of instructional set and image dimension. However, participants in the 3D-rumination/worry condition experienced significant reductions in PA. With respect to negative affect (NA), the results indicated that for the typical participant in the study, NA increased following exposure. The rise in NA was significant for both the 2D- and 3D-rumination/worry groups. Thus, for participants induced into a state of rumination/worry, exposure was aversive regardless of the dimension of the image. In addition, there was a dispositional BD by exposure interaction in that those participants with high dispositional BD had a significant increase in NA. Overall, while it appears that body image exposure caused an increase in negative affect among participants, those with high dispositional BD were the most adversely affected. Participants in the 3D-rumination/worry condition experienced a significant decrease in PA as well. These findings are consistent with much of the literature that shows that body image exposure can be an aversive experience (Hilbert et al., 2002;) especially during an initial exposure session. Additionally, research has demonstrated that the longer the duration of an exposure session, the more the negative reactions subside (Vocks et al., 2007). Since participants were exposed to their body images through a 2min and 48 sec slideshow, it is unlikely that the participants would become habituated to their images and, thus, have an accompanying decrease in negative reactions. In therapy, body exposure is often used to make negative body related thoughts salient, so that these thoughts can then be targeted (Hilbert et. al, 2002). Therefore, it is likely that participants experienced an increase in negative body related thoughts following the brief body exposure in this study.

The positive linear relationship between NA and BD is also of some interest. Increases in NA were significantly correlated with the subsequent increase in BD, hence highlighting the link between negative affect and feelings about one's body following body exposure. This is of special importance in stressing the need for further research into how changes in both NA and body image are related following a body exposure session. It is possible that when confronted with their own body image, a large number of individuals are unhappy with what they see. The increase in negative affect associated with body exposure, coupled with the subsequent attention paid to negative aspects of one's physical appearance, likely combine to achieve detrimental effects on BD.

Contrary to the hypothesis, mindfulness based focused breathing did not have a dampening effect on reported body dissatisfaction and negative affect following the body exposure experience. While Arch and Craske (2006) found that a focused breathing induction reduced the negative reactivity to distressing visual stimuli, this was not the case when participants were shown life sized pictures of their own body. Although body exposure has been shown to be distressing (Hilbert et al., 2002; Tuschen-Caffier et al., 2003), the mindfulness based focused breathing exercise did not serve to minimize the negative reactions in this study. It is important to note, however, that this does not necessarily indicate that a mindfulness approach to body image exposure would not be helpful in reducing the distressing properties of exposure. As previously noted, focused breathing is one of the basic tools upon which true mindfulness skill is based (Stewart, 2004). It is therefore a skill that needs to be practiced and perfected (Arch and Craske, 2006; Stewart, 2004). Since participants in this study were subjected to only one brief 10-min session of focused breathing, most would not have achieved a true mindful state.

It had also been predicted that the rumination/worry induction would cause an overall increase in BD across the whole sample. However, while individually both 3D exposure and rumination/worry induction were not sufficient in producing significant increases in BD, their combination did indeed result in such a change in state BD. The fact that the resultant increase in BD was dependant on the interaction of 3D exposure with rumination/worry induction raises some interesting possibilities. It is possible that having been induced into a state of rumination/worry participants were more susceptible to viewing pictures of themselves in 3D. When people look at themselves in a mirror, the image is a virtual one in that the actual image appears to be behind the plane of the mirror (Hecht, 1996). This differs from a real image where the image is seen in the plane of the object upon which it is projected, like a screen (Cutnell & Johnson, 1995). Conversely, a 3D image has properties that give it the appearance of having parts in front of the screen upon which it is projected, which would be much different from the mirror images people are used to seeing on an everyday basis. In other words, segments of the 3D image appear be in the foreground or in "viewer space" due to negative parallax values (Stereographics, 1997, p.17). As these parts appear to exist between the viewer and the screen, they may be perceived by the participant as being larger than what the individual is used to seeing. Thus, it is likely that while in a state of rumination/worry, participants would focus on these protruding body parts resulting in increases in BD. Therefore, for participants who are in a state of relative anxiety due to the rumination/worry induction, they may be seeing a view of themselves that is exaggerated, which could possibly magnify any negative thoughts they are experiencing about their bodies.

