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Women's Attention as a Function of Body Dissatisfaction and Images of Thin Models: An Eye-Tracking Study

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Women's Attention as a Function of Body Dissatisfaction and Images of Thin Models: An Eye-Tracking Study

by

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Abstract

To gain insight into cognitive underpinnings of body dissatisfaction, we compared attentional biases in body-dissatisfied and body-satisfied women, as well as the influence of thin media images on attention. Women (42 body-dissatisfied and 40 body-satisfied) completed a paradigm measuring attention to fat- and thin-related words via eye gaze, both before and after exposure to images of thin models. Participants self-reported on height, weight, and body dissatisfaction. Body-dissatisfied women paid more attention to weight words (both fat and thin) than body-satisfied women. Exposure to thin model images did not affect attention to weight words. Body mass index was related to attention to fat words only prior to image exposure. Our findings suggest that body-dissatisfied women display an attentional bias to weight words but not in the direction predicted by the cognitive model of eating disorders, and that brief exposures to models do not affect the attentional biases.

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Introduction

The term "body image" reflects a representation of an individual's own body formed in his or her mind (Schilder, 1935). This term incorporates affective, evaluative, cognitive, behavioural, and perceptual components (Sarwer, Wadden, & Whitaker, 2002; Thompson, 2004). Dissatisfaction with one's body image has been linked to poor peer relationships (Davidson & McCabe, 2006) and involvement in risky behaviours, including substance use, early sexual activity, self-harming behaviours and suicidal ideation (Cook, MacPherson & Langille, 2007; Palmqvist & Santavirta, 2006). There is also evidence that dissatisfaction with one's body image is a causal risk factor for the development of eating disturbances among adolescent girls and women (Stice, Marti, & Durant, 2011; Stice & Hoffman, 2004). Research has shown that dissatisfaction with one's body is highly prevalent amongst women in Western cultures (Rodin, Silberstein, & Striegel-Moore, 1984). Given the high prevalence and negative outcomes related to body image difficulties, it is important to study and understand the factors influencing the development of body image difficulties.

Sociocultural Influences on Body Image

The sociocultural influence of the media on body image has been supported by a large body of correlational research (Tiggemann, 2011). A prominent sociocultural theory of body image and eating disturbance is the Tripartite Influence Model (Shroff & Thompson, 2006), which organizes the sociocultural influences of body image into three influences that are thought to have a direct effect on body dissatisfaction: peers, media, and parents. According to this model, these influences can affect body dissatisfaction directly and indirectly, via two processes: internalization (of societal standards of appearance) and social comparison (excessive appearance comparison to others). Within the framework of the Tripartite Influence Model, this

study focused on examining the direct influence of media images on women with body image dissatisfaction.

Media and body dissatisfaction. Many studies have compared the influence on body dissatisfaction of thin media images (e.g., images of female models) vs. control images (e.g., cars, houses, average sized models, etc.). Two meta-analyses have been conducted, involving over 47 published experiments (Want, 2009; Groesz, Levine, & Murnen, 2002). In these studies, body image is typically measured either after, or both before and after image exposure. Both meta-analyses have concluded that there is a small to medium effect of experimental presentation of thin media images on state levels of body dissatisfaction, measured for the most part via self-report questionnaires.

Attentional Bias as an Implicit Measure of Body Image Dissatisfaction

As demand characteristics may lower the reliability of self-report questionnaires (Wiers & Stacy, 2006), the present study also examined attentional bias – a measure of implicit cognitive processing related to body image – as an alternatively to relying solely on self-report measurements. Due to the limited and selective nature of attention, biases in the allocation of attention to concern-related stimuli can be explored (Sears, Thomas, LeHuquet, & Johnson, 2010). Attentional biases to food/body/weight/shape words have been a prominent area of investigation in individuals diagnosed with an eating disorder (Dobson & Dozois, 2004). These studies often rely on Vitousek and Hollon's cognitive theory of eating disorders (1990) to explain how the attentional biases operate. This theory proposes that individuals with eating disorders or body image disturbances can develop organized cognitive structures or "self-schemas" that are focused on weight and the individual's negative thoughts about her or his weight. When processing information about weight, they selectively process schema-congruent

information (e.g., fat-related stimuli) and resist schema-incongruent information (e.g., thin-related stimuli), which is thought to result in the persistence of eating disorders, dissatisfaction with one's body, and eating pathology. The present study explored attentional biases to weight words (i.e., fat and thin-related words) as an implicit measure of cognitive processing related to body dissatisfaction and the influence of media.

People diagnosed with an eating disorder often exhibit attentional biases to weight and body words (Dobson & Dozois, 2004). However, findings are discrepant with respect to whether non-clinical individuals with body dissatisfaction but without a clinical eating disorder exhibit attentional biases for weight and body stimuli. In a meta-analysis of Stroop tasks that measured attentional biases in both clinical and non-clinical eating disorder populations, Dobson and Dozois (2004) concluded that the evidence supporting attentional biases in dieting and food-restricted subjects was trivial. However, more recent studies using attentional bias measures other than the Stroop task have found evidence for attentional biases to weight and body stimuli in individuals with body image difficulties (Gao et al., 2011; Li, Jackson, & Chen, 2011; Thomsen, Breckenridge, Infanger, & Harding, 2014).

Attentional bias paradigms. Many attentional bias measuring paradigms have been used in this literature. The Stroop task (1935) is the most common paradigm and requires the participant to indicate the font colour that control and target words are presented in while ignoring the word's meaning. It is inferred that the participant will be slightly slower to respond if his or her attention is initially drawn to the content of the word; the idea is that if the meaning of the word captures attention then response times will be slower, thus attentional bias is measured by reaction time. The problem with the use of the Stroop task is that the meaning of the results is uncertain: attention, cognitive avoidance, and distraction due to increased emotional

arousal have all been put forth as potential mechanisms to explain the differences in reaction time for target vs. control words (Lee & Shafran, 2004). Additionally, the Stroop task is only a measure of the initial orienting of attention (Gao et al., 2011). Other attentional bias measuring paradigms used in the body image literature include the dot probe task (MacLeod, Mathews, & Tata, 1986; e.g., Markis and McLennan, 2011), the lexical decision task (Meyer & Schvaneveldt, 1971; e.g., Cassin, von Ranson, and Whiteford, 2008), and the dichotic listening task (Treisman & Geffen, 1967; e.g., Li et al., 2011). Similar to the Stroop task, most of these paradigms only give an indication of inferred initial orienting of attention based on a behavioral response.

Eye-tracking. Eye gaze tracking is another technique for measuring attentional bias that has been used in the body image literature (Gao et al., 2011). Because eye movements are guided by attention, tracking eye movements can give a direct, continuous measure of visuospatial attention, and allows various components of attention to be explored, such as maintenance, shifts, and disengagement. Unlike other techniques that only measure the initial orienting of attention, eye-tracking allows for attention to be measured over extended intervals (Sears et al., 2010). These benefits of eye-tracking in the measurement of attentional processing may help to explain why recent research identified significant attentional biases for body stimuli in a nonclinical population (Gao et al., 2011), despite discrepant findings when the other paradigms were used. Further research on attentional biases using eye-tracking technology is greatly needed to explore continuous attentional processing among nonclinical, body-dissatisfied women. Such findings have implications for treatment and prevention. For example, attentional bias modification techniques have been used to successfully reduce attentional bias in anxious individuals (Bar-Haim, 2010). The use of similar techniques for the reduction of attentional biases in individuals with an eating disorder has been proposed (Renwick, Campbell, & Schmidt,

2013), and could also be considered for use with body-dissatisfied individuals to aid in prevention of eating disorders.

