

PSYCHOLOGICAL RESPONSES TO THREE DIMENSIONAL BODY SHAPE
EXPOSURE IN FEMALE UNIVERSITY STUDENTS

by

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Abstract

The purpose of the present study was to experimentally investigate the psychological responses of women to two dimensional (2D) or three-dimensional (3D) body image exposure. Seventy female undergraduate students were randomly assigned to view life-size images of themselves in 2D or 3D as well as to receive one of two sets of instructions (nonjudgmental self-description [NSD] versus no instruction). Body dissatisfaction (BD), length of time engaged in mindful activity, and self-reported mood were assessed throughout the experiment. Among participants with dispositionally low-shape concerns, exposure to 3D images produced significantly lower BD compared to their 2D counterparts. Among participants with high-shape concerns, BD decreased significantly from pre- to post-exposure among those viewing their images in 2D with NSD instruction. Conversely BD decreased significantly from pre- to post-exposure among participants in the 3D condition who simply viewed their images without instruction. In addition, participants high in dispositional shape concerns reported spending less time engaging in mindful activity and reported more negative affect following exposure than did their low-shape concerns counterparts. Findings of the present study suggest that 3D body image exposure is a viable method for reducing BD in dispositionally high-shape concerned individuals. The superiority (e.g., lower BD) of no instruction among participants with high-shape concerns when viewing their images in 3D may be attributed to the negation of negative body schemas and automatic thoughts by the novelty of 3D exposure. Further research is required to determine the underlying mechanisms of 3D body image exposure and the ways in which it exerts its effects.

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Psychological Responses to Three Dimensional Body Shape Exposure In Female University Students

Thinness has progressively become the idealized standard for feminine beauty in Western cultures. Evidence suggests that women and girls experience considerable dissatisfaction with their body size and shape and a particular desire to be thinner (Tiggemann, 2005). In a *Psychology Today* magazine survey, Cash, Winstead, and Janda (1986) sampled 2,000 individuals and discovered that 38% of women surveyed were dissatisfied with their overall appearance. While most respondents were comfortable with their face and height, they were particularly dissatisfied with their body weight and shape (as cited in Cash, 2002). In a similar national survey, 56% of American women sampled reported dissatisfaction with their overall appearance (Garner, 1997). Among those surveyed, 62% of women ages 13 to 19 reported being dissatisfied with their weight, while 67% of women over 30 years of age reported being unhappy with their weight.

Negative thoughts and feelings about one's appearance can be a transitory experience for many women. For others, chronic dissatisfaction significantly disrupts one's quality of life. When body image reaches a critical level of dissatisfaction, it may contribute to problematic eating behaviours and attitudes (Cash, 2002). There is evidence to suggest that body image disturbances predict the severity of problematic eating patterns. It has also been postulated that a disturbance in body image plays a role in the etiology of eating disorders (Cash & Deagle, 1997; Cash & Brown, 1987) in which dysfunctional body image experiences are a core feature.

Body Image

Body image has developed into a psychological construct of growing scientific and clinical interest (Cash & Henry, 1995; Cash, Morrow, Hrabosky, & Perry, 2004). Slade (1988)

defines body image as “the picture we have in our minds of the size, shape and form of our bodies; and to our feelings concerning the size, shape and form of our bodies, and its constituent parts” (Slade, 1988, p. 20). In agreement with this definition, body image is viewed as having two main components: a perceptual component and an attitudinal component (Skrzypek, Wehmeier, & Remschmidt, 2001; Slade, 1994). Paralleling this conceptual distinction, two modalities of body image dysfunction can be distinguished: perceptual body size distortion, and cognitive-evaluative dissatisfaction. The former is viewed as the accuracy of an individual’s body size estimation, while the latter is generally considered to be the attitudes and feelings an individual has towards one’s body (Skrzypek et al.; Slade, 1994). Body image bears a moderate relationship to self-esteem and psychosocial functioning (Cash & Henry). A negative body image can generate adverse psychosocial consequences, including eating disturbances, depression, social anxiety, impaired sexual functioning, and diminished quality of life (Cash et al.).

Perceptual Body Image Assessment

Many approaches to investigate body image use perceptual assessment methods (Cash & Deagle, 1997). Perceptual methods can be broadly classified as belonging to one of three categories: analogue scales, image marking, and optical distortion methods (Farrell, Lee, & Shafran, 2005). Analogue scales require subjects to adjust the horizontal separation of a pair of calipers to represent their estimate of the width of a body part. Similarly, image marking methods present subjects with a vertically mounted piece of paper and require them to draw their body, or to mark on the paper the width of certain body parts. Optical distortion methods require participants to correct a pictorial or video image of oneself that has been distorted in width (Farrell et al.). Perceptual methods can further be classified into two categories: body-part size

estimation procedures and whole-body or distorting image techniques (Cash & Deagle; Skrzypek et al., 2001). Both methods allow researchers to assess how accurately a person is in gauging his or her body size. Approaches to investigating perceptual distortion include, but are not limited to, the movable caliper technique, the image marking procedure, the distorting mirror, video distortion techniques, the life-size screen distortion method, and the computer-based image distortion technique (Skrzypek et al.).

While the perceptual component of body image has received considerable attention in the literature, interest in this area has waned in recent years due to the heterogeneity of results concerning body size overestimation in eating disorders (Farrell et al., 2005; Farrell, Shafran, & Fairburn, 2003). In a recent review of the published literature in this area, Farrell and colleagues (2005) revealed that nearly half (48%) of the 52 studies included in the review reported that patients with anorexia nervosa overestimated their body size compared to healthy controls. Additionally, 37% of the studies reported that patients with bulimia nervosa overestimated their body size compared to normal controls. Conversely, 23% of studies found no difference between the accuracy of body size estimations made by patients with anorexia nervosa and healthy controls. Farrell and colleagues (2005) suggest that the inconsistent findings can be attributed to a number of causes including the diversity of the assessment methods, and demand characteristics inherent in body size estimation tasks. Overall, there is a considerable amount of inconsistency from studies assessing body size estimation (Farrell et al., 2005).

Attitudinal Body Image Assessment

Although attitudinal body image is a multidimensional concept that includes interrelated cognitive, affective, and behavioural elements, the majority of researchers target body dissatisfaction (BD) assessed by self-report questionnaires and structured interviews (Cash &

Deagle, 1997; Skrzypek et al., 2001). Less often, researchers employ exposure techniques and measure dissatisfaction with body weight and shape, the frequency of body-related thoughts, situational body image dysphoria, behavioural avoidance, appearance-schematic beliefs, and the investment in and discrepancy from physical ideals (Skrzypek et al.). Body image exposure techniques provide visual feedback of one's physical appearance, enabling individuals the experiential opportunity to correct distorted body image attitudes (Hilbert, Tuschen-Caffier, & Vögele, 2003). A summary of the literature employing exposure methods to investigate attitudinal body image is presented in Table 1.

Compared to perceptually-oriented techniques, the more rarely investigated exposure techniques focus more on the cognitive-emotional aspects of body image disturbance (Hilbert et al., 2003). Studies investigating the affective responses of eating disordered patients and healthy controls to their body shape report that body shape exposure is particularly anxiety provoking. Tuschen-Caffier and colleagues (2003) exposed 20 female volunteers diagnosed with bulimia nervosa and 20 female non-eating disordered volunteers to their body shape using a video recording called video confrontation. Participants' head, upper body, arms, waist, hips, bottom, and legs were filmed using a standard video camera without sound. The 10 min video recording was then played back to participants. Following the video confrontation session participants were asked to rate how they felt while watching the video recording. The results revealed that both groups reacted with an increase in self-reported tension, anxiety, insecurity, and sadness when confronted with their body shape.

Table 1

Methods of Body Image Exposure

Author(s)	Participants	Name of Method	Procedure	Instructional Set
Rushford & Ostermeyer (1997)	19 female inpatients in an eating disorder unit and 19 female normal controls	Videofeedback	<p>Participants stood in front of a plain background in underwear or swimwear to make the video.</p> <p>The video was filmed from the front, both sides and the back.</p> <p>The videotape was replayed to each participant.</p>	<p>The researcher discussed the perceptions of the participant throughout the tape.</p> <p>Participants were encouraged to view the figure on the screen as someone they might see on the beach and to describe them.</p>
Riva (1998)	24 females attending a conference on virtual reality and 24 matched controls	Virtual reality exposure	<p>Five immersive virtual environments. Sessions 1 and 2 gave the participant minimum skill in perceiving, moving through, and manipulating objects in virtual environments. Stages 3, 4, and 5 were designed to modify the body experience of the participant.</p> <p>Participants were subjected to the procedure for no more than 10 min and no less than 8 min.</p>	<p>Once the participant entered into the virtual environment, the therapist described the situation encouraging them to associate to it in pictures rather than in words.</p>

Author(s)	Participants	Name of Method	Procedure	Instructional Set
Hilbert et al. (2002)	30 females diagnosed with binge eating disorder and 30 female non-eating disordered controls	Mirror exposure	Participants stood at 2 ft distance in front of the mirror while dressed in a white leotard. The wings of the mirror were opened at a 45 degree angle	Participants asked to describe themselves as precisely as possible. If participants' self-description included a negative or positive evaluation of the body part described they were reminded to use a more neutral description.
Tuschen-Caffier et al. (2003)	20 females diagnosed with bulimia nervosa and 20 female non-eating disordered controls	Video confrontation	Video recording filmed while participant stood dressed in a beige-colored leotard at a 2 m distance against a white wall for 10 min. Participants' head, upper body, arms, lower body and legs were filmed.	Participants were asked to describe their body using an exposure manual based on a cognitive-behavioral treatment manual for bulimia nervosa. The manual comprised questions designed to enhance focus on specific body areas (e.g., head, upper and lower body) and on general physical appearance.
Delinsky & Wilson (2006)	45 females with extreme weight and shape concerns	Mirror exposure	Three 1 hr sessions scheduled a week apart. Participants (fully-clothed) stood in front of a full-length, three-way mirror.	Participants asked to describe themselves from head to toe systematically. Reminded to give equal attention to all body parts. Asked to refrain from using critical or negative language.