An alternative explanation may be that the 3D image when compared to the 2D image is more similar to the everyday likeness that people see of themselves. The most common way that

people see themselves is via a mirror or a reflective surface. As noted previously, a mirror image appears behind the plane of the mirror. The 2D images in the study, however, exist within the plane of the screen and thus may not initiate the same reaction that one gets when viewing their mirror image. As noted previously, the 3D images also had positive parallax values resulting in parts of the images appearing behind the plane of the screen. Therefore, according to this perspective, viewing one's image via the 3D condition more likely approximates the everyday experience of seeing oneself via a mirror, when compared to the 2D condition. In other words, viewing the 3D image may feel more akin to the experience of seeing oneself via a mirror, while viewing the 2D image may feel unfamiliar. When this experience is combined with a rumination/worry induction, it is more likely that negative self-schemas would be activated which would result in the accompanying increases in NA and BD found in the study.

Overall, the 3D-rumination/worry group was the most adversely affected by body image exposure. This finding suggests there may be a unique quality to this combination of factors that exacerbates BD. Tiggemann (2001) has argued that normal weight women are more susceptible to using situational cues to determine their state BD. Given the non-clinical population used in the study, it is possible that the combination of 3D body exposure and rumination/worry induction presented participants in this condition with cues that contributed to produce more negative views of themselves. Given that research has demonstrated that being in a state of worry causes individuals to attend to threatening information (MacLeod, Mathews & Tata, 1986), it is likely that seeing themselves in 3D following the rumination/worry induction either triggered or magnified existing negative schema for participants in this group. Consequently, being in a state of relative anxiety, participants may have focused on these personally threatening cues, which in this case were the body parts/areas that appeared to protrude from the screen. The

subsequent effect on BD and affect is expected, especially given that situational cues have been known to trigger fluctuations in body image states (Rudiger, Cash, Roehrig & Thompson, 2007). These findings suggest that being in a state of rumination/worry serves to exacerbate the already negative reactions of exposure. Therefore it appears important to investigate specific states of mind that females are experiencing prior to, and during, times when they focus on their bodies. The apparent susceptibility of body disposition on these states of mind makes it an area that may warrant future interest.

A possible limitation to the present study may be the distance between the cameras used to provide the slightly different perspectives to achieve stereographic images. The average distance between human eyes is 65 mm. The distance from centre to centre of the lenses in this design was 88 mm. The larger distance employed in the present design could have caused some participants to experience some level of discomfort, or have reduced the ability for some participants to achieve binocular fusion. Although participants reported neither of these possibilities, future research may need to ensure that the distance between the cameras more closely matches the average distance between human eyes.

Future research directions might focus on more objective measures of reactions to body image exposure. Physiological variables such as brain activity, skin conductivity and enzyme production could be monitored to investigate changes and fluctuations caused by the mode of mind inductions and body exposure. While it is assumed that differences between the present study's findings and that of Riendeau (2007) may be due to differences in how the 3D images were viewed, objective measures can be used to investigate this claim. Psychophysiological reactions to the mode of mind inductions in combination with body image exposure in 2D and 3D could then be investigated using available technologies. Another possible measure could be

an eye-tracking device that would allow experimenters to determine if participants in different conditions focused on different body parts/areas. This would allow researchers to determine if being induced into specific modes of mind actually influences where individuals focus during body exposure. It would also be beneficial to increase the exposure time to see if any negative effects diminish regardless of variables surrounding the exposure scenario. Prolonged exposure would also help investigate reactions to the mode of mind inductions in conjunction with 2D and 3D body exposure in a setting more akin to that of a therapeutic body exposure session.

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Appendix A

Visual Analogue Scales

Body Dissatisfaction VASs

Mark a slash on each of the lines below to indicate your answer:

1) At **this moment** in time how concerned are you about your body shape?

not at all concerned _____ **extremely concerned**

2) At **this moment** in time how dissatisfied are you with your body?

not at all dissatisfied _____ **extremely dissatisfied**

3) On an emotional level how 'fat' do you feel at **this moment** in time?

not at all 'fat' _____ **extremely 'fat'**

Manipulation Check

1) How much of the previous 10 min did you follow the recorded instructions?

none of the time _____ **all of the time**

Appendix B

Eating Disorder Examination – Questionnaire Version

EDE-Q

Instructions

The following questions are concerned with the **PAST FOUR WEEKS ONLY** (**28 DAYS**). Please read each question carefully and circle the number on the right. Please answer ALL the questions.