Gao et al. (2011) used eye-tracking to assess attentional biases for fat and thin words in nonclinical women with weight dissatisfaction. Weight-dissatisfied and control (weight-satisfied) women engaged in a dot probe task that required them to indicate as quickly as possible after words had disappeared from the screen, which of two words a dot replaced. Word pairs were either fat-neutral, thin-neutral, or neutral-neutral, and were presented for one second. Eye gaze was measured during the dot probe task. An eye gaze *direction bias* was found, such that weight-dissatisfied women had more frequent initial fixations on fat words compared to weight-satisfied women. This finding was also supported by how quickly weight-dissatisfied women correctly identified the dot location for fat words in the dot probe task. These findings support Vitousek and Hollon's (1990) theory, which holds that negative weight words are more salient to individuals with maladaptive body image schemas. However, for *mean gaze duration*, weight-dissatisfied women spent less overall time gazing at thin words, although there was no difference between weight-dissatisfied and weight-satisfied women in gaze duration for fat words. Stimulus words were only presented for one second, however, which may have affected results. For example, termination of the initial fixation of the participants' gazes occurred approximately 740 milliseconds after word pair onset, so the remaining gaze fixation measurements were based only on the remaining 260 milliseconds. This duration may have been too short to detect an overall maintenance bias. Future research using longer gaze duration times is needed to gain further insight into mean gaze duration biases for fat and thin words in women with body dissatisfaction.

Additionally, in the depression and dysphoria literature, research using time course analysis (a data analytic technique that parses several-second image presentations in an eye-

tracking paradigm into shorter intervals of time to explore attentional bias over time) found that it was only after 4 seconds of image presentation that differences in attention to positive and depression-related images in dysphoric and non-dysphoric participants became apparent (Arndt, Newman, & Sears, 2014). No research to date has used time course analysis to explore attentional biases using an eye-tracking paradigm in individuals with body dissatisfaction, which may reveal patterns that vary over time and thus help explain previous discrepant findings in this literature related to the attentional bias paradigms used.

The Role of Exposure to Thin Media Images on Attentional Bias

It has been proposed that individuals at risk for development of an eating disorder may have attentional biases that are latent (LeBarge, Cash, & Brown, 1998; Johansson, Lundh, & Andersson, 2005; Cassin et al., 2008; Markis & McLennan, 2011). Researchers have proposed that the presentation of thin media images may prime an individual's maladaptive body image schema through mechanisms such as social comparison and self-discrepancy (representations in the self-concept of ways in which one falls short of some important standard; Higgins, 1987), which may lead to attentional biases in nonclinical individuals at risk for development of an eating disorder (Cassin et al., 2008; Markis & McLennan, 2011). Findings in this literature are not entirely consistent, however. For example, one study found an attentional bias in a nonclinical sample after the presentation of thin model images (Markis & McLennan, 2011), whereas another study did not (Cassin et al., 2008).

Cassin et al. (2008) attempted to heighten women's maladaptive body image schemas with a priming condition that involved the presentation of images of thin fashion models, and measured attentional biases to appearance and body-related words using the lexical decision task. Cassin et al. observed no attentional biases in high thin-ideal internalizers who were exposed to

attractive models when compared to a control image exposure group, or when compared to low thin-ideal internalizers in either image exposure group. They concluded that high-risk non-clinical samples rarely display attentional biases similar to those diagnosed with an eating disorder, and they found Vitousek and Hollon's cognitive theory of eating disorders to be unsupported in a non-clinical sample.

Conversely, Markis and McLennan (2011) aimed to heighten women's maladaptive body image schemas by exposure to images of thin models, and measured biases to body related words using the Stroop task. They found a significant correlation between self-reported body dissatisfaction as measured by the body dissatisfaction subscale of the Eating Disorder Inventory (EDI; Garner, Olmsted, & Polivy, 1983), and attentional biases to body words. They concluded that attentional biases to body words do occur in women with body image difficulties when maladaptive body image schemas are primed with thin model exposure.

These two studies varied with respect to the aspect of body image being measured (body dissatisfaction vs. thin ideal internalization). It is important to explore the influence of thin media images on attentional biases related to body dissatisfaction in particular, given that body dissatisfaction is the construct of interest in the majority of research that investigates the role of thin media images on body image (Want, 2009), and that body dissatisfaction is highly prevalent in Western cultures (Rodin et al., 1984) and a risk factor for the development of eating disturbances (Stice et al., 2011). Additionally, neither Cassin et al. (2008) nor Markis and McLennan (2011) used a continuous eye-tracking measure of attentional bias. The use of a continuous measure of attentional bias would allow for a more thorough understanding of attentional processes occurring after initial orientation. Finally, the two studies differed in the specific words used in the attentional bias paradigms. Cassin et al. (2008) used fat and thin

words, whereas Markis and McLennan (2011) used what they defined as general words related to body image (e.g., fat, arm, hips, thighs). According to Vitousek and Hollon's (1990) cognitive theory of eating disorders, the use of fat, thin, and neutral words would provide more specific information about the direction of attentional biases, and the theory would propose that women with maladaptive body image schemas will find schema-congruent (fat) information more salient, and schema-incongruent (thin) information less salient.

This study aimed to resolve the discrepancies noted above by exploring the influence of thin media images on attentional biases related to body dissatisfaction, using eye-tracking as a continuous measure of attention, and using both fat and thin word lists in the attentional bias paradigm (as opposed to body words in general) to provide more specific information about patterns of attentional biases.

The Present Study

Given the negative outcomes related to body dissatisfaction, it is important to research whether nonclinical women with body image difficulties exhibit similar attentional biases as women diagnosed with an eating disorder. As noted, findings in nonclinical samples have implications for eating disorder prevention and treatment.

The current study's inclusion of thin media images was intended to help clarify whether they influence attentional biases in women with body dissatisfaction. This study allowed researchers to examine the important role of context and environmental cues on an individual's information processing, something that could also be taken into consideration in prevention efforts.

Study aims. The aims of this study were to measure attentional biases toward weight words (fat and thin) using a continuous measure of attention in women reporting high vs. low

body dissatisfaction, and to explore the influence of exposure to thin media images on attentional biases to weight words.

Attentional maintenance bias hypotheses.

Hypothesis 1a. It was hypothesized that body-dissatisfied women would display an *attentional maintenance bias* such that they would have longer overall gaze durations for fat words, and shorter overall gaze durations for thin words compared to body-satisfied women.

Hypothesis 1b. It was hypothesized that after exposure to the images of thin models women would display an *attentional maintenance bias* such that they would have longer overall gaze durations for fat words, and shorter overall gaze durations for thin words compared to before exposure to the images of models.

Hypothesis 1c. Combining hypotheses 1a and 1b, it was hypothesized that there would be an *interaction* in attentional maintenance biases such that the attentional bias would be influenced by women's level of body dissatisfaction *and* by the priming condition (for example, body-dissatisfied women would display the largest attentional biases when primed with the thin media images).

Attentional direction bias hypotheses.

Hypothesis 2a. It was hypothesized that body-dissatisfied women would display an *attentional direction bias* such that they would have more frequent initial fixations to fat words, and less frequent initial fixations to thin words compared to body-satisfied women.

Hypothesis 2b. It was hypothesized that after exposure to the images of thin models women would display an *attentional direction bias* such that they would have more frequent initial fixations to fat words, and less frequent initial fixations to thin words compared to before exposure to the images of models.

Hypothesis 2c. Combining hypotheses 2a and 2b, it was hypothesized that there would be an *interaction* in attentional direction biases such that the attentional bias would be influenced by women's level of body dissatisfaction *and* by the priming condition (for example, body-dissatisfied women would display the largest attentional biases when primed with the thin media images).

Exploratory Research Questions.

Question 1. We explored whether we would observe relationships between body mass index (BMI) and attentional maintenance biases to fat and thin words both before and after priming exposure, as BMI and body dissatisfaction are positively correlated (Yates, Edman, & Arugete, 2004).

Question 2. We explored differences in attentional maintenance bias patterns over time between body-satisfied and body-dissatisfied women using time course analysis.

Method

General Procedure

This study involved three separate phases. The first was an online survey conducted for the purpose of developing and validating stimuli sets to be used in the main eye-tracking study. The second phase was an online survey to screen potential participants for eligibility to participate in the main study. The third phase was the main study, which involved collecting data via eye-gaze tracking.

Stimuli development phase. To develop and validate a set of thin media images to be used to prime women's negative body image schemas, as well as a word list consisting of fat, thin, and neutral words to be used as stimuli in the eye-tracking experiment, an online survey was conducted (www.qualtrics.com). Sixty-four female undergraduate psychology students from

the University of Calgary participated in the online survey, and each student was presented a randomly selected half of the thin media images and thin, fat, and neutral words.