Author(s)	Participants	Name of Method	Procedure	Instructional Set
Shafran et al. (2007)	60 female volunteers without a current or previous history of an eating disorder	Mirror exposure	Participants stood in their underwear and looked in a full-length mirror	Two conditions: High body checking – Participants asked to focus attention on body parts they were most dissatisfied with. Low body checking – Participants asked to look at all body parts from head to toe in a neutral manner. No positive or negative language.
Vocks et al. (2007)	21 females diagnosed with an eating disorder and 28 normal controls	Mirror exposure	Participants exposed to their own bodies (wearing tight-fitting one-piece body suit) in front of a mirror for 40 min	Four confrontation periods of 7 min with standardized audiotaped instructions asking participants to look at specific body parts.

Similar results were found in a sample of 150 non-eating disordered women, half of whom reported high levels of body shape concern (Farrell, Shafran, & Fairburn, 2004). A significantly greater proportion of those participants with high levels of shape concern compared to those with low concern reported paying more attention in the mirror to body parts such as stomach and hips. Furthermore, checking behaviours (e.g., pinching and wobbling body parts in front of the mirror) and avoidance of looking in the mirror were significantly more frequent in participants with high levels of body shape concern compared to participants with low concern (Farrell et al.). The emotions and cognitions experienced by participants when looking in the mirror were rated as either “positive/neutral” or “negative/mixed”. A significantly greater proportion of participants with high levels of shape concern compared to those with low concern reported experiencing negative/mixed cognitions and emotions when confronted with their body shape in the mirror. These results suggest that confrontation with body shape is a stressful and upsetting experience not only for patients with eating disorders but also for many women without eating disorders (Tuschen-Caffier et al., 2003.).

Recently, modern developments in artificial environments such as computer-generated virtual environments (VEs) have provided innovative research settings in which the experience of the body can be explored. Virtual reality (VR) computer simulations present participants with immersive, perceptually encompassing environments where the physical world is approximated or manipulated to varying degrees via head-mounted displays and instrumented clothing (Murray & Gordon, 2001). Many VR applications currently in use do not include a visual representation of the participant’s body shape or size within the virtual scene. Occasionally a participant’s whole body may be rendered in a rough static form (Murray & Gordon). While there is potential for the use of VEs in body image research, some problems have limited their application in this

field. Some users experience side effects both during and after exposure to the virtual environment. These side effects, collectively referred to as “simulator sickness” are similar to those reported by participants exposed to simulators with wide field-of-view displays and include ocular problems such as eye strain and fatigue, disorientation and balance disturbances, and nausea (Riva, 1998). At present, the unique experience of one’s body shape in immersive VR requires further exploration.

Body Checking

Mirrors are the most common means by which individuals assess their body shape. Given that mirrors are the main source of visual information about one’s body, they are of obvious importance when examining body image dissatisfaction (Farrell et al., 2004). Mirror exposure can generate intolerable anxiety for some individuals (Key, George, Beattie, Stammers, Lacey, & Waller, 2002). Research indicates that while using mirrors to check one’s body size, shape, and weight is common among young women, people who have significant shape concern use the mirror to critically scrutinize parts of their body more often than those whose level of shape concern is low. For example, recent studies indicate that the majority of patients with eating disorders engage in body checking, and do so more often than normal controls (Shafran et al., 2007). Body checking is defined as “the repeated critical scrutiny of one’s body size, shape and weight” (Shafran et al., p. 113). Examining oneself in the mirror, using the fit of clothes to judge whether body size has changed, feeling for bones, and seeking reassurance about shape are all examples of body checking behaviours. The exact nature of the relationship between body checking and BD has yet to be ascertained. One early hypothesis was that bodily imperfections are magnified by the frequent but brief checking of shape while in a state of high arousal (Shafran et al.). It has also been suggested that “body checking is an expression of the

characteristic overevaluation of shape and weight in patients with eating disorders and that such behaviour is likely to intensify their concerns” (Shafran et al., p. 114). In recognition that body checking has importance in theoretical accounts of the maintenance of eating disorders, the relationship between body checking and BD is of interest.

Shafran and colleagues (2007) explored the impact of manipulating body checking on BD in a non-clinical group of 60 women. Participants were randomly assigned to an instructional set to either repeatedly scrutinize their bodies in a critical way in the mirror (high body checking) or to examine their bodies in a neutral way, refraining from body checking (low body checking). The low body checking condition required participants to look at all parts of their body in the mirror, each for a few seconds, starting from the head and working down to the feet. The experimenter called out body parts and participants were required to describe each part in a neutral manner, refraining from using either positive or negative language. If positive or negative language was used, participants were reminded of the original instructions to remain neutral. BD, feelings of fatness and self-critical thoughts were measured using self-report questionnaires and Visual Analogue Scales (VAS). The results indicated that participants who were assigned to the high body checking condition reported spending more time checking their body shape than those assigned to the low body checking condition. Furthermore, those in the high body checking condition also experienced a temporary increase in BD, feelings of fatness, and body-related critical thinking, while feelings of fatness decreased among those in the low body checking condition. In keeping with previous findings that suggest that body checking contributes to the maintenance of shape concerns, Shafran and colleagues suggest that these findings support the theoretical accounts that body checking is an expression of the over evaluation of shape and weight in people who have significant shape concern and that such behaviour is likely to

intensify concerns about shape and weight. Given that the intervention had relatively little impact on BD in the low body checking condition and that the intervention has positive findings in clinical samples (as cited in Shafran et al.), the authors suggest that the intervention is only effective in individuals with high shape concerns.

Mindfulness

In consideration of behaviours associated with body image disturbances (e.g., body checking), a mindful state may allow individuals to confront the physical body experience without associated fear and reactive negative appraisal (Stewart, 2004). Mindfulness is 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, p. 784). Mindfulness combines enhanced present moment awareness and a stance of nonjudgment, neutrality, and acceptance of all experience (Stewart). Body image disturbances may be regarded as *mindless*, in which negative body schemas, automatic thoughts, core beliefs, and prejudice create a rigid, inflexible state of being, thus preventing awareness of novel perceptions (Stewart). Ultimately, mindfulness is observation of one’s body with awareness, nonjudgment, and nonreaction, resulting in a decreased likelihood of impulsive behaviours (e.g., body checking) and the ability to perceive and acknowledge alternative perceptual, cognitive, behavioural, and affective body experiences (Stewart).

Included among the components of mindful body image treatment is mirror exposure, in which individuals are trained to face body image exposure without negative appraisal of the body. Using mindfulness as a therapeutic technique, body parts that elicit negative emotions, as well as those that do not create significant distress, are described by the individual so as to prevent extreme negative reactions (Stewart, 2004). Delinsky and Wilson (2006) demonstrated

the utility of such a descriptive approach in women with extreme shape and weight concerns. Twenty-four women were instructed to stand in front of a full-length mirror and to verbally describe themselves from head to toe systematically during three 1 hr sessions each scheduled 1 week apart. Participants were reminded to give equal attention to all body parts and asked to refrain from using critical or negative language. If the women did use critical language during the exercise, a therapist interjected and reminded the participants of the instructions. Following the three sessions (coupled with homework to monitor and reduce body checking and avoidance behaviours), the women were compared to a non-directive control group of 21 women. The 3 week non-directive intervention, which was primarily psychoeducational in nature, included daily journaling by participants regarding body image and once a week meetings with a therapist employing primarily Socratic questioning. The results revealed that participants in the descriptive mirror exposure condition scored significantly lower on a number of body weight and shape measures at post-intervention. In addition, depression scores and dieting behaviours were significantly lower compared to their counterparts in the non-directive intervention group. This style of descriptive mindful processing is particularly relevant in body image exposure.¹

The Present Study

The present study sought to partially replicate and extend the previous findings of Shafran and colleagues (2007) who found that feelings of fatness decreased among participants in the low body checking condition. Considering the theoretical and empirical evidence suggesting that the brief checking of shape while in a state of high arousal magnifies perceived bodily imperfections and concerns about shape, we expected to observe a significant time by instruction interaction when assessing the results of the impact of body image exposure on

¹ A more comprehensive introduction is presented in Appendix A.

attitudes toward body shape and dissatisfaction. It was hypothesized that participants instructed in the ways of *nonjudgmental self-description* (NSD) during body image exposure would subsequently report lower BD than individuals given *no instruction* during body image exposure.

The second aim of the study was an exploratory extension of the research by Shafran and colleagues (2007) wherein we experimentally investigated the impact of exposure to two dimensional (2D) versus three dimensional (3D) images of one's body shape. Given that our understanding of our own body image derives largely from a mirror reflection, we expected to observe greater reports of BD among participants following exposure to the less familiar, more novel 3D images compared to 2D exposure. To our knowledge, the work described here represents the first study assessing BD in individuals exposed to a 3D image of one's body shape.

Method

Participants

Seventy female students enrolled in undergraduate Psychology courses at Lakehead University participated in the study. Participants ranged in age from 18 to 46 years old, with a mean age of 23 years ($SD = 8.02$ years). Participants enrolled in the Introductory Psychology course who completed the study received one bonus percentage point in their Introductory Psychology course. All other Psychology students received a \$10.00 gift certificate for Tim Horton's as appreciation for their participation.