EXAMPLES: ON HOW MANY DAYS OUT OF THE PAST 28 DAYS.....	No Days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
...Have you tried to eat vegetables?	0	1	2	(3)	4	5	6
...How many times have you walked to school?	0	1	(2)	3	4	5	6

ON HOW MANY DAYS OUT OF THE PAST 28 DAYS.....	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
2. ...Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?	0	1	2	3	4	5	6
3. ...Have you gone for long periods of time (8 hrs or more) without eating anything in order to influence your shape or weight?	0	1	2	3	4	5	6
4. ...Have you tried to avoid eating any foods which you like in order to influence your shape or weight?	0	1	2	3	4	5	6
5. ...Have you ever tried to follow definite rules regarding your eating in order to influence your shape or weight; for example, a calorie limit, a set amount of food, or	0	1	2	3	4	5	6

rules about what or when you should eat?							
6. ...Have you wanted your stomach to be empty?	0	1	2	3	4	5	6
7. ...Has thinking about food or its calorie content made it much more difficult to concentrate on things you are interested in; for example, read, watch TV, or follow a conversation?	0	1	2	3	4	5	6
8. ...Have you been afraid of losing control over your eating?	0	1	2	3	4	5	6
9. ...Have you had episodes of binge eating?	0	1	2	3	4	5	6

ON HOW MANY DAYS OUT OF THE PAST 28 DAYS.....	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every Day
10. ...Have you eaten in secret? (Do not count binges.)	0	1	2	3	4	5	6
11. ...Have you definitely wanted your stomach to be flat?	0	1	2	3	4	5	6
12. ...Has thinking about shape or weight made it more difficult to concentrate on things you are interested in; for example, read, watch TV, or follow a conversation?	0	1	2	3	4	5	6
13. ...Have you had a	0	1	2	3	4	5	6

definite fear that you might gain weight or become fat?							
14. ...Have you felt fat?	0	1	2	3	4	5	6
15. ...Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

OVER THE PAST FOUR WEEKS (28 DAYS).....

16. ...On what proportion of times that you have eaten have you felt guilty because the effect on your shape or weight? (Do not count binges.) (Circle the number which applies.)

0. None of the times
1. A few of the times
2. Less than half the times
3. Half the times
4. More than half the times
5. Most of the times
6. Every time

16. ... Over the past four weeks (28 days), have there been any times when you have eaten what other people would regard as an unusually large amount of food given the circumstances? (Please circle appropriate number). **0- NO 1- YES**

17. ...How many such episodes have you had over the past four weeks? (Please write the appropriate number.) _____

18. ....During how many of these episodes of overeating did you have a sense of having lost control? _____

19. ....Have you had other episodes of eating in which you have had a sense of having lost control and eaten too much, but have not eaten an unusually large amount of food given the circumstances? **0- NO 1- YES**

20. ... How many such episodes have you had over the past four weeks? _____

21. ....Over the past four weeks have you made yourself sick (vomit) as a means of controlling your shape or weight? **0---NO 1--- YES**

22. ....How many times have you done this over the past four weeks? _____

23. ....Have you taken laxatives as a means of controlling your shape or weight? **0 -- NO 1 -- YES**

24. ....How many times have you done this over the past four weeks? _____

25. ....Have you taken diuretics (water tablets) as a means of controlling your shape or weight?	**0 -- NO** **1 -- YES**
26. ....How many times have you done this over the past four weeks?	_____
27. ....Have you exercised hard as a means of controlling your shape or weight?	**0 -- NO** **1 -- YES**
28. ....How many times have you done this over the past four weeks?	_____

OVER THE PAST FOUR WEEKS (28 DAYS).....
(Please circle the number which best describes your behaviour)