Thin model images. To develop the set of images of thin models in the media, following Markis and McLennan's (2011) procedure, participants were asked to rate a set of 40 images of thin models as to how closely each model depicted the thin ideal standard portrayed by mass media on a Likert scale from 1 "not at all" to 5 "very much.". The thin model images in the survey included all of the images used by Markis and McLennan (who used 13 images in total), and an additional 27 images to increase the amount of priming exposure to thin images. The first author and a research assistant identified the additional 27 images from the internet as most similar to Markis and McLennan's images. Of the set of 40 images in the survey, the 25 images with the highest average ratings as depicting the thin ideal standard portrayed in mass media were chosen to be used as stimuli in the priming portion of the main experiment. The average Likert scale rating for the models chosen to be included in the main experiment was $M = 4.89$ ($SD = .13$), and for the models not chosen it was $M = 4.13$ ($SD = .19$).

Word lists. To develop thin, fat, and neutral word lists, the survey also asked participants to rate a set of 380 words. The words chosen for this survey included a word list of 18 thin and 18 fat words created by Cassin and von Ranson (2005). In addition, 22 thin-related and 22 fat-related words, which were found by examining synonyms of the original Cassin and von Ranson words, were added to the survey. Thus in total, the survey included 40 thin words and 40 fat words. The number of thin and fat words was increased to develop a longer thin and fat word list than was used by Cassin et al. (2008), with an aim to heighten the likelihood of one of these words eliciting body-dissatisfied women's negative body image schemas. There were also 300 neutral words added to the survey. Participants rated the 380 words on valence, category, and

whether or not they understood the word's meaning. Printed normative frequency and number of letters for each word were also recorded (normative frequency was calculated as the number of times a word appeared in print per one million words, as determined using SUBTLEXus, an index of American English, http://subtlexus.lexique.org/). Following Cassin and von Ranson's procedure, participants were asked to rate the valence of each word on a scale from -3 ("very negative") to +3 ("very positive"). The valence ratings were transferred to a scale of 1-7 for analyses. For category/word meaning ratings, participants were asked to classify each word as either "thin," "fat," "neutral," or "unsure". For a word to be considered for inclusion in the final word lists, more than 70% of participants had to place the word in the same category and less than 10% could be unsure of the word's meaning. Of the words that passed these criteria, the final thin, fat, and neutral word lists were created such that word lists were comparable in number of letters and normative frequency. Similar to the Cassin and von Ranson (2005) findings, word lists significantly differed on valence, with the fat word list being rated as significantly more negatively valenced than both the thin and neutral word lists. There were 25 thin, 25 fat, and 150 neutral words in the final rated word lists. Appendix A shows each word list. Appendix B shows the analyses comparing number of letters, normative frequency, and valence for each of the word lists. Appendices C and D contain the Informed Consent and Debriefing forms, respectively, for the stimuli development questionnaire.

Screener phase. To identify a group of body-dissatisfied and a group of body-satisfied women to be eligible to participate in the main eye-tracking study, a second online survey was conducted using Qualtrics software (www.qualtrics.com). Female undergraduate psychology students from the University of Calgary ($N = 642$) and 22 campus community participants completed the online survey (see recruitment information below). The survey included the Body

Shape Questionnaire (BSQ; Cooper et al., 1987), a measure of body dissatisfaction, as well as demographics questions, including age, education, and ethnicity. Total scores from the BSQ were calculated, with higher scores representing higher levels of body dissatisfaction. Participants were divided into top, middle, and bottom tertiles based on BSQ scores. Women scoring in the top tertile were considered "body dissatisfied" and women in the bottom tertile were considered "body satisfied." There were 221 participants scoring in the bottom tertile (BSQ scores ranging from 35-70), 222 in the middle tertile (BSQ scores ranging from 71-98), and 221 in the top tertile (BSQ scores ranging from 99-190). Only women who scored in the top tertile (body-dissatisfied women) and the bottom tertile (body-satisfied) were considered eligible to participate in the main eye-tracking study. Appendices E and F contain the Informed Consent and Debriefing forms, respectively, for the screener survey.

Main Study Method

Participants. A total of 82 women participated in the study. Sixty-six undergraduate students enrolled in psychology courses at the University of Calgary participated in the study in exchange for course credit, and 16 campus community participants recruited via posters placed on campus participated in the study in exchange for $10 gift cards as a token of appreciation for their time commitment. Only individuals whose first language was English were eligible to participate, given that the eye-tracking paradigm involved reading many low-frequency words (e.g., undernourished, heavyset, heterogeneous).

Materials and measures.

Priming Conditions. Following Markis and McLennan's (2011) procedure, we developed a thin media (images of thin models) priming task, and a control (images of gender-neutral shoes) priming task. The 25 images of thin models validated in the stimuli development phase were used as the stimuli in the thin media priming task. For the images of gender neutral shoes in the control priming task, we included the 13 gender neutral shoes used by Markis and McLennan and an additional 12 gender neutral shoes chosen by the first author and a research assistant based on similarity to the original 13 shoes (making a total of 25 shoes to match the number of model images in the thin media priming task). For each of the two priming tasks, a Microsoft PowerPoint version 2010 slideshow was used to present the 25 colour images for 10 seconds each. There was a three second interval between the presentation of each image, and participants were instructed to make their ratings during this interval using the slide show rating questionnaires (described below). The priming tasks each lasted 325 seconds.

Slide Show Rating Questionnaires. Rating questionnaires for both the thin media priming task and the control priming task were developed for this study to follow the Markis & McLennan (2011) full priming paradigm. For the thin media priming task, participants were asked to rate how closely each model matched the ideal female body as portrayed in mass media, on a scale from 1 "Not at all" to 4 "Very much." For the control priming task, participants were asked to rate how nice-looking each shoe was, using the same scale. Appendix G shows the Slideshow Rating Questionnaires.

Eye-Tracking Paradigm. Eye movements were recorded using an EyeLink 1000 eye-tracking system (SR Research Ltd., Ottawa, Ontario). This system uses infrared video-based tracking technology, allows for a temporal resolution of 2 milliseconds, has a 1000 Hz sampling

rate, and an average gaze error of less than 0.5 degrees of the visual angle. The eye-tracking system was connected to a 21-inch ViewSonic G22f monitor that was positioned approximately 60 centimeters away from each participant. Participants used a chin rest to minimize head movements in order to increase tracking accuracy. Each participant was shown 75 sets of four words, each set shown for 8 seconds. Eye gaze was tracked and recorded throughout this interval. There were 25 thin-neutral word sets (one thin word and three neutral words), 25 fat-neutral word sets (one fat word and three neutral words), and 25 all-neutral words sets that served as fillers to make the fat and thin words less conspicuous. Each word in a set was presented in a different quadrant of the display. The order of word set presentation and which corner of the screen the weight word in each set was presented was randomized. Words in a word set were made to be matched on number of letters, and comparable on normative frequency and valence. The words in the neutral word lists were matched to words in the other two sets on number of letters. To ensure eye gaze was in the middle of the screen before each word set presentation, a dot appeared in the middle of the screen between each word set and the program would not continue to the next word set until the participant fixated on the dot.

Body Shape Questionnaire (BSQ; Cooper et al., 1987). The BSQ is a 34-item questionnaire widely used to measure body dissatisfaction. The questionnaire assesses a respondent's concern about body shape and the experience of "feeling fat" over the past four weeks on a 6-point Likert scale that ranges from "never" to "always". Higher scores reflect greater levels of body dissatisfaction. It has demonstrated good concurrent and discriminant validity, and good reliability (Cooper et al., 1987; Rosen, Jones, Ramirez, & Waxman, 1996).

Body Mass Index (BMI=Kg/M^2). Participants' heights and weights were self-reported, and their BMIs were calculated. The BMI is an estimate of adiposity (Manson, Skerret, &

Willett, 2002) which correlates highly with other measures of body mass like skinfold thickness and measures of body density (Power, Lake, & Cole, 1997). High correlations ($r > .90$) have been found between self-reported and measured weight and height (Kuczmarski, Kuczmarski, & Najjar, 2001; Gorber, Tremblay, Moher, & Gorber, 2007).