Materials

Visual Analogue Scales (VAS; see Appendix B). VASs are widely and effectively used in a range of settings as clinical and research tools. While they are largely used to measure subjective experiences, they are also used less frequently for behavioural measurement

(McCormack, Horne, & Sheather, 1988). High levels of validity and reliability are reported in studies using VASs. VASs typically consist of a 10 cm horizontal line anchored at both ends with verbal labels or numbers defining the end points. Participants are asked to express how they are feeling by marking a line at the appropriate point between the two extremes. The scales are scored by measuring the distance from the minimal end point to the mark using a predetermined measurement interval. With a 10 cm line, the most commonly chosen interval is mm, thus producing a 100-point scale. Six VASs constructed by Shafran and colleagues (2007) were used for the present study. Four VASs were administered as operational measures of BD, and the two others for exploratory purposes to assess for elements of mindfulness. Participants completed the four BD VASs at baseline and immediately after viewing their profile pictures on a projection screen. They were asked to indicate “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). Participants were also asked to identify the strongest thought that came to mind while viewing their images and to rate “How much does this thought bother you? (0 = *not at all* to 100 = *extremely*)” (Shafran et al., p. 115). The nature of each thought was examined and rated by two independent raters (blind to condition allocation) on a scale from -2 (*very negative*) to +2 (*very positive*) where a rating of zero was *neutral* (Shafran et al.).

The two remaining VASs required participants to indicate how much of the previous 3 min had been spent “...scrutinizing your body in detail, checking and looking for flaws (from 0 = *none of the time* to 100 = *all of the time*)” (Shafran et al., p. 115) and how much of the previous 3 min has been spent “...standing back and seeing your body in a neutral way (from 0 = *none of*

the time to 100 = all of the time)” (Shafran et al., p. 115). These two VASs were completed by participants following the intervention.

Eating Disorder Examination – Questionnaire Version (EDE-Q; Fairburn & Belgin, 1994; Appendix C). This 36-item self-report questionnaire is based on the Eating Disorder Examination (EDE; Cooper & Fairburn, 1987) and focuses on the participant’s state over the preceding 28 days. The items focus on the main behavioural features of eating disorders as well as those items needed to generate the EDE-Q subscales of Restraint, Eating Concerns, Shape Concerns, and Weight Concerns. The questionnaire takes approximately 15 min to complete and uses a 7-point forced-choice rating scheme for the subscales. Frequencies of eating disorder behaviours are measured in terms of the number of days on which each behaviour occurred (Shafran et al., 2007). Overall, the EDE-Q has good reliability and validity (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004). For the present study, the Shape Concerns subscale was used to operationally define participants as being dispositionally high or low on this dimension.

Positive and Negative Affect Schedule (PANAS; Watson et al., 1988; Appendix D). This 20-item scale is a measure of the two primary dimensions of mood – positive affect (PA) and negative affect (NA), and was administered as a measure of affect pre- and post- body image exposure. According to the authors, PA refers to the extent to which an individual feels enthusiastic, alert, and active. On the other hand, NA refers to feelings of subjective distress that subsume a variety of aversive mood states such as anger, guilt and fear. Each scale is a composite of 10 descriptors. The 10 PA descriptors included are, attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong, and active. The 10 NA descriptive terms included are distressed, upset, hostile, irritable, scared, afraid, ashamed, guilty, nervous,

and jittery. Participants are asked to report how often they have felt a particular emotion during a specified period of time (e.g., moment, today, past few weeks, general) on a 5-point scale ranging from *very slightly or not at all* to *extremely*. The authors note that the 10-item scales (PA and NA) are internally consistent, have excellent convergent and discriminant correlations with lengthier measures of the underlying mood factors, and display a significant level of stability in each time frame.

Procedure

Potential participants were selected from an initial pool of female volunteers from the undergraduate Psychology courses who completed a consent form (see Appendix E) and screening questionnaire (see Appendix F) used by two researchers in the same research lab who were simultaneously conducting separate studies. The experimenter reviewed participants' responses to the screening questionnaire. Participants were excluded if they were currently receiving treatment for an eating disorder and/or depression. These participants were excluded as conducting such an experimental manipulation on women with a preexisting eating disorder or depression might lead to an exacerbation of their psychological disturbance. Potential participants were contacted according to their preferred method of contact (phone and/or email). A mutual time for the first appointment, which took approximately 25 min, was scheduled for interested volunteers. This two-way, between-subjects experimental design involving the cross classification of the two independent variables of dimension (2D versus 3D) by instructional set (NSD versus no instruction) produced the following 4 cells: 2D NSD ($n = 18$), 2D no instruction ($n = 17$), 3D NSD ($n = 17$), and 3D no instruction ($n = 18$).

Main study. Upon arrival to the laboratory for their first appointment, participants read the cover letter and signed the consent form (see Appendix G). Participants were then asked to

complete the questionnaires presented in the following order: the PANAS, the four BD VASs, and the EDE-Q. Participants then had nine portrait photographs taken of them for each pose: full portrait, seated portrait, and head and shoulders portrait, each taken at the following angles to the cameras' line of sight: 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 to a CNC Milled Aluminum Mount designed specifically for stereo (3D) photography. The photographs were rendered to 3D portraits using StereoPhoto Maker (Suto, 2006). Participants were scheduled to return to the laboratory within 1 week for their final 15 min appointment.

Upon their return to the laboratory participants stood in a dark, quiet room 2.44 m in front of a projection screen with a diagonal of 3.05 m and were shown the 27 portrait photographs that were taken at baseline in the dimension to which they were randomly assigned. Participants were instructed in the ways of NSD or given no instruction at all (see Appendix H for each instructional set). Participants in the NSD condition were asked to look at all parts of their body starting from their feet (e.g., calves, ankles, feet) and working up to their head (e.g., hair, forehead, eyebrows). The researcher called out body parts and participants were asked to describe each part in a neutral fashion (Shafran et al., 2007). Participants were instructed not to use positive or negative language. If positive or negative language was used, participants were reminded of the original instructions to remain neutral throughout the experiment (Shafran et al.). Participants in the no instruction group were not given any instruction. The 2D and 3D photographs were projected in full size onto the screen using the InFocus™ video projector. Participants in the 3D condition viewed their photographs while wearing red/cyan anaglyph glasses; those in the 2D condition did not view their images using the eyewear. Each portrait was

presented to the participant for 6 s, for a total exposure duration = 2 min, 42 s. Immediately after participants had viewed the 27 photographs they were asked to complete the four BD VASs, the PANAS, and the two mindful VASs. Participants were then debriefed about their experience and thanked for their participation. Participants were provided with an information sheet (Appendix I) listing local mental healthcare agencies with contact numbers should they wish to seek professional consultation.

Results

All information gathered from the questionnaires was entered into the Statistical Package for the Social Sciences (SPSS) v15. Before any of the main analyses were conducted, the data was first evaluated for precision of data entry through the DESCRIPTIVES procedure of SPSS. The minimum and maximum scores for each of the items were examined and any theoretically improbable values were corrected. In the case of missing data, missing values were prorated from existing responses for each participant on the particular scale (Tabachnick & Fidell, 2001). Of the 70 participants, one participant did not have baseline data for the PANAS, thereby preventing the inclusion of her data from any analyses exploring results of the PANAS.

Constructing the State Body Dissatisfaction Dependent Variable

Three of six VAS variables (“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 entered in an SPSS v15 reliability analysis. The variables were highly correlated at pre-exposure, with inter-item r s ranging from .71 -.82, and with a resulting index of internal consistency of Cronbach’s $\alpha = .90$. Post-exposure results produced r s ranging from .84 -.88, and Cronbach’s $\alpha = .95$. The three variables were subsequently averaged to produce a single

index of state BD separately at both pre- and post-exposure.

Constructing the Shape Concerns Grouping Independent Variable

Participants were grouped into low- and high-shape concerns conditions following completion of data collection. A median split of 2.24 on the EDE-Q Shape Concerns subscale was used, resulting in *ns* of 33 and 37, respectively. The subscale itself was internally consistent in the current sample, with Cronbach's $\alpha = .89$ over the 8-item subscale.

Body Dissatisfaction Response

Does exposure to one's photographic images produce differential effects upon subsequent reports of BD as a function of the three independent variables of instruction, image dimension, and dispositional shape concerns? To address such a question where a pre- and post-exposure sampling is available on the same variable, as in the present study, the recommended analytical procedure is analysis of covariance (ANCOVA; Tabachnick & Fidell, 2001). This analysis compares group means on the BD dependent variable at post-exposure after such scores have been adjusted for differences in pre-exposure BD. Thus, a 2 x 2 x 2 between- subjects ANCOVA was performed on post-exposure BD. Independent variables included instruction (nonjudgmental self-description [NSD] and no instruction), image dimension (2D and 3D), and dispositional shape concerns (low and high), all factorially combined. After adjustment by the covariate, post-exposure BD varied significantly in a 3-way interaction among the independent variables, $F(1, 61) = 4.42, p = .04, \eta_p^2 = .07$. The 2-way instruction x dimension interaction is depicted in Figure 1 as a function of the low- and high-shape concerns groups.

To further investigate the nature of the 3-way interaction, separate 2-way instruction x dimension ANCOVAs were conducted at each of the levels of shape concerns. Regarding the low-shape concerns groups, only a significant main effect for dimension was revealed, $F(1, 28) =$

3.83, $p = .06$, $\eta_p^2 = .12$, indicating that participants exposed to their 3D images reported lower BD compared to their 2D counterparts, adjusted $M(SE) = 41.73(5.7)$ versus $26.8(4.87)$, respectively.