	NOT AT ALL		SLIGHTLY		MODERATELY		MARKEDLY
29. ....Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
30. ....Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
31. ....How much would it upset you if you had to weigh yourself once a week for the next four weeks?	0	1	2	3	4	5	6
32. ....How dissatisfied have you felt about your weight?	0	1	2	3	4	5	6
33. ....How dissatisfied have you felt about your shape?	0	1	2	3	4	5	6
34. ....How concerned have you been about other people seeing you eat?	0	1	2	3	4	5	6

OVER THE PAST FOUR WEEKS (28 DAYS).....
(Please circle the number which best describes your behaviour)

	NOT AT ALL		SLIGHTLY		MODERATELY		MARKEDLY
35 ....How uncomfortable have you felt seeing your body; for example, in the mirror, in shop window reflections, while undressing or taking a bath or shower?	0	1	2	3	4	5	6
36....How uncomfortable have you felt about others seeing your body; for example, in shared changing rooms, when swimming or wearing tight clothes?	0	1	2	3	4	5	6

Appendix C

Positive and Negative Affect Schedule (PANAS)

PANAS

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, that is, at the present moment. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	**a little**	**moderately**	**quite a bit**	**extremely**

_____ interested
_____ distressed
_____ excited
_____ upset
_____ strong
_____ guilty
_____ scared
_____ hostile
_____ enthusiastic
_____ proud

_____ irritable
_____ alert
_____ ashamed
_____ inspired
_____ nervous
_____ determined
_____ attentive
_____ jittery
_____ active
_____ afraid

Appendix *D*

Focused Breathing Instructional Set

Focused Breathing Induction

Available from *The mindful way through depression: Freeing yourself from chronic unhappiness* by Williams et al. (2007). The session is called "The Mindfulness of the Breath".

Appendix E

Rumination/Worry Instructional Set

Rumination and Worry Script

Rumination

First, settle into a comfortable sitting position.

During this period, you will be instructed to engage in rumination; this involves focusing on any thoughts or images about a past mistake or failure that you have made. Please ruminate about your most negative topic, in the way that you usually ruminate about it, but as intensely as you can. If you normally ruminate about only one topic at a time, please try to do the same during this period. However, if your thoughts change to another rumination topic during this period feel free to allow these thoughts to continue. It is all right to change topics during this period if the changes occur naturally during the rumination process.

Thinking about this past mistake or failure, ask yourself how could things have turned out differently?

What could I have done to change the outcome?

When you notice that your mind is wandering and this could happen over and over again, bring yourself back to something you are ruminating about.

Keep asking yourself- why did that occur?

Soon you will hear the sound of a bell to signal the end of the rumination state segment. Please use the sound of the bell to bring this period to a close. Continue to ruminate until you hear the bell. After the bell, continue to follow the instructions.

Worry

During this period, you will be instructed to engage in worry; this involves focusing on any thoughts or images about a future event or catastrophe. Please worry about your most worrisome topic, in the way that you usually worry about it, but as intensely as you can. If you normally worry about only one topic at a time, please try to do the same during this period. However, if your thoughts change to another worrisome topic during this period feel free to allow these thoughts to continue. It is all right to change topics during this period if the changes occur naturally during the worry process.

Perhaps you are thinking about your health or the health of someone close to you? Perhaps you are focusing on your financial situation or anything else currently of concern to you. Now ask yourself- what is it that worries me about it? Think about all of the different reasons that this thing concerns or worries you. And all of the different things that can happen as a result of this thing that worries or concerns you.
Elaborate fully on all of the different possible consequences of whatever it is you are most worried about.

When you notice that your mind is wandering and this could happen over and over again, bring yourself back to something you are worrying about.

Keep asking what if that happens?

Ask yourself what is it that worries me about it? Think about all of the different reasons that this thing worries or concerns you.

Elaborate fully on all of the different possible consequences of whatever it is you are most worried about.

Soon you will hear the sound of a bell to signal the end of the worry state segment. Please use the sound of the bell to bring this period to a close. Continue to worry until you hear the bell. After the bell, continue to follow the instructions.