Body Dissatisfaction Visual Analogue Scale. Participants were asked to rate their current level of body dissatisfaction on a scale from 0 to 100, by drawing a vertical line anywhere along a 16cm horizontal line which had its two endpoints labelled as "0 – Extremely *satisfied* with your body" and "100 – Extremely *dissatisfied* with your body." Body dissatisfaction visual analogue scores were calculated as percentage of line to the right of 0 in which participants drew the vertical line, as a proportion of the total line length. Appendix H shows the Body Dissatisfaction Visual Analogue Scale.

Study Credibility Check Form. Participants were asked to explain in writing what they thought the study was attempting to learn. Responses were coded by a research assistant as 0 (does not understand the purpose of the study), 1 (partially understands the purpose of the study – i.e. that it is related to body image/dissatisfaction, attention to weight words, or the effects of viewing thin models), or 2 (fully understands the purposes of the study – i.e., that study was trying to track whether exposure to images of thin media had bearing on subject's recognition or familiarity of words associated with body image versus no stimulation from photos of shoes, and that the body image questionnaires are related). Appendix I shows the Study Credibility Check Form.

Procedure. Participants scoring in the top and bottom tertiles of BSQ scores in the screener phase were invited via email for a laboratory visit to participate in the eye-tracking study. Of the participants contacted, 42 women who scored in the top tertile (body-dissatisfied;

BSQ scores ranging from 99-182) and 40 women who scored in the bottom tertile (body-satisfied; BSQ scores ranging from 43-70) participated in the eye-tracking study. The participation rate among those invited was 25.15% (24.71% from the top tertile and 25.64% from the bottom tertile). Among those invited who participated in the main study, 50.6% were Caucasian and 49.4% were other (all other ethnicities combined). Their average age was 22.52 years (*SD* = 5.46). Among those invited who did not participate in the main study, 53.8% were Caucasian and 46.2% were other. Their average age was 20.33 years (*SD* = 3.09).

For the eye-tracking study, participants were given the initial Consent Form (Appendix J) to read over and sign that did not fully explain the purpose of the study. Participants were told initially it was a study on individual differences in attention. This partial disclosure was done to avoid potentially biasing responses by alerting participants to the study's full purpose.

Next, participants were exposed to the control priming task where they viewed each of the shoe images while completing the Slide Show Rating Questionnaire. Participants then completed the first eye-tracking task. They were told they would view some words and the purpose was to determine how their pupil dilation varied as a function of word familiarity (similar to Sears et al., 2011). These instructions were given to lower the chance of response bias with respect to eye movements. In the eye-tracking task, participants were presented a subset of word sets that consisted of close to *half* of the 75 word sets (e.g., half of the 25 fat-neutral, 25 thin-neutral, and 25 all neutral word sets). Specifically, there were 37 word sets in one of the subsets, and 38 word sets in the other. As mentioned previously, each individual word set consisted of four words presented for eight seconds on the screen at once, with one word in each corner of the screen, and the order of word set presentation and which corner of the screen the weight word in each set was presented was randomized. Additionally, the order of presentation

of each half of the 75 word sets during the first eye-tracking task (and which was presented during the second eye-tracking task, as discussed shortly) was counterbalanced between participants. After the first eye-tracking task, participants filled out a Body Dissatisfaction Visual Analogue Scale.

Participants were then exposed to the thin media priming task in which they viewed each of the model images while completing the Slide Show Rating Questionnaire. Participants then completed the second eye-tracking task. The instructions were the same as for the first eye-tracking task. In the second eye-tracking task, participants were presented with the other half of the 75 word sets, which were presented in the same randomized and counterbalanced fashion. After the second eye-tracking task, participants filled out a second Body Dissatisfaction Visual Analogue Scale.

Participants were then asked to fill out the BSQ (Cooper et al., 1987) and the Study Credibility Check Form. After participants were verbally debriefed about the purpose of the study and given a debriefing form, they were asked to complete informed consent to use their data after being told the full purposes of the study. Finally, participants were given a list of community mental health resources as per ethics protocol. Appendices K and L contain the Informed Consent Form and Debriefing Form for the main study, respectively.

Results

Group Characteristics

Appendix M shows demographic information for each group. Body-satisfied and body-dissatisfied groups did not significantly differ in age, $t(78) = .15$, $p = .878$, or coded responses on the Study Credibility Check Form, $X^2(2, N = 81) = 1.50$, $p = .474$. The two groups also did not significantly differ in number of participants who were Caucasian vs. other (all other ethnicities combined), $X^2(1, N = 81) = 1.05$, $p = .306$, or number of participants who were currently enrolled

in an undergraduate degree vs. those who had graduated with a degree (undergraduate, master's and Doctor of Philosophy combined), $X^2(1, N = 81) = .037$, $p = .847$. The two groups significantly differed in their BMI scores, $t(78) = 4.61$, $p < .001$, and total BSQ scores, $t(50) = 18.32$, $p < .001$.

Eye-Tracking Data

Attentional maintenance bias hypotheses (1a-c). Following Gao et al. (2011), attentional maintenance bias scores were obtained by calculating average time spent gazing at fat or thin words (gaze time was summed across each trial) as a percentage of the total time spent gazing at all four words in each word set. To examine whether attentional maintenance biases varied as a function of word type, body dissatisfaction group, and prime condition, a 2 (word type: fat, thin) x 2 (body dissatisfaction group: body-satisfied, body-dissatisfied) x 2 (prime condition: pre-prime, post-prime) mixed factor analysis of variance (ANOVA) was conducted (see Table 1 for overall means and standard deviations). Levene's test of homogeneity of variances was not significant for all conditions (all p values > .05). The analysis revealed a significant main effect of body dissatisfaction group, with body-dissatisfied women (M = 26.95%) paying more attention to weight words (both fat and thin) than body-satisfied women (M = 24.34%), $F(1, 76) = 10.98$, $\eta^2_p = .13$, $p = .001$. The interaction between word type and body dissatisfaction group was not significant however, $F(1,76) = .97$, $\eta^2_p = .01$, $p = .327$. That is, body-dissatisfied women did not pay more attention to fat words and less attention to thin words than body-satisfied women, as hypothesized. Figure 1 displays the body dissatisfaction group x word type interaction and shows that body-dissatisfied women paid more attention to *both* fat and thin words than body-satisfied women.

The interaction between word type and prime condition was not significant, $F(1, 76) = 1.55$, $\eta^2_p = .02$, $p = .217$, meaning that women did not pay more attention to fat words and less attention to thin words after the prime than before the prime. Finally, the interaction among word type, prime condition, and body dissatisfaction group, $F(1, 76) = .49$, $\eta^2_p = .01$, $p = .488$, was not significant. That is, attentional maintenance biases were not influenced by both women's body dissatisfaction group *and* by priming condition (e.g., body-dissatisfied women after the prime did not display the largest attentional bias to fat words and away from thin words).