The same ANCOVA conducted on the high-shape concerns groups revealed a significant 2-way instruction x dimension interaction, $F(1, 32) = 4.98$, $p = .033$, $\eta_p^2 = .14$ (see right panel of Figure 1). It was predicted a priori that participants instructed in the ways of nonjudgmental self-description during body image exposure would subsequently report lower BD than individuals given no viewing instructions. However, ANCOVAs performed to analyze this instruction effect proved not to be statistically significant for participants in either 2D or 3D dimension conditions. Interestingly, the means are in the predicted direction at 2D, but in the opposite direction at 3D. It appears that NSD instruction during 2D exposure is beneficial which is consistent with predictions. Indeed, a dependent t -test performed on pre- versus post-exposure BD scores proved significant for participants in the 2D condition, $M(SE) = 55.1(5.26)$ versus $40.4(8.26)$, $t(9) = 2.24$, $p = .052$, $r = .32$. The same analysis proved significant for participants in the 3D condition who received no instruction, pre- and post-exposure, $M(SE) = 63.2(5.13)$ versus $43.23(8.48)$, $t(9) = 2.43$, $p = .038$, $r = .41$. Thus, the benefits of NSD instruction during 2D exposure are comparable to those experienced by simply viewing 3D images without instruction.

Affective Response

Does exposure produce differential effects upon subsequent reports of affect as a function of the three independent variables of instruction, image dimension, and dispositional shape concerns? Conducting the ANCOVA as modeled above using negative affect as the dependent variable revealed a simple main effect for dispositional shape concerns. Participants high in such concerns reported more negative affect following exposure than did their low-shape concerns

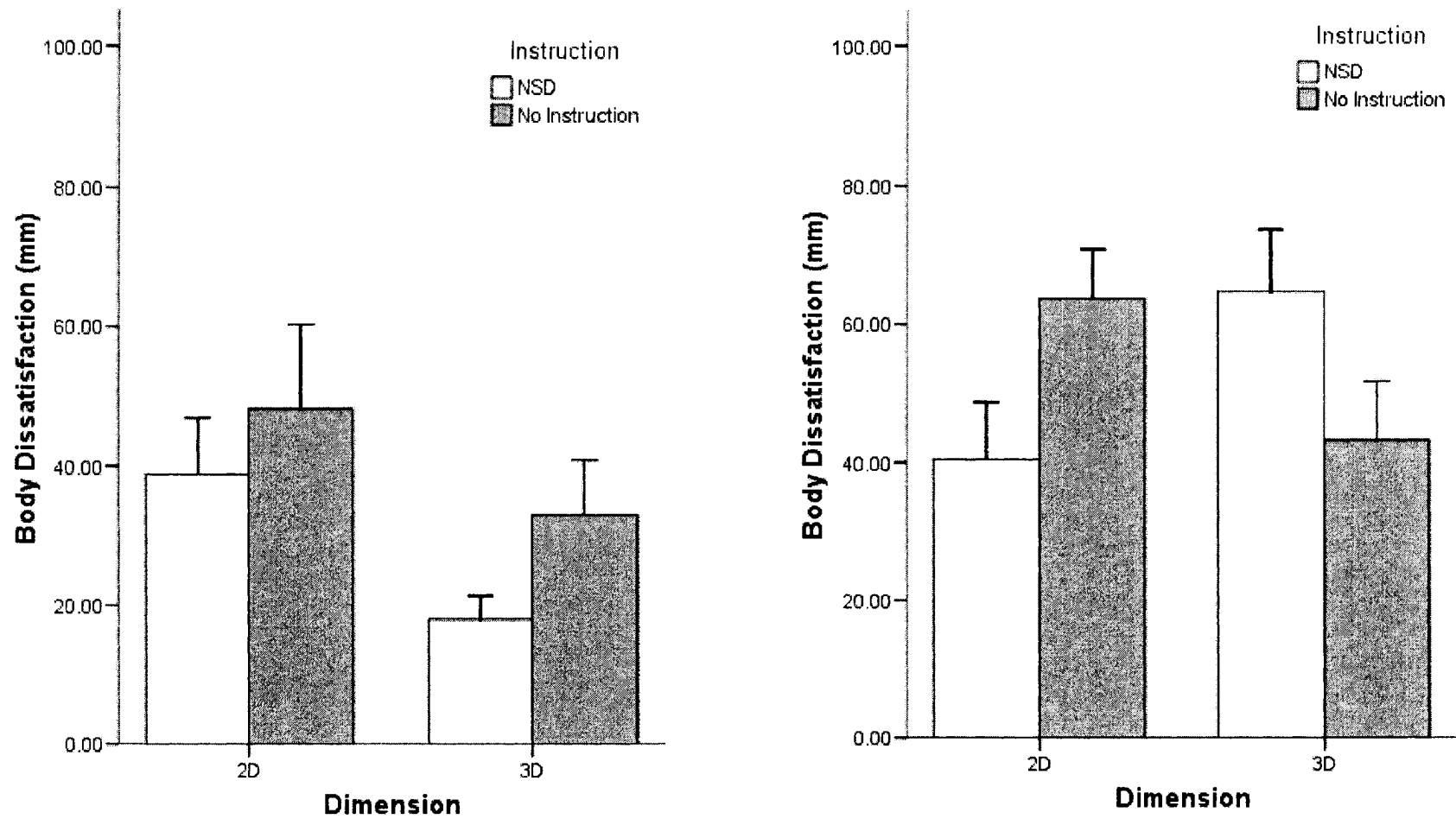


Figure 1. Mean body dissatisfaction scores (+1 SE) for nonjudgmental self-description (NSD) and no instruction conditions while viewing 2D versus 3D images plotted as a function of the low- (left panel) and high-shape concerns (right panel).

counterparts, adjusted $M(SE) = 17.93 (0.98)$ versus $14.79 (1.07)$, respectively, $F(1, 60) = 4.59$, $p = .036$, $\eta_p^2 = .07$. The ANCOVA conducted on positive affect did not produce any significant effects.

Mindful Response

Two exploratory variables included VAS scales tapping perceived amount of time spent while viewing images (a) “scrutinizing your body in detail, checking and looking for flaws”, and (b) “standing back and seeing your body in a neutral way”, where higher scores indicate more time spent engaging in the mental activity. These mental activities are arguably components of the mindfulness construct. Further, they correlated $r(69) = -.52$, $p < .001$, thereby justifying averaging the two (with the first VAS reverse scored) to produce one single variable labeled *mindful*. The resulting three-way between-subjects ANOVA with instruction, image dimension, and dispositional shape concerns as independent variables produced a main effect for only the latter variable. High-shape concerns participants reported less time spent engaging in mindful activity during exposure compared to low-shape concerns participants, $M(SE) = 33.07 (3.79)$ versus $44.22 (3.99)$, respectively, $F(1, 62) = 4.10$, $p = .047$, $\eta_p^2 = .06$.

Strongest Thought Response

Participants were instructed to write down the strongest thought that came to mind pre- and post- exposure (the latter are presented in Table 2). The nature of each participants’ written thought was rated by two independent raters who were blind to group assignment using a valence scale ranging from -2 (*very negative*) to $+2$ (*very positive*) where a rating of zero was *neutral* (Shafran et al., 2007). Inter-rater reliability was high with 89% agreement in 125/140 of the ratings made. For the remaining 15 cases where there was not a consensus, ratings differed by a maximum of two points. The independent raters subsequently discussed the ratings in these cases

and established consensus on the final valence ratings.

Does exposure produce differential effects upon the valence of participants' subsequent strongest thought as a function of the three independent variables of instruction, image dimension, and dispositional shape concerns? A 2 x 2 x 2 between-subjects ANCOVA on post-exposure valence ratings with pre-exposure ratings as the covariate yielded a significant 3-way interaction, $F(1, 60) = 4.98, p = .036, \eta_p^2 = .07$. The interaction is depicted in Figure 2. To ascertain which of the eight experimental cells significantly deviated on average from a neutral rating, separate one-sample t tests were performed to test the null hypothesis of no difference from zero. Five experimental cells produced a result that could not lead to the rejection of the null hypothesis, suggesting among these participants there was a mental state of relative neutrality as evidenced in their strongest thought. Two cells produced significantly negative valence ratings, with a trend on a third (denoted by * in Figure 2): low-shape concerns participants in the 2D x NSD condition, $t(7) = -7.64, p < .001$; high-shape concerns participants in the 3D x NSD instruction condition, $t(5) = -3.87, p = .012$; and high-shape concerns participants in the 2D x no instruction condition, $t(5) = -2.03, p = .070$. Among participants in these three experimental cells, the strongest thought that occurred to the individual during the viewing of their own images could be regarded as non-neutral with a predilection towards a negative valence. Interestingly, these results were not corroborated when analyzing participants' own rating of "How much does this thought bother you" on the 100 mm VAS anchored *not at all* and *extremely*. No main effects or interactions emerged from the ANCOVA conducted on the ratings in question. As one might expect, the two variables bear a negative relationship such that thoughts rated to be of a more positive valence by raters were considered less bothersome to participants both at pre- and post-exposure, $r(69) = -.36, p = .002$, and $r(70) = -.65, p < .001$.