Appendix F

Screening Questionnaire

Screening Questionnaire

1. Do you currently smoke cigarettes?

Y N

2. During the last 6 months, have you taken oral contraceptives, or are you currently taking oral contraceptives?

Y N

3. Do you practise yoga?

Y N

4. Do you practise meditation?

Y N

5. What is your dominant hand for:

Y N

6. List any food allergies you may have:

Y N

7. Are you currently being treated by a health care professional for an eating disorder?

Y N

8. Are you currently being treated by a health care professional for depression?

Y N

9. Are you currently being treated by a health care professional for an anxiety disorder?

Y N

Appendix G

Participant Cover letter

Cover letter

Dear Participant:

Thank you for taking part in this research study investigating people's psychological reactions to viewing portraits of themselves delivered in unique two-dimensional (2D) or three-dimensional (3D) representations, following a particular state of mind induction. This study is being conducted by Eduardo Roldan and supervised by Dr. Ron Davis from the psychology department at Lakehead University.

The two states being explored are a focused breathing induction and a worry induction. You will be randomly assigned to either the breathing or worry induction. The focused breathing induction will involve listening to a 10-min recording guiding you through a mindfulness based breathing exercise. The worry induction will involve listening to a 10-min recording outlining six topics that you will be requested to worry about. These topics include Social Relations, Achievement, Money/Economics, Environment, Health, and Safety. Throughout the recording, you will be asked to think about what worries you the most within each topic.

Your participation involves two visits to the laboratory about a week apart from each other. During the first visit, you will be asked to complete a series of questionnaires on eating attitudes and behaviours, and then have 27 portrait photographs taken of you. This will take about 30 minutes of your time. During the second visit to the laboratory, you will be induced into either a mindfulness or worry state, following which you will view your 27 pictures in full portrait either in 2D or in 3D. This visit will take about 30 minutes of your time. You will receive a Psychology 1100 bonus point for your participation.

Although there are no physical risks involved in participating in this study, you may be randomly assigned to undergo the worry induction and subsequently experience any amount of psychological discomfort consistent with what you ordinarily feel while worrying.

This research project has been approved by the Lakehead University Senate Research Ethics Board. Only Dr. Davis and I will have access to the information you provide. Any information that is obtained in connection with this study, and that can be identified with you, will remain confidential and will be disclosed only with your permission. Your responses to questionnaires will not be identified by your name. The data you supply will only be identified by number. When the study is completed, the information will be securely stored in the Department of Psychology at Lakehead University for seven years. A summary of findings will be available to those interested upon request.

Participation in this research study is voluntary. If for any reason you wish to withdraw from the study, you may do so at any time without penalty. If you have any questions or concerns about this study, please do not hesitate to contact me at oeroldan@lakeheadu.ca. You may also contact the Lakehead University Research Ethics Board at 343-8283.

Thank you,

Eduardo Roldan

M.A. graduate student, Clinical Psychology

Department of Psychology, Lakehead University

Appendix H

Participant Consent Form and Demographics Questionnaire

Consent Form

My signature on this form indicates that I agree to participate in the study investigating people's psychological reactions to viewing portraits of themselves delivered in unique two-dimensional (2D) or three-dimensional (3D) representations, following either focused breathing or worry induction. This study is being conducted by Eduardo Roldan, in the Department of Psychology, for his Master's thesis under the supervision of Dr. Ron Davis (343-8646). I understand that my participation in this study is conditional on the following:

1. I have read the cover letter and I fully understand what I will be required to do as a participant in the study.
2. I am a volunteer and may withdraw from the study at any time without penalty.
3. There are no anticipated physical risks associated with my participation in this study. It is, however, possible that I may experience a degree of psychological discomfort as a function of the worry induction if I am randomly assigned to that condition.
4. My data will be confidential and stored in the Department of Psychology for a period of seven years.
5. I may receive a summary of the project, upon request, following the completion of the project.

_____
Name of Participant (please print)

_____
Date of birth

_____
Signature of Participant

_____
Date

_____
Email Address

_____
Name of Psychology Professor and course number

_____
Student number

Demographic Questionnaire

Marital status:

Married/common law □ Divorced/separated □ Single □ Widowed □

What is your ethnic background?

Caucasian	□	South Asian	□	Hispanic	□
African-Canadian	□	European	□	Native-Canadian	□
East Asian	□	Other (please specify):_____			

School Enrolment:
Full time student □ Part time student □

What academic program(s) are you in?_____