Table 1

Mean (standard deviation) attentional maintenance bias scores (percentage of time gazing at fat and thin words relative to total time gazing at all words)

	Body-Satisfied	**Body-Dissatisfied**	**Total[1]**
N	38	40	78
Pre-Prime[2]			
Fat Words	23.40 (4.77)	26.39 (5.02)	24.93 (5.10)
Thin Words	24.29 (3.86)	26.92 (4.69)	25.64 (4.47)
Post-Prime[3]			
Fat Words	24.58 (4.75)	27.66 (5.80)	26.16 (5.51)
Thin Words	25.08 (4.24)	26.82 (4.80)	25.97 (4.59)

[1]Total = the average of the Body-Satisfied and Body-Dissatisfied groups
[2]Pre-prime = before exposure to the thin model images
[3]Post-prime = after exposure to the thin model images

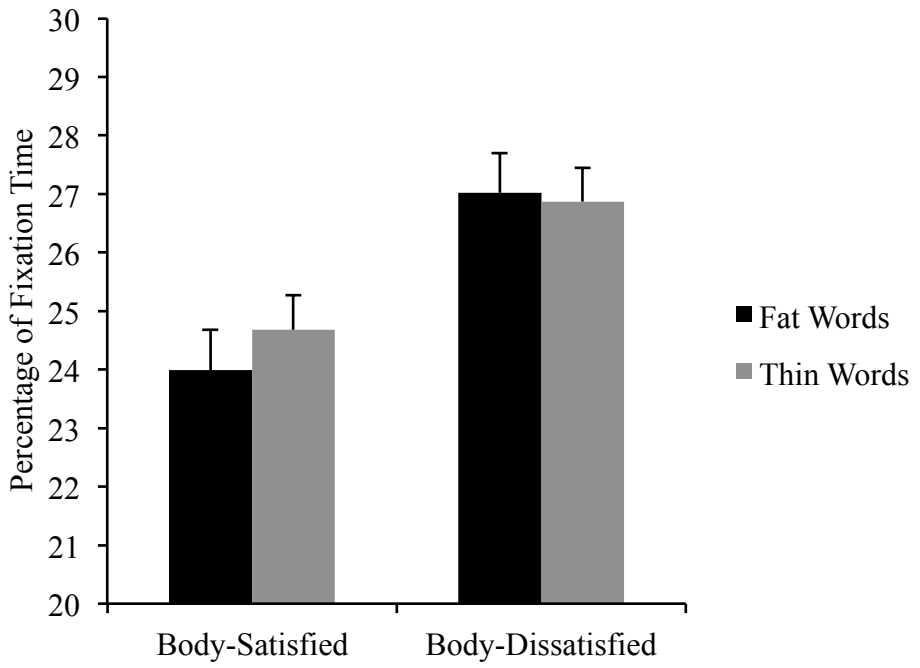

Figure 1. Percentage of fixation time on fat versus thin words as a proportion of time spent looking at all words in a word set in body-satisfied and body-dissatisfied women (averaged across priming conditions)

Attentional direction bias hypotheses (2a-c). Following Gao et al. (2011), attentional direction bias scores were obtained by calculating the percentage of trials in which the first eye gaze on a word was to a fat or thin word, relative to total trials with eye-movements. To examine whether attentional direction biases varied as a function of word type, body dissatisfaction group, and prime condition, a 2 (word type: fat, thin) x 2 (body dissatisfaction group: body-satisfied, body-dissatisfied) x 2 (prime condition: pre-prime, post-prime) mixed factor analysis of variance (ANOVA) was conducted (see Table 2 for overall means and standard deviations). Levene's test of homogeneity of variances was not significant for all conditions (all p values > .05). The analysis revealed a significant main effect of word type, with more initial fixations to fat words (M = 11.59%) than thin words (M = 6.69%), $F(1, 76) = 495.41$, $\eta^2_p = .87$, $p < .001$. The interaction between word type and prime condition was not significant, $F(1, 76) = .09$, $\eta^2_p = .00$,

$p = .771$. That is, women did not display more initial eye gazes on fat words and less on thin words after the prime than before the prime. The interaction between word type and body dissatisfaction group was not significant, $F(1,76) = .09$, $\eta^2_p = .00$, $p = .771$, meaning that body-dissatisfied women did not display significantly more initial eye gazes on fat words and less on thin words than body-satisfied women. Finally, the interaction among word type, prime condition, and body dissatisfaction group, $F(1, 76) = 1.42$, $\eta^2_p = .02$, $p = .237$, was not significant. That is, attentional direction biases were not influenced by both women's body dissatisfaction group *and* by priming condition (e.g., body-dissatisfied women after the prime did not display the largest attentional bias to fat words and away from thin words).

Table 2

Mean (standard deviation) attentional direction bias scores (percentage of trials in which the first eye gaze at a word was on a fat or thin word, relative to total trials with eye-movements)

	Body-Satisfied	**Body-Dissatisfied**	**Total**[1]
N	38	40	78
Pre-Prime[2]			
Fat Words	11.48 (2.76)	11.52 (1.74)	11.50 (2.28)
Thin Words	6.18 (1.60)	6.84 (1.76)	6.52 (1.70)
Post-Prime[3]			
Fat Words	11.50 (1.95)	11.85 (2.02)	11.68 (1.98)
Thin Words	7.13 (1.70)	6.60 (1.51)	6.85 (1.62)

[1]Total = the average of the Body-Satisfied and Body-Dissatisfied groups
[2]Pre-prime = before exposure to the thin model images
[3]Post-prime = after exposure to the thin model images

Exploratory research question 1. Zero-order Pearson's correlations were conducted to explore potential relationships between BMI and attentional maintenance bias scores to fat and thin words both before and after being exposed to priming images of thin models (body-dissatisfied and body-satisfied groups were combined in analyses). The only significant correlation observed was a positive relationship between BMI and attentional maintenance bias scores for fat words *before* priming exposure (r = .25, p = .030). This correlation coefficient is considered a small effect (Cohen, 1988).

There were no significant correlations between BMI and attentional maintenance bias scores for fat words *after* priming exposure (r = .02, p = .872), or for thin words both before (r = .08, p = .474) or after (r = .03, p = .787) priming exposure.

Exploratory research question 2. To examine attentional maintenance bias scores over time, we divided the gaze duration data from each 8-second word set presentation into 2-second intervals and conducted time course analyses on these intervals. Any 2-second intervals in which a word was not fixated on were not included in analyses.

Attention prior to exposure to thin model images. First, to examine attentional patterns over time *before* women were exposed to the images of thin models, pre-prime data were analyzed using a 2 (word type: fat, thin) x 2 (body dissatisfaction group: body-satisfied, body-dissatisfied) x 4 (time interval: 0-2 seconds, 2-4 seconds, 4-6 seconds, 6-8 seconds) mixed model ANOVA. Levene's test of homogeneity of variances was not significant for all conditions (all p values > .05). Mauchly's test of sphericity was not significant for all conditions (all p values > .05). There was a significant main effect of time interval, $F(3, 77) = 4.08$, $\eta^2_p = .05$, p = .008, indicating the percentage of time spent fixating on weight words varied across the 0-2, 2-4, 4-6, and 6-8 second intervals (M = 26.20%, 24.91%, 23.70%, and 24.29%, respectively). As with the

overall attentional maintenance bias analysis in the main hypotheses, there was a main effect of body dissatisfaction group, $F(1, 77) = 11.88$, $\eta^2_p = .13$, $p = .001$. Again, the body-dissatisfied women ($M = 26.15\%$) paid more attention to weight words (both fat and thin) than did body-satisfied women ($M = 23.40\%$).

The only significant interaction was between word type and time interval, $F(3, 77) = 6.40$, $\eta^2_p = .08$, $p < .001$. This interaction is shown in Figure 1, which displays the data averaged over body-satisfied and body-dissatisfied women. Follow-up paired-samples t-tests revealed that during the 0-2 second time interval, women gazed significantly more time at fat words than thin words ($M = 27.93\%$ vs. 24.46%), $t(79) = 3.83$, $p < .001$. During the 4-6 and 6-8 second time intervals, women gazed significantly longer at thin words than fat words ($M = 25.14\%$ vs. 22.36%, and 25.88% vs. 22.87%, respectively), $t(78) = 2.28$, $p = .025$, and $t(78) = 2.40$, $p = .019$, respectively. In the 2-4 second time interval, there was no difference between gaze times for thin (25.33%) and fat (24.54%) words, $t(79) = .70$, $p = .486$.

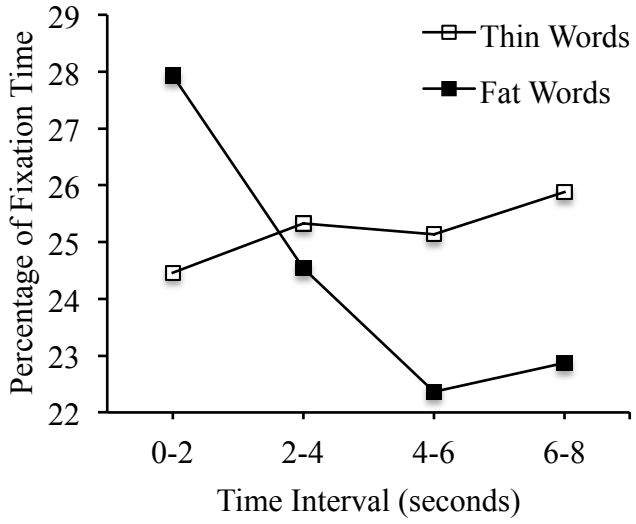

Figure 2. Percentage of fixation time on fat versus thin words as a proportion of time spent looking at all words in a word set (averaged across body-dissatisfied and body-satisfied women) during each 2-second interval of the 8-second word set presentations *before* women were exposed to the thin model prime.