Table 2

Strongest Thought Recorded By Participants Immediately Following Body Shape Exposure As A Function of Experimental Condition

	2D		3D	
	NSD*	No instruction	NSD	No instruction
Low-shape concerns				
	My body tilts - right side less than left - why? (-1)	I have large thighs; I need a haircut and a new sweatshirt (+2)	Even after seeing myself from every different angle, I still feel that I like what I am despite any imperfection, I may or may not have (+1)	I have a curved nose (0)
	Anxious (-1)	I don't look as fat as I thought. Yay! (+1)	I'm extremely tired and hungry (-1)	It was neat to see yourself in 3D (+1)
	Sad. Thoughts of alignment, posture, crooked (-2)	School (0)	I'm extremely tired (-1)	Satisfied (+1)
	I wish I could stand up straighter (-1)	Happy with the way I look all around and see there is a bit of workout that I can do (+1)	My eyebrows are not symmetrical; I look like my sister (0)	I still feel like I am a healthy size for me (+1)

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	2D		3D	
	NSD	No instruction	NSD	No instruction
Noticeable weight gain/muscle loss since being away from home (-1)		Hungry (0)	I have a ton of things to do today; Going out of town tomorrow (0)	Average (0)
Fat (-2)		Hungry (0)	That I have gained weight over the past year (-1)	Brown sweater (0)
Stressed (-1)			The 3D pictures are pretty neat (+1)	After looking at the slide show, it confirms my pear shape (0)
Work out more (-1)			Not to be worried about my body (0)	Exams (0)
			Stressed (-1)	
			I can look pretty good (+1)	
			I can look good (+1)	

	2D		3D	
	NSD	No instruction*	NSD*	No instruction
High-shape concerns				
	I look better (skinnier) than I thought I would (+1)	I'm full (0)	You're not going to get anywhere sitting on your ass (0)	The pictures didn't look as bad as I thought they would (+1)
	I have very bad posture and stick out my stomach (+2)	Shocked (0)	The fat on my face (-2)	I feel healthy (+2)
	I'm not as in shape as I could be and I could work out more (-1)	I have a crooked nose (-1)	Tired (-1)	Cute butt!!! I never saw my backside before (+2)
	A new sense of satisfaction with who I am, but I also realize I need to fix a few things with my body (0)	Disgust (-2)	Not feeling pretty (-1)	I feel satisfied with my body but there are still some things I wish to change (+1)
	My hair looked red (0)	My body looks chubby all over, you can see the fat lumps, it's disheartening (-2)	Tired (-1)	Disgusted (-2)

2D		3D	
NSD	No instruction	NSD	No instruction
I look a bit more in shape than I thought I did. I feel more beautiful right now (+2)	I got an essay to write...lol. Ten pages (0)	I need to lose weight around my stomach (-1)	My eyes look wonky...laughter (0)
Didn't realize I look so bad from the back (-2)	I looked better than expected (+1)		How looking at the pictures is scary (-2)
My body is not as bad as it seemed. My waistline could use some work (-1)	Flabby (-2)		Height (0)
Stress (-1)	I can look good (+1)		I looked so unhappy (-1)
School (0)	More exercise (-1)		I feel very "fat" today due to illness (-2)
	Fat (-2)		

Note. Information within brackets indicates independent rater ratings on a valence scale of -2 (*very negative*) to +2 (*very positive*) where a rating of zero is *neutral*. NSD = Nonjudgmental self-description. * = Significantly negative valence ratings.

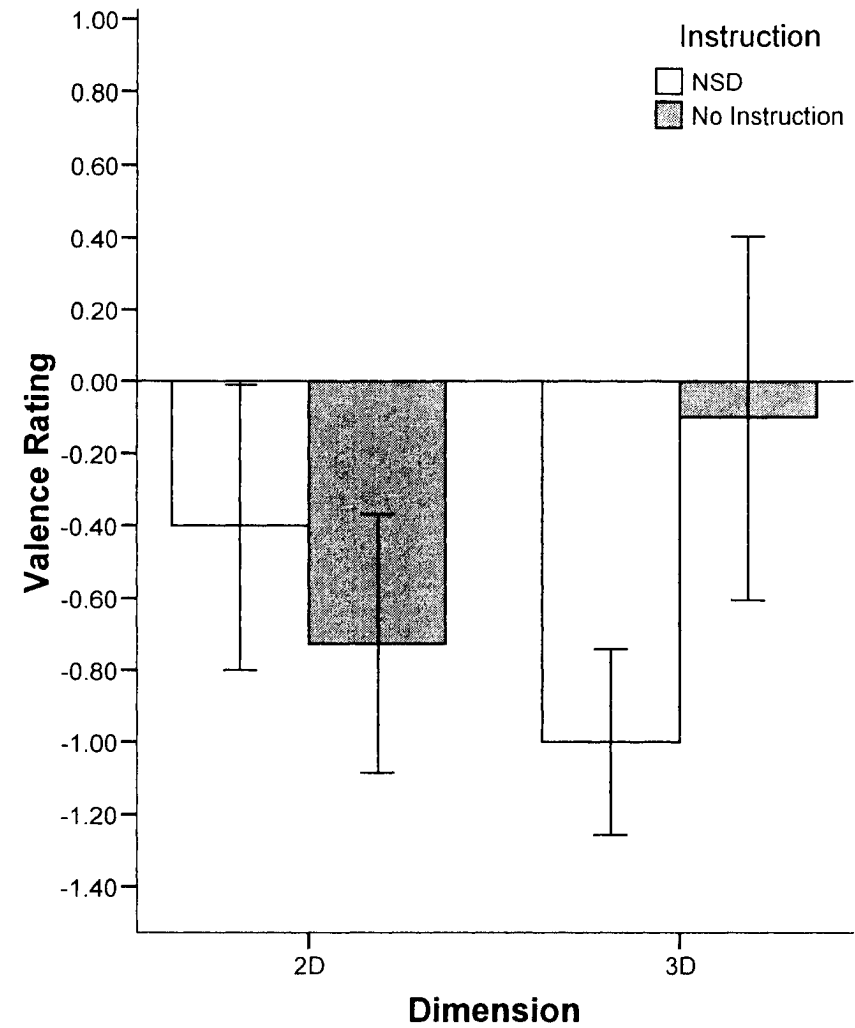
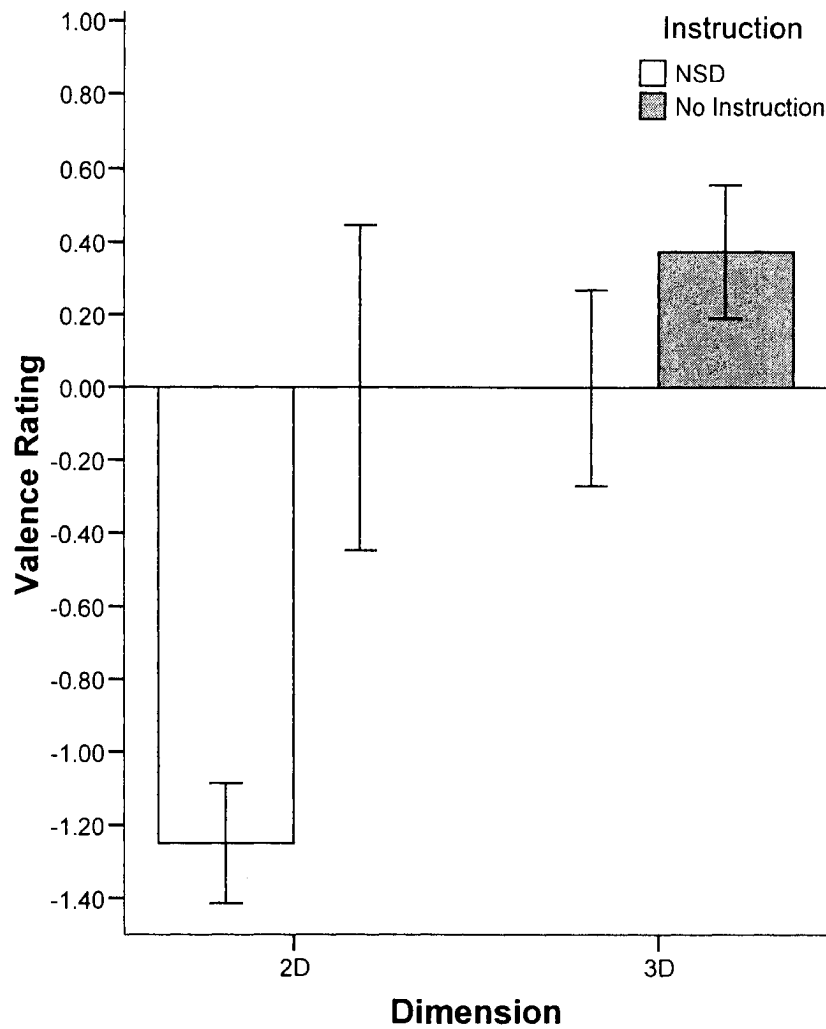


Figure 2. Mean valence ratings (± 1 SE) based on strongest thought response for nonjudgmental self-description (NSD) and no instruction conditions while viewing 2D versus 3D images plotted as a function of the low- (left panel) and high-shape

Discussion

The present study aimed at investigating the psychological responses of women to 2D or 3D body image exposure. It was predicted that participants assigned to view their images in 3D would experience greater BD compared to their 2D counterparts. On the contrary, among participants with dispositionally low-shape concerns, exposure to their 3D images led to significantly lower reports of state BD compared to their 2D counterparts. One might speculate, based on previous research (Farrell et al., 2004), that the findings would be more pronounced in those with high-shape concerns, given their excessive concern and negative thoughts over body shape (Shafran et al., 2007) and that the heightened anxiety and associated negative schemas that are habitually associated with 2D body image exposure would be negated by the novelty of 3D exposure. Among high-shape concerns participants, BD decreased significantly from pre- to post-body image exposure among those viewing their images in 2D with NSD instruction. Interestingly, the same analysis proved significant among participants in the 3D condition who received no instruction, such that BD decreased significantly from pre- to post- exposure. These results suggest that among participants with dispositionally high-shape concerns, the benefits of NSD instruction during 2D body image exposure are comparable to those experienced by participants who simply view their images in 3D with no instruction.

The finding that the benefits of NSD and no instruction are dependent upon the dimension in which participants view their images appears counterintuitive. In keeping with the research, one would expect that the benefits of the descriptive approach utilized in NSD instruction would be consistent across image dimensions. Studies employing a descriptive approach similar to NSD instruction, in 2D body image exposure, report significant improvements in body checking, weight and shape concerns, and BD among participants,

compared to their counterparts in the non-directive control group (Delinsky & Wilson, 2006; Shafran et al., 2007). Relative to current findings, it is possible that requiring participants to view their images in the novel 3D interferes with one's ability to comply with instructions, thereby counteracting the otherwise beneficial effects of the NSD instruction. The superiority (e.g., lower BD) of no instruction among participants with high-shape concerns when viewing their images in 3D may be attributed to the temporary suspension of negative body schemas and automatic thoughts brought about by mental processes yet to be determined which occur during this novel means of viewing one's images.

This study also explored whether exposure produced differential effects upon subsequent reports of affect as a function of the three independent variables of instruction, image dimension, and dispositional shape concerns. Participants high in dispositional shape concerns reported experiencing significantly more negative affect immediately following exposure than did their low-shape concerns counterparts. This finding is consistent with results of previous studies indicating that individuals with high-shape concerns report experiencing greater negative affect during body image exposure compared to those with low-shape concerns (Farrell et al., 2004; Hilbert et al., 2002).

The results of analyses conducted on two exploratory variables included in the present study to assess length of time spent (while viewing images) engaging in neutral and nonjudgmental mental activity revealed that participants in the high-shape concerns group reported spending significantly less time engaging in mindful activity than their counterparts in the low-shape concerns group. One explanation for this finding may be that, not only are individuals with high-shape concerns more dissatisfied with their bodies, they are also more self-preoccupied and particularly attentive to the negative. Within the mindfulness framework, body

image disturbances are regarded as mindless. Theorists posit that among individuals with high-shape concerns, the idea of observation without engaging in a process of negative evaluation or emotional reaction is foreign (e.g., Stewart, 2004). Consequently negative body schemas, automatic thoughts, core beliefs, and prejudice create a rigid, inflexible state of being, thus preventing awareness of novel perceptions and limiting the amount of time spent engaged in mindful activity.

The nature of the strongest thought that came to mind at pre- and post- body image exposure was examined. Among participants with dispositionally low-shape concerns in the 2D x NSD instruction condition, valence ratings significantly deviated from neutrality to become more towards the negative pole. Similar results were observed in the 3D x NSD condition as well as in the 2D x no instruction condition among high-shape concerns participants. Given that BD and self-critical thoughts are a core feature of body image disturbances, it is not surprising that the strongest thought that occurred to high-shape concerns individuals during the viewing of their own images could be regarded as non-neutral with a predilection towards a negative valence.

There are some notable limitations of the present study. Firstly, the findings of the present study are limited in generalizability due to the homogeneity of the sample. The participants considered here consisted of non-eating disordered female undergraduate students. Whether the findings of this study can therefore be generalized to other populations (e.g., clinical populations) requires further investigation. Secondly, this study relied solely on self-report measures of BD, eating disordered behaviours, and affect. While the measures employed in the present study demonstrate robust reliability and validity, a key concern among investigators is that self-report measures, such as the EDE-Q, may provide less accurate data than structured

interviews (Carter, Aime, & Mills, 2000). In addition, VAS s were used to operationally define several variables of interest, however, the psychometric properties of these scales were not ascertained (Sharfran et al., 2007).

The present study demonstrated a number of strengths. To our knowledge, the work described here represents the first study assessing psychological responses to 3D body image exposure. In addition, the psychometric measures administered in this study demonstrate high levels of internal reliability and have, for the most part, been used with comparable populations in past body image research. Furthermore, while the sample size was relatively small, it was sufficient to test the hypotheses, as demonstrated by the obtained effect sizes.

The findings that the benefits of 3D body image exposure were observed in dispositionally high-shape concerns participants, who simply viewed their images, has potential therapeutic implications for body dissatisfaction. Empirical evidence is still lacking regarding the effective implementation of body image exposure (e.g., duration, instructional set). Body image exposure in the present study took place within a 3 min duration. While this is much shorter than recorded exposure in therapeutic sessions (Delinsky & Wilson, 2006), significant positive and negative effects were observed on state BD. The results of the present study suggest that prolonged and repeated body image exposure may not be essential to improve levels of BD among individuals with dispositionally high-shape concerns. Rather, the manner in which participants are exposed to their images may be particularly important. Given that research in this area suggests that the ability of dispositionally high-shape concerned individuals to engage in mindful activity is limited, 3D body image exposure, while simply viewing one's images without instruction, has the potential to result in significant decreases in BD.

In summary, the current study found that 2D and 3D body image exposure interact with dispositional shape concerns and instructional set to produce differential effects on BD and affect among non-eating disordered women. Findings of the present study suggest that 3D body image exposure is a viable method for reducing BD in dispositionally high-shape concerned individuals. Several areas warrant further investigation. Firstly, it would be of interest to determine whether the benefits of 3D exposure can be replicated in a clinical group of females to determine the generalizability of the findings to additional populations. Secondly, BD in clinical populations has been enhanced through prolonged and repeated body image exposure in comprehensive treatment programs and experimental investigations (as cited in Tuschen-Caffier et al., 2003). Future studies should investigate the effects of prolonged and repeated 3D body image exposure on levels of BD, negative mood, and negative thoughts in dispositionally high-shape concerned individuals. Lastly, future research should assess the durability of any impact of 3D body image exposure to determine the viability of 3D exposure as a promising therapeutic technique.

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Appendix A

Comprehensive Introduction

Thinness has progressively become the idealized standard for feminine beauty in Western cultures. Evidence suggests that women and girls experience considerable dissatisfaction with their body size and shape and a particular desire to be thinner (Tiggemann, 2005). Body dissatisfaction (BD) increasingly represents a normative sentiment among women in our society (Cash & Henry, 1995). In a *Psychology Today* magazine survey, Cash, Winstead, and Janda (1986) sampled 2,000 individuals and discovered that 38% of women surveyed were dissatisfied with their overall appearance. While most respondents were comfortable with their face and height, they were particularly dissatisfied with their body weight and shape (as cited in Cash, 2002). In a similar national survey 56% of American women sampled reported dissatisfaction with their overall appearance (Garner, 1997). More specifically, female respondents were dissatisfied with their abdomens, body weight, hips, and muscle tone. In fact, among those surveyed, 62% of women ages 13 to 19 reported being dissatisfied with their weight, while 67% of women over 30 years of age reported being unhappy with their weight.

Negative thoughts and feelings about one's appearance can be a transitory experience for many women. For others chronic dissatisfaction significantly disrupts one's quality of life. When body image reaches a critical level of dissatisfaction, it may contribute to problematic eating behaviours and attitudes (Cash, 2002). There is evidence to suggest that body image disturbances predict the severity of problematic eating patterns. It has also been postulated that a disturbance in body image plays a role in the etiology of eating disorders (Cash & Deagle, 1997; Cash & Brown, 1987). Dysfunctional body image experiences are a core feature of eating disorders. Among the diagnostic criteria for anorexia nervosa outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000) are an "intense fear of gaining weight or becoming fat, even though underweight", and a "disturbance

in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight" (American Psychiatric Association, p. 589). Similarly, the criteria for bulimia nervosa include the necessary criterion that "self-evaluation is unduly influenced by body shape and weight" (American Psychiatric Association, p. 594).

Body Image

Body image has developed into a psychological construct of growing scientific and clinical interest (Cash & Henry, 1995; Cash, Morrow, Hrabosky, & Perry, 2004). Slade (1988) defines body image as "the picture we have in our minds of the size, shape and form of our bodies; and to our feelings concerning the size, shape and form of our bodies, and its constituent parts" (Slade, p. 20). In agreement with this definition, body image is viewed as having two main components: a perceptual component and an attitudinal component (Skrzypek, Wehmeier, & Remschmidt, 2001; Slade, 1994). Paralleling this conceptual distinction, two modalities of body image dysfunction can be distinguished: perceptual body size distortion, and cognitive-evaluative dissatisfaction. The former is viewed as the accuracy of an individual's body size estimation, while the latter is generally considered to be the attitudes and feelings an individual has towards one's body (Skrzypek et al.; Slade, 1994). Body image bears a moderate relationship to self-esteem and psychosocial functioning (Cash & Henry). A negative body image can generate adverse psychosocial consequences, including eating disturbances, depression, social anxiety, impaired sexual functioning, and diminished quality of life (Cash et al.).

Perceptual Body Image Assessment

Many approaches to investigate body image use perceptual assessment methods (Cash & Deagle, 1997). Perceptual methods can be broadly classified as belonging to one of three

categories: analogue scales, image marking, and optical distortion methods (Farrell, Lee, & Shafran, 2005). Analogue scales require subjects to adjust the horizontal separation of a pair of calipers to represent their estimates of the width of a body part. Similarly, image marking methods present subjects with a vertically mounted piece of paper and require them to draw their body, or to mark on the paper the width of certain body parts. Optical distortion methods require participants to correct a pictorial or video image of oneself that has been distorted in width (Farrell et al.). Perceptual methods can further be classified into two categories: body-part size estimation procedures and whole-body or distorting image techniques (Cash & Deagle; Skrzypek et al., 2001). Both methods allow researchers to assess how accurately a person is in gauging his or her body size (Cash & Deagle; Skrzypek et al.). Approaches to investigating perceptual distortion include, but are not limited to, the movable caliper technique, the image marking procedure, the distorting mirror, video distortion techniques, the life-size screen distortion method, and the computer based image distortion technique (Skrzypek et al.).

While the perceptual component of body image has received considerable attention in the literature, interest in this area has waned in recent years due to the heterogeneity of results concerning body size overestimation in eating disorders (Farrell et al., 2005; Farrell, Shafran, & Fairburn, 2003). In a recent review of the published literature in this area, Farrell and colleagues (2005) revealed that nearly half (48%) of the 52 studies included in the review reported that patients with anorexia nervosa overestimated their body size compared to healthy controls. Additionally, 37% of the studies reported that patients with bulimia nervosa overestimated their body size compared to normal controls. Conversely, 23% of studies found no difference between the accuracy of body size estimations made by patients with anorexia nervosa and healthy controls. Farrell and colleagues (2005) suggest that the inconsistent findings can be attributed to

a number of causes including the diversity of methods that have been used for measuring body size estimation, the variability in the quality of the assessment methods, and demand characteristics inherent in body size estimation tasks. Overall, there is a considerable amount of inconsistency from studies assessing body size estimation (Farrell et al., 2005). Although there is variability in the body size estimation literature, Farrell and colleagues (2003) maintain that there are good reasons to investigate the perceptual component of body image. They report that studies using the signal detection approach have shown that the tendency to overestimate is due to nonsensory rather than sensory factors. They further suggest that the clinical observation that underweight and normal weight patients with eating disorders commonly complain that they look fat when looking at oneself in the mirror, argues for further investigation of the perceptual component of body image (Farrell et al., 2003).