Attention after exposure to thin model images. To examine attentional patterns over time *after* women were exposed to the images of thin models, the post-prime data were analyzed using a 2 (word type: fat, thin) x 2 (body dissatisfaction group: body-satisfied, body-dissatisfied) x 4 (time interval: 0-2 seconds, 2-4 seconds, 4-6 seconds, 6-8 seconds) mixed model ANOVA. Levene's test of homogeneity of variances was not significant for all conditions (all p values > .05). Mauchly's test of sphericity was significant for the main effect of time (Mauchly's $W = .85$, $p = .036$), thus the Greenhouse Geisser correction was used for this effect, which was not significant, $F(3, 205) = 1.22$, $p = .304$. Mauchly's test of sphericity was not significant for all other conditions (all p values > .05). As with the overall attentional maintenance bias analysis in the main hypotheses, there was a main effect of body dissatisfaction group, $F(1, 76) = 8.09$, $\eta^2_p = .10$, $p = .006$, in which the body-dissatisfied women ($M = 27.30$) paid more attention than body-satisfied women ($M = 24.76$) to weight words (both fat and thin).

As with the pre-prime time course analyses, in the post-prime data the only significant interaction was between word type and time interval, $F(3, 76) = 4.97$, $\eta^2_p = .06$, $p = .002$. This interaction is shown in Figure 2, which displays the data averaged over body-satisfied and body-dissatisfied women. Follow up paired-samples t-tests revealed that for the 0-2 second time interval, women gazed significantly less time at thin words than fat words ($M = 24.52\%$ vs. 28.54%), $t(78) = 4.42$, $p < .001$. There were no differences between gaze times for thin and fat words in the 2-4 second time interval ($M = 27.25\%$ vs. 25.71%), $t(78) = 1.36$, $p = .179$, the 4-6 second time interval ($M = 26.04\%$ vs. 24.13), $t(77) = 1.43$, $p = .156$, or the 6-8 second time interval ($M = 25.97\%$ vs. 26.36%), $t(77) = .27$, $p = .790$.

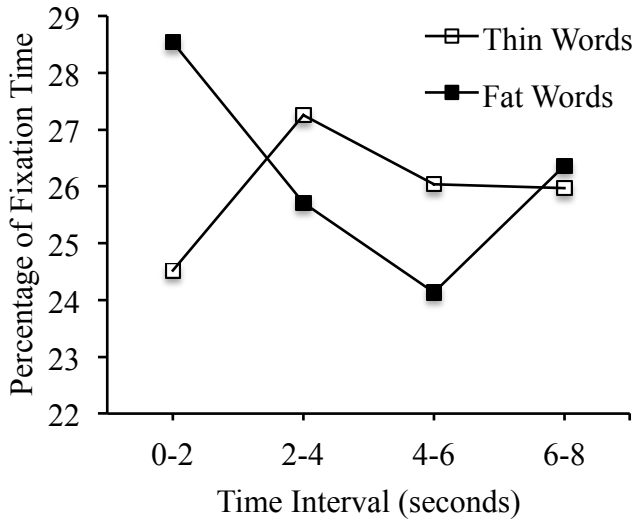

Figure 3. Percentage of fixation time on fat versus thin words as a proportion of time spent looking at all words in a word set (averaged across body-dissatisfied and body-satisfied women) during each 2-second interval of the 8-second word set presentations *after* women were exposed to the thin model prime.

Post-hoc analysis of second run direction scores. We conducted a post-hoc analysis to determine if there were any differences in second run information (i.e., the second time a participant comes back to view a word after leaving the area of the word a first time). To explore whether the number of times a word was the first word to have a second run (i.e., have a participant go back to view it, as though it is drawing back their attention after viewing other words), a second run direction score was calculated as the average number of times fat or thin words were the first word to have a second run. To explore whether second run direction scores varied as a function of word type, body dissatisfaction group, and prime condition, a 2 (word type: fat, thin) x 2 (body dissatisfaction group: body-satisfied, body dissatisfied) x 2 (prime condition: pre-prime, post-prime) mixed factor ANOVA was conducted. Levene's test of homogeneity of variances was not significant for all conditions (all p values > .05). The analysis showed a significant main effect of word type, with fat words (M = 2.91) more frequently being the first word to have a second run than thin words (M = 2.50), $F(1, 77) = 6.02$, $\eta^2_p = .07$, p =

.016. There was also a main effect of body dissatisfaction group, with body-dissatisfied women ($M = 2.95$) more frequently having the first word in a second run be a weight word in general (both fat and thin) than body-satisfied women ($M = 2.47$), $F(1, 77) = 4.21$, $\eta^2_p = .05$, $p = .044$.

Discussion

The purpose of this study was to gain further insight into the implicit cognitive underpinnings of body dissatisfaction, focusing on attentional biases in women and the potential role of the media on such biases. As body dissatisfaction is widespread and a risk factor for the development of eating disturbances, research into the role of thin images in the media on body dissatisfaction and the link between body dissatisfaction and biases in attention is important. Specifically, this study tested whether body-dissatisfied women would exhibit attentional biases predicted by the cognitive model of eating disorders (Vitousek & Hollon, 1990) compared to body-satisfied women, and whether priming of their body image concerns would increase attentional biases in all participants, particularly in body-dissatisfied participants. The current findings suggest that body-dissatisfied and body-satisfied women do *not* preferentially attend to schema-congruent information (i.e., fat words for body-dissatisfied women) or avoid schema-incongruent information (i.e., thin words for body-dissatisfied women). Instead, body-dissatisfied women display an attentional bias to weight words in general compared to body-satisfied women. Additionally, the findings suggest that brief exposures to images of thin models do not affect women's implicit attentional biases related to body dissatisfaction.

The hypothesis that there would be an attentional maintenance bias such that compared to body-satisfied women, body-dissatisfied women would display greater attentional biases to fat words and away from thin words was not supported. These findings did not corroborate the Gao et al. (2011) eye tracking study findings that weight-dissatisfied women had a shorter overall gaze duration for thin words than weight-satisfied women. There are several differences between

the Gao et al. study and the current study that may help explain the difference in results. First, in identifying weight-dissatisfied vs. satisfied women, Gao et al. used the Negative Physical Self-Fatness Scale (NPS-F; Chen, Jackson, & Huang, 2006). This measure only contains 11 items which ask about general thoughts, feelings, and behaviours related to fatness and overweight concerns. By contrast, we used the Body Shape Questionnaire (BSQ; Cooper et al., 1987), which contains 34 items regarding frequency of concerns about shape and weight over the past 28 days. In addition to these differences in body image concern measures, Gao et al. randomly selected their weight-dissatisfied and weight-satisfied groups from a subset of the individuals scoring above and below specific cut-scores on the NPS-F, leaving only 46 high-scorers and 88 low-scorers out of 500 individuals who completed the NPS-F pre-screen eligible for random selection to participate. This method of participant selection may have resulted in somewhat more polarized groups of weight-dissatisfied and weight-satisfied groups than the current study's method, which involved a tertile split based on BSQ scores. Thus the more stringent cut scores used in Gao et al. study may have resulted in more extreme groups with slightly stronger attentional biases, making an attentional maintenance bias interaction between word type (fat and thin) and weight-dissatisfaction more likely to be found. However, the sample size in the current study was significantly larger ($N = 40$ in Gao et al. versus $N = 82$ in the current study), thus the current study should be more likely to detect an effect of a body dissatisfaction x word type interaction in attentional biases if one exists. It is also important to note that Gao et al. only presented word sets for one second. Given that termination of the initial fixation of gazes in that study occurred approximately 740 milliseconds after word set presentation, there could be additional attentional shifts in the current study (in which word sets were presented for 8 seconds) that may have resulted in an overall attentional maintenance bias to both fat and thin

words after a longer period of time. Interestingly, post hoc analyses for the current study (see analysis specifics below) showed that body-dissatisfied women were more likely to go back and view *both* fat and thin words a second time first (i.e., before viewing other words a second time) than body-satisfied women. It is possible that body-dissatisfied women initially display an attentional avoidance of thin words as suggested by Gao et al., but that this effect is mitigated over time and during the second looks at the words.