Attitudinal Body Image Assessment

Although attitudinal body image is a multidimensional concept that includes interrelated cognitive, affective, and behavioural elements, the majority of researchers target BD assessed by self-report questionnaires and structured interviews (Cash & Deagle, 1997; Skrzypek et al., 2001). Less often, researchers employ exposure techniques and measure dissatisfaction with body weight and shape, the frequency of body-related thoughts, situational body image dysphoria, behavioural avoidance, appearance-schematic beliefs, and the investment in and discrepancy from physical ideals (Skrzypek et al.). Body image exposure techniques provide visual feedback of one's physical appearance, enabling patients the experiential opportunity to correct distorted body image attitudes (Hilbert, Tuschen-Caffier, & Vögele, 2003). A summary of the literature employing exposure methods to investigate attitudinal body image is presented in Table 1.

Compared to perceptually-oriented techniques, the more rarely investigated exposure techniques focus more on the cognitive-emotional aspects of body image disturbance (Hilbert et al., 2003). Studies investigating the affective responses of eating disordered patients and healthy controls to their body shape report that body shape exposure is particularly anxiety provoking. Tuschen-Caffier and colleagues exposed 20 female volunteers diagnosed with bulimia nervosa and 20 female non-eating disordered volunteers to their body shape using a video recording called video confrontation. During the recording, participants were dressed in a beige-colored leotard and stood against a white wall at a 2 m distance in front of the camera for 10 min. Participants' head, upper body, arms, waist, hips, bottom, and legs were filmed using a standard video camera without sound. During the viewing, participants were seated in an armchair at a 1.5 m distance to the video monitor. A series of 7-point rating scales (1 = *not at all*, 7 = *extremely*) were used repeatedly during the experimental session to assess the subjective experience of participants. Participants were asked to provide ratings that best reflected their feelings of hunger, desire to binge, sadness, anxiety, tension, and feelings of insecurity that they were currently experiencing. Subjects provided a first set of subjective ratings (baseline). The 10-min video recording was then played back. Following the video confrontation session participants were asked to rate (on a series of 7-point rating scales) how they felt while watching the video recording. A 5 min rest period followed after which participants provided a final mood rating. The results revealed that both groups reacted with an increase in self-reported tension, anxiety, insecurity, and sadness when confronted with their body shape.

Similar results were found in a sample of 150 women, half of whom reported high levels of body shape concern (Farrell, Shafran, & Fairburn, 2004). Participants completed the Mirror Questionnaire, a 26-item questionnaire based on an existing questionnaire on mirror behaviours

for patients with body dysmorphic disorder (Veale & Riley, 2001). The Mirror Questionnaire included items on “the frequency and duration of looking, and avoidance of looking, in the mirror, mirror-related checking behaviours, and cognitions and emotions evoked by looking in the mirror” (Farrell et al., p. 226). Participants also completed the Eating Disorder Examination – Self Report Version (EDE-Q; Fairburn & Belgin, 1994). This 36-item questionnaire generates scores on four subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern. A significantly greater proportion of those participants with high levels of shape concern compared to those with low concern reported paying more attention in the mirror to body parts such as stomach and hips. Furthermore, checking behaviours (e.g., pinching and wobbling body parts in front of the mirror) and avoidance of looking in the mirror were significantly more frequent in participants with high levels of body shape concern compared to participants with low concern (Farrell et al.). The emotions and cognitions experienced by participants when looking in the mirror were rated as either “positive/neutral” or “negative/mixed”. A significantly greater proportion of participants with high levels of shape concern compared to those with low concern reported experiencing negative/mixed cognitions and emotions when confronted with their body shape in the mirror. These results suggest that confrontation with body shape is a stressful and upsetting experience not only for patients with eating disorders but also for many women without eating disorders (Tuschen-Caffier et al., 2003.).

Recently, modern developments in artificial environments such as computer-generated virtual environments (VEs) have provided innovative research settings in which the experience of the body can be explored. Virtual reality (VR) computer simulations present participants with immersive, perceptually encompassing environments where the physical world is approximated or manipulated to varying degrees via head-mounted displays and instrumented clothing (Murray

& Gordon, 2001). For example, a VE commonly used in the treatment of disturbances of body experience is based on five different VEs. The first two VEs are designed to give the participant “minimum skill in perceiving, moving through, and manipulating objects in virtual reality and to focus attention on eating and food. The next three are designed to modify the body experience of the subject” (Riva, 1998, p.165). To do this the VE integrates two approaches: a cognitive behavioural approach aimed at modifying participants’ feelings of dissatisfaction with different body parts through individual interview, relaxation and imaginal techniques, and a visuomotor approach that makes use of videorecordings of gestures and movements with the aim of influencing bodily awareness (Riva). Many VR applications currently in use do not include a visual representation of the participant’s body shape or size within the virtual scene. Occasionally a participant’s whole body may be rendered in a rough static form (Murray & Gordon). While there is potential for the use of VEs in body image research some problems have limited their application in this field. Some users experience side effects both during and after exposure to the virtual environment. These side effects, collectively referred to as “simulator sickness” are similar to those reported by participants exposed to simulators with wide field-of-view displays and include ocular problems such as eye strain and fatigue, disorientation and balance disturbances, and nausea (Riva). At present, the unique experience of one’s body shape in immersive VR requires further exploration.

Body Checking

Mirrors are the most common means by which individuals assess their body shape. Given that mirrors are the main source of visual information about one’s body, they are of obvious importance when examining body image dissatisfaction (Farrell et al., 2004). Mirror exposure can generate intolerable anxiety for some individuals (Key, George, Beattie, Stammers, Lacey, &

Waller, 2002). Patients with eating disorders report repeated and unusual use of mirrors to critically check their body size, weight, and shape, and routinely over-evaluate the importance of what they see (Shafran, Lee, Payne, & Fairburn, 2007). Key and colleagues examined the role of mirror exposure in 15 women within an inpatient program for anorexia nervosa. A within-subjects design was used to examine the impact of body image treatment with (modified) and without (standard) the repeated use of mirror confrontation on BD, anxiety, and avoidance behaviours. The program consisted of 8 weekly sessions of 90 min in which both modes of treatment followed a set format of exposure exercises and homework. In addition to the main themes of standard treatment, the modified treatment also included mirror confrontation as an exposure exercise. The standard program used mirror confrontation only during the first session, although the mirror remained in the room for the duration of the program. Participants in the modified treatment group were required to stand in front of a full-length mirror and look at their whole body (clothed) for increasing periods of time each week. BD, anxiety, and avoidance were measured by self-report questionnaires. The modified body image treatment produced a significant reduction in BD that was not observed in the standard treatment group over an equivalent time period. The authors concluded that “the mirror exercise. . . produced a powerful and immediate emotional experience in most subjects when compared with other exposure exercises” (Key et al., p. 189). The authors therefore note that the manner in which the mirror confrontation is implemented is particularly important.

Research indicates that while using mirrors to check one’s body size, shape, and weight is common among young women, people who have significant shape concern use the mirror to critically scrutinize parts of their body more often than those whose level of shape concern is low. For example, recent studies indicate that the majority of patients with eating disorders

engage in body checking, and do so more often than normal controls (Shafran et al., 2007). Body checking is defined as “the repeated critical scrutiny of one’s body size, shape and weight” (Shafran et al., p. 113). Examining oneself in the mirror, using the fit of clothes to judge whether body size has changed, feeling for bones, and seeking reassurance about shape are all examples of body checking behaviours. The exact nature of the relationship between body checking and BD has yet to be ascertained. One early hypothesis was that bodily imperfections are magnified by the frequent but brief checking of shape while in a state of high arousal. It has also been suggested that “body checking is an expression of the characteristic overevaluation of shape and weight in patients with eating disorders and that such behaviour is likely to intensify their concerns” (Shafran et al., p. 114). In recognition that body checking has importance in theoretical accounts of the maintenance of eating disorders, the relationship between body checking and BD is of interest.

Shafran and colleagues (2007) explored the impact of manipulating body checking on BD in a non-clinical group of 60 women. Participants were randomly assigned to an instructional set to either repeatedly scrutinize their bodies in a critical way in the mirror (high body checking) or to examine their bodies in a neutral way, refraining from body checking (low body checking). The low body checking condition required participants to look at all parts of their body in the mirror, each for a few seconds, starting from the head and working down to the feet. The experimenter called out body parts and participants were required to describe each part in a neutral manner, refraining from using either positive or negative language. If positive or negative language was used, participants were reminded of the original instructions to remain neutral. BD, feelings of fatness and self-critical thoughts were measured using self-report questionnaires and Visual Analogue Scales (VAS). The results indicated that participants who were assigned to the

high body checking condition reported spending more time checking their body shape than those assigned to the low body checking condition. Furthermore, those in the high body checking condition also experienced a temporary increase in BD, feelings of fatness, and body-related critical thinking, while feelings of fatness decreased among those in the low body checking condition. In keeping with previous findings that suggest that body checking contributes to the maintenance of shape concerns, Shafran and colleagues suggest that these findings support the theoretical accounts that body checking is an expression of the over evaluation of shape and weight in people who have significant shape concern and that such behaviour is likely to intensify concerns about shape and weight. Given that the intervention had relatively little impact on BD in the low body checking condition and that the intervention has positive findings in clinical samples (as cited in Shafran et al.), the authors suggest that the intervention is only effective in individuals with high shape concerns.

Mindfulness

In consideration of behaviours associated with body image disturbances (e.g., body checking), a mindful state may allow individuals to confront the physical body experience without associated fear and reactive negative appraisal (Stewart, 2004). Mindfulness is 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, p. 784). Mindfulness combines enhanced present moment awareness and a stance of nonjudgment, neutrality, and acceptance of all experience (Stewart). Body image disturbances may be regarded as *mindless*, in which negative body schemas, automatic thoughts, core beliefs, and prejudice create a rigid, inflexible state of being, thus preventing awareness of novel perceptions (Stewart). Ultimately, mindfulness is observation of one’s body with awareness,

nonjudgment, and nonreaction, resulting in a decreased likelihood of impulsive behaviours (e.g., body checking) and the ability to perceive and acknowledge alternative perceptual, cognitive, behavioural, and affective body experiences (Stewart).

Included among the components of mindful body image treatment is mirror exposure, in which individuals are trained to face body image exposure without negative appraisal of the body. Using mindfulness as a therapeutic technique, body parts that elicit negative emotions, as well as those that do not create significant distress, are described by the person as to prevent extreme negative reactions (Stewart, 2004). Delinsky and Wilson (2006) demonstrated the utility of such a descriptive approach in women with extreme shape and weight concerns. Twenty-four women were instructed to stand in front of a full-length mirror and to verbally describe themselves from head to toe systematically during three 1 hr sessions each scheduled 1 week apart. Participants were reminded to give equal attention to all body parts and asked to refrain from using critical or negative language. If the women did use critical language during the exercise, a therapist interjected and reminded the participants of the instructions. Following the three sessions (coupled with homework to monitor and reduce body checking and avoidance behaviours), the women were compared to a non-directive control group of 21 women. The 3 week non-directive intervention, which was primarily psychoeducational in nature, included daily journaling by participants regarding body image and once a week meetings with a therapist employing primarily Socratic questioning. The results revealed that participants in the descriptive mirror exposure condition scored significantly lower on a number of body weight and shape measures at post-intervention. In addition, depression scores and dieting behaviours were significantly lower compared to their counterparts in the non-directive intervention group. This style of descriptive mindful processing is particularly relevant in body image exposure.

Appendix B
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 _____ **extremely concerned**

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

not at all _____ **extremely dissatisfied**

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

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

4) Please identify the **strongest** thought that comes to mind.

How much does this thought bother you?

not at all _____ **extremely**

Mindful VASs

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

- 1) How much of the previous 3 minutes has been spent scrutinizing your body in detail, checking and looking for flaws?

**none of
the time**

**all of
the time**

- 2) How much of the previous 3 minutes has been spent standing back and seeing your body in a neutral way?

**none of
the time**

**all of
the time**

Appendix C

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 hours 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 rules about what or when you should eat?	0	1	2	3	4	5	6
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 definite fear that you might gain weight or become fat?	0	1	2	3	4	5	6
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.)
1. None of the times
 2. A few of the times
 3. Less than half the times
 4. Half the times
 5. More than half the times
 6. Most of the times
 7. 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
	0	1	2	3	4	5	6
35How uncomfortable have you felt seeing your body; for example, in the mirror, in shop window reflections, while undressing or taking a bath or shower?							
36....How uncomfortable have you felt about others seeing your body; for example, in shared changing rooms, when swimming or wearing tight clothes?							

Appendix D

Positive and Negative Affect Schedule

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	_____	irritable
_____	distressed	_____	alert
_____	excited	_____	ashamed
_____	upset	_____	inspired
_____	strong	_____	nervous
_____	guilty	_____	determined
_____	scared	_____	attentive
_____	hostile	_____	jittery
_____	enthusiastic	_____	active
_____	proud	_____	afraid

Appendix E
Screening Questionnaire Consent Form

Participant Consent Form

My signature on this form indicates that I agree to participate in the following questionnaire.

I fully understand the information that has been provided to me and what I am required to do. I understand that I will only receive a bonus mark for Psychology 1100 should I be selected and participate in the study. The information that I provide will remain confidential, and be stored at Lakehead University for seven years. I give my permission to be contacted by telephone or email should I be selected to participate the study.

Name of participant (please print)

Date

Signature of participant

Appendix F
Screening Questionnaire

Screening Questionnaire

If you are interested in participating in a research study in the Department of Psychology, please answer the following questions. Participants will be selected based upon the answers they provide to this brief questionnaire.

Name: _____ Date of birth: _____

Email: _____ Phone number: _____

How do you prefer to be contacted? Email Phone

What is your preferred time to be contacted? Day/time _____

Please circle your answer:

1. Do you currently smoke cigarettes? YES or NO
2. During the last 6 months, have you taken oral contraceptives, or are you currently taking oral contraceptives? YES or NO
3. During the last 6 months, have there been times when you felt you have eaten what other people would regard as an unusually large amount of food given the circumstances (e.g., a quart of ice cream)? YES or NO
4. If you did experience times when you ate an unusually large amount of food, did you experience a loss of control (feel that you couldn't stop eating or control what or how much you were eating)? YES or NO.
5. During the last 6 months, have there been times where you have consumed a large number of alcoholic drinks (e.g., more than 5 drinks) in a short period of time? YES or NO
6. Do you have any food aversions or allergies to chocolate? YES or NO
7. Do you have any food aversions or allergies to peanut butter? YES or NO
8. Are you currently being treated by a health care professional for any of the following:
 - (a) Depression? YES or NO
 - (b) Eating disorder? YES or NO
 - (c) Anxiety disorder? YES or NO

Appendix G

Participant Cover letter and Consent Form

Cover letter

Dear Participant:

Thank you for taking part in this research study investigating peoples' psychological reactions to seeing true portraits of themselves delivered in unique two-dimensional (2D) or three-dimensional (3D) representations.

During this study you will be asked to complete a series of questionnaires, have 27 fully-clothed portrait photographs taken of you, and view the photographs in unique 2D and 3D ways. This study will take approximately 40 minutes to complete and you will receive a Psychology 1100 bonus point for your participation.

This research project is being conducted under the supervision of Dr. Ron Davis and has been approved by the Lakehead University Senate Research Ethics Board. Only Dr. Davis, a research assistant (Loretta Blanchette) and I will have access to the information you provide. Your responses will not be identified by your name. When the study is completed, the information will be securely stored in the Department of Psychology at Lakehead University for seven years. A report of findings will be available to those interested upon request.

Participation in this research study is completely voluntary. If for any reason you wish to withdraw from the study you may do so at any time without penalty.

Thank you,

Julie Riendeau
M.A. graduate student, Clinical Psychology
Department of Psychology, Lakehead University

Participant Consent Form

My signature on this form indicates that I agree to participate in the study investigating peoples' psychological reactions to seeing true portraits of themselves delivered in unique 2D or 3D representations. This study is being conducted by Julie Riendeau in the Department of Psychology for her 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 some transitory psychological or emotional discomfort as a function of completing the questionnaires.
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.
6. I give my permission to be contacted by telephone and/or email for purposes of participation in the present study.

 Name of Participant (please print)

 Date of birth

 Signature of Participant

 Date

 Email Address

 Telephone number

 Student number

 Name of Psychology Professor and course number

Appendix H
Instructional Set Scripts

Instructional Set – Nonjudgmental Self-Description (NSD)

In a few moments you will be shown a series of photographs that were taken of you at our last meeting. I will call out body parts, starting from your feet (for example, your calves, ankles, and feet) and working up to your head (for example, your hair, forehead, eyebrows, and eyes). I ask that you describe each body part in a neutral fashion as I call it out. Do not use either positive or negative language. Simply describe what you see as if you were looking at 'someone else'. For example, if I said the word "eyelashes"- it would not be OK to say, "My eyelashes are too curly" because that is not a neutral description. It would be OK to say, "I have long eyelashes". Remember, you are to describe each body part in a neutral fashion. When you have finished viewing the photographs I will return and you will be given further instructions.

Instructional Set – No Instruction

In a few moments you will be shown a series of photographs that were taken of you at our last meeting. When you have finished viewing the photographs I will return and you will be given further instructions.

Appendix I

Mental Health Resources Contact Information

Thank you for your participation in this research study. For your information, listed below are a number of agencies that offer mental health services.

- 1. Lakehead University Student Health and Counselling Centre** (located across from Security, near the Agora and University Centre Theatre) 343-8361

Personal counselling for students covering a wide variety of issues.
- 2. Lakehead Psychiatric Hospital – Community Mental Health Services** 343-4394

Multidisciplinary assessment and treatment for individuals between the ages of 16 and 65 who present with psychological concerns.
- 3. Family Services Thunder Bay** 684-1880

A not-for-profit organization providing confidential counselling, advocacy, education, and support for individuals and families in Thunder Bay. Counsellors provide comprehensive help for a wide variety of issues such as grief and coping, substance use, credit and financial problems, anger, anxiety, depression, and past experiences of violence. Fees are based upon individual circumstances and no person will be denied service due to an inability to pay.
- 4. Eating Disorder Program (St. Joseph's Care Group)** 343-2400

A multidisciplinary team, which provides assessment and treatment to individuals with Anorexia Nervosa, Bulimia Nervosa, and Eating Disorder Not Otherwise Specified. A physician's referral is required for admission to the program.
- 5. Personal Development Centre (St. Joseph's Care Group)** 343-2400

An adult out-patient program which offers an innovative, multi-disciplinary approach to treating a variety of mental health issues such as anxiety, depression, stress related problems, self-esteem, issues, and compromised coping strategies. A physician's referral is required for admission to the program.