These attentional maintenance bias results do corroborate the findings of Cassin, von Ranson, and Whiteford (2008), who found that high thin-ideal internalizers did not preferentially attend to fat words and avoid thin words in a lexical decision task. Cassin et al. proposed that such results lend support to the body of evidence that cognitive biases are more characteristic of women with clinical eating disorders than women in the general population with body image difficulties (Dobson & Dozois, 2004; Lee & Shafran, 2004). However, while the results of the current study do not appear to fully support the cognitive model of eating disorders (Vitousek & Hollon, 1990), which states that individuals who have developed negative weight-related self-schemas preferentially attend schema-congruent (fat) information and resist schema-incongruent (thin) information, the current findings suggest that body-dissatisfied women display attentional biases to weight words in general. It is worth noting that an a priori power analysis indicated there was sufficient power to detect an interaction between word type and body dissatisfaction group if one was present.

Thus, an important revision to the cognitive model of eating disorders suggested by this study is that rather than a "negative weight/body schema" causing fat words to be more salient to body-dissatisfied women than thin words, perhaps thin words are also incorporated into this negative weight/body schema. Thoughts of thinness could also cause negative thoughts towards

one's body. Supporting this idea, this attentional bias to *both* fat and thin words was previously found in patients with anorexia nervosa using a modified Stroop task (Sackville et al., 1998), and an attentional bias to body words in general was found to be positively correlated with body dissatisfaction scores in women primed with thin ideal models (Markis & McLennan, 2011). Future research that attempts to replicate these findings would be useful, as they have important implications for treatment of body dissatisfaction and thus eating disorder prevention. For example, attentional bias modification programs that might follow the cognitive model of eating disorders to attempt to reduce biases to fat stimuli only, or worse, attempt to increase attentional biases to thin stimuli in an attempt to 'neutralize' this bias, could potentially worsen an existing bias. Development of such programs should consider the potential influence of thin related information on a negative weight/body schema. Replication is important to solidify the understanding of the cognitive theories underlying body image difficulties, which have had conflicting results in the past, before applying these theories in a vulnerable population. Given that the present study is the first to assess attention over a sustained period of time for both fat and thin words, and the first to find attentional maintenance biases to *both* fat and thin words in body dissatisfied women with a direct measure of attention (versus indirect measures based on reaction time data), the present findings do not definitively settle the conflicting results related to attentional biases in non-clinical, body-dissatisfied women. They do, however, suggest the importance of continued eye-tracking research that focuses on the specifics of information incorporated within attentional biases in body-dissatisfied women to gain further understanding into negative weight/body schemas. Future research should carefully explore both fat and thin stimuli, as well as different facets of attention.

The hypothesis that there would be an attentional direction bias such that compared to body-satisfied women, body-dissatisfied women would have more frequent initial fixations on fat words and less t thin words was not supported. These findings did not corroborate the Gao et al. (2011) eye-tracking study findings that weight-dissatisfied women had more frequent initial fixations on fat words compared to weight-satisfied women. While results of the current study showed that *all* women had more frequent initial fixations on fat words than thin words, this finding was likely a result of the experimental design. Due to the presentation of four words in a word set, almost all participants had a tendency to read the words in an order such that the word in the top left quadrant was the first to be viewed. In the first set of eye-tracking word sets, there were four fat words and three thin words that appeared in an upper left quadrant. In the second set of eye-tracking word sets, there were five fat words and two thin words that appeared in an upper left quadrant. Thus, the current study was limited in that the main effect of more frequent initial fixations on fat versus thin words across all participants was likely a result of there having been more fat words in the upper left quadrant, and cannot inform theory as a result.

The hypotheses that brief exposure to thin images of models can increase both attentional maintenance and attentional direction biases to fat and away from thin words were not supported. It is also worth noting that an a priori power analysis indicated there was sufficient power to detect an effect of the priming condition if one was present. Markis and McLennan's (2011) study remains the only one to have found an influence of brief exposure to thin models on attentional biases in body-dissatisfied women. Not only did these authors use a much shorter word list of 12 body words (the current study had 50 target words in total), their analyses were also correlational, preventing causal conclusions from being drawn. They found that in the thin-ideal prime group there was a moderate positive correlation between body dissatisfaction scores

and reaction times for body words. This correlation was not significant in the group primed with images of shoes. This type of analysis cannot definitively discern that the prime caused an increase in body dissatisfaction, which caused an attentional bias for weight words. That is, Markis and McLennan only showed that in the group of women who were primed with control images (shoes) there was not a significant correlation between body dissatisfaction scores and attentional biases for weight words, whereas in the group of women who were primed with thin images of models, there was a significant positive correlation between body dissatisfaction scores and attentional biases. However, those findings do not confirm that there was a difference between the control prime and model prime groups. We conducted a follow-up Fisher's Z analysis to see if there was a significant difference between these two correlations from independent groups. This statistic was not significant, $Z = .61$, $p = .271$, indicating that the two priming groups did not differ in the strength of correlation between body dissatisfaction scores and attentional biases for weight words. Thus, to date, the theory that brief exposure to thin images of models can influence attentional biases specifically for weight-related words through schema activation remains unsupported.

Priming with thin models has been shown across many studies to influence *explicit*, self-reported body dissatisfaction, as shown in two meta-analyses (Want, 2009; Groesz, Levine, & Murnen, 2002). To confirm that there was an effect of the priming condition on self-reported body dissatisfaction in the current study, a follow up paired samples *t*-test was conducted on the Body Dissatisfaction Visual Analogue Scale scores as filled out before and after exposure to the thin model prime. Visual analogue scale scores significantly differed before (M = 41.57, SD = 24.15) and after the priming condition ($M = 44.68$, $SD = 25.38$), $t = 3.47$, $p = .001$. However, self-report results may be partially influenced by self-reporting biases. For example, demand

characteristics might influence certain participants to form an interpretation of the purposes of the study and change their responses to fit that interpretation. Thus while brief exposure to priming images may affect explicit thoughts of body dissatisfaction or negative body image, this short-term exposure may not be enough to influence implicit cognitive biases that are present in women with body image difficulties (as evidenced by the difference between body-dissatisfied and body-satisfied women in attentional maintenance biases for weight words) that would affect attentional biases. In fact, priming with thin images of models does not appear to have an effect on attentional biases even in women pre-selected for high levels of body dissatisfaction; neither of the current study's three-way interaction hypotheses that proposed priming would have a stronger effect on attentional biases (both maintenance and direction biases) in body-dissatisfied women was supported. Women scoring high on body dissatisfaction should be the most likely to show an effect of the prime given that exposure to attractive models may be a schema-congruent trigger for women with already existing body image difficulties (Cassin et al., 2008; Johansson, Lundh, & Andersson, 2005; Markis & McLennan, 2011), thus these findings suggest further that brief exposure to thin images of models does not affect implicit attentional biases related to body dissatisfaction.

In the correlational analyses, BMI showed a small, positive relationship to attentional maintenance biases for fat words before women were exposed to the priming condition, and, interestingly, not afterwards. It is possible that the prime was cueing a subset of participants towards the purposes of the study, such that after exposure to the prime, individuals across the BMI spectrum were paying more attention to fat words (while not significant, the maintenance bias scores for fat words across all participants before and after priming exposure were; M = 24.93% and M = 26.16%, respectively). This cueing to the study's purpose could have attenuated

the relationship between BMI and attention for fat words that existed before being exposed to an array of thin models. It is also important to note that the average BMI was significantly different between the body-dissatisfied and body-satisfied groups. Given that there is a relationship between BMI and maintenance biases for fat words, this relationship could be partially influencing the significant difference between body-dissatisfied and body-satisfied women for weight words.

When percentages of eye gaze fixation time to fat and thin words were explored in time course analyses, it was found that before being exposed to the thin model primes, from 0-2 seconds women (averaged across body-dissatisfied and body-satisfied) looked longer to fat words than thin words, and from 4-6 seconds and 6-8 seconds, women looked longer at thin words. After being exposed to the thin model prime, the only significant finding was that from 0-2 seconds women looked longer at fat words than thin words (similarly as before the prime). Whereas it initially appeared as though these findings suggested distinct changes in attentional patterns over time to fat and thin words, a closer look at the structure of the experimental presentation along with experimenter observation suggested that these results are partially due to specifics of the word set presentation. It was observed by both individuals who tested participants (the first author and a research assistant) that almost all participants looked at the words in each word set in the following order: top left corner, top right corner, bottom right corner, bottom left corner (i.e., a 'backward C' shape). Some participants then looked back at words already viewed. It is hypothesized that this tendency for participants to read words in this order combined with the fact that words were not completely balanced across quadrants (as Table 3 shows) likely resulted in the findings being influenced by the number of target words presented in each quadrant.

Table 3

Average number of fat and thin words presented in each quadrant throughout word set presentations

	Top Left Quadrant	**Top Right Quadrant**	**Bottom Right Quadrant**	**Bottom Left Quadrant**
Thin Words	2.5	4	4	2
Fat Words	4.5	2	2	4

*Numbers in table are the average of the number of word sets presented in the eye-tracking paradigms both before and after the prime exposure.

As most participants were following words in the order presented above, results suggesting that women pay more attention to fat words in the 0-2 and 6-8 time intervals and thin words in the 2-4 and 4-6 time intervals are potentially confounded by experimental design. Thus specific conclusions regarding attentional patterns cannot be made. One time course analysis result did *not* follow this pattern: before being exposed to thin prime images, in the 6-8 second time interval women paid significantly more attention to thin words than fat words. This finding exists despite the fact that there were more fat words than thin words presented in the bottom left quadrant across word sets (which for most participants was the last quadrant to be viewed).

The post-hoc analysis on second run information (i.e., the second time a participant comes back to view a word after leaving the area of the word a first time, as an indication of that word drawing back the participant's attention) was conducted to see if second runs could help explain the finding above. While the main effect of body dissatisfaction group in the second run direction scores are consistent with the present study's attentional maintenance bias findings such that body-dissatisfied women display attentional biases to weight words in general compared to body-satisfied women (confirming both a bias in sustained attention over time and a

bias in the first direction to look back at a second time), the main effect of word type is less clear. The time course analysis result such that prior to priming exposure in the 6-8 second time interval women paid more attention to thin words than fat words suggests that the potential second run direction score bias should be to thin words, however it was to fat words. This second run direction finding suggests that women in general are more likely to redirect their attention back to fat words after already viewing the words. It also suggests that the time course analysis finding may, in fact, reflect a potential bias to thin words near the end of the trial. It may indicate that while women are more likely to first redirect their attention to fat words, they are more likely to direct attention to thin words near the end of their attentional engagement. However, it is important to note that this main effect of word type is averaged across body dissatisfaction groups and thus does not change the current study's findings of a weight word bias in body dissatisfied women. These different findings in the various types of attentional bias highlight the importance of eye-tracking research as opposed to other types of attentional bias research paradigms that only measure initial orienting of attention based on reaction time.

In a four-quadrant design using words, even with an even number of target words presented in each of the four quadrants across word sets, if participants' natural tendency is to view words in a specific order, then the words should be presented for enough time such that there will be second look data to interpret. While time course analysis has been successfully conducted previously with a four-quadrant design using pictures as stimuli (Thomas et al., 2013), perhaps the use of words influenced participants to view stimuli in a particular order as words involve reading, making time course analysis more complicated with a four-quadrant design with word stimuli. Alternatively, participants could be instructed not to view the words in the same order each time they are presented, although such cognitive effort in word-order viewing could

confound other important information such as first and second run data. Otherwise, full gaze duration time, number of fixations per target word (as seen in Ellis, Beevers, & Well, 2010), and second gaze information may be more suitable for this type of design. As seen in the current study, the 8 second word set presentation time allowed for adequate time to gain second run information for analyses. These findings have implications for time course analysis when using a four-quadrant word set presentation in eye-tracking research in that careful consideration needs to be taken with respect to stimuli type, balancing of stimuli across quadrants, and length of word set presentation time.

In summary, the results of the present study do not fully support the cognitive model of eating disorders (Vitousek & Hollon, 1990), and instead suggest an attentional bias for weight words in general in body-dissatisfied women, similar to findings by Sackville et al. (1998) and Markis and McLennan (2011). These findings suggest that further research should explore more carefully what specific information is held within a negative weight/body schema, as it is possible that body-dissatisfied women also incorporate thin-related information into this schema. Future research should incorporate an adequate number of both fat and thin stimuli to confirm whether both fat and thin, or solely fat words are incorporated into a negative weight/body schema. Future research could also look at biases in attention to each fat and thin word individually as opposed to an average across fat and thin words to help gain more specific information in understanding negative weight schemas. The finding of no differences in attentional biases before and after exposure to thin model images did not support the idea that priming women with thin idealized images from the media can affect implicit biases due to a heightened negative weight/body schema. Certain limitations of the current study (i.e., unequal presentation of fat vs. thin words in each of the four quadrants and not a long enough word set

presentation time to gain large amounts of information after a participant has looked at each word once), highlighted avenues for improvements in future eye-tracking research and time course analysis. Using eye-tracking paradigms that are methodologically rigorous and explore a large array of attentional properties (e.g., first gaze direction, gaze duration, number of fixations, second look direction, time course of attention, etc.), future research can determine which information is schema-congruent and incongruent for body-dissatisfied individuals and use this information to inform prevention efforts and treatments that rely on attentional bias theories.

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Appendix A: Word Lists Used in Eye-Tracking Paradigm

Table A1. Thin words used in eye-tracking paradigm

Word	Number of Letters	Frequency Per Million[1]	Rated Valence[2]	Percent Categorized as Thin Word	Percent Unsure of Word's Meaning
Bony	4	1.2	2.7	94	00
Lean	4	10.4	5.5	83	00
Slim	4	11.9	5.2	100	00
Thin	4	20.2	4.7	93	03
Tiny	4	32.2	4.4	87	00
Lanky	5	0.4	2.9	83	00
Frail	5	1.6	2.5	84	03
Stick	5	97.1	3.5	76	00
Small	5	125.0	4.3	72	00
Petite	6	1.1	5.0	87	00
Dainty	6	1.2	4.5	74	00
Narrow	6	7.0	4.1	81	00
Skinny	6	14.0	4.4	93	00
Slender	7	0.7	5.5	96	00
Scrawny	7	1.6	2.3	96	00
Starved	7	4.6	1.5	100	00
Fragile	7	5.1	3.2	73	00
Underfed	8	0.1	1.7	94	06
Skeletal	8	0.5	2.6	97	00
Delicate	8	9.5	4.9	77	00
Undersized	10	0.1	3.1	96	00
Underweight	11	0.2	2.3	96	00
Lightweight	11	1.2	4.1	86	00
Featherweight	13	0.1	4.0	88	04
Undernourished	14	0.1	1.5	88	00

[1]*Frequency Per Million = Frequency of the word in the English language per million words determines with the SUBTLEXus database.*
[2]*Rated Valence = Average of participant rated valences on a scale from 1-7, which were transformed from participant ratings in stimuli development survey on a scale from -3 ("very negative") to +3 ("very positive).*
**Percent Categorized as Thin Word, and Percent Unsure of Meaning were taken from participant ratings in stimuli development survey.*

Table A2. Fat words used in eye-tracking paradigm

Word	Number of Letters	Frequency Per Million[1]	Rated Valence[2]	Percent Categorized as Fat Word	Percent Unsure of Word's Meaning
Fat	3	79.4	1.9	100	00
Lard	4	1.7	2.6	88	00
Wide	4	23.8	3.4	90	00
Huge	4	48.4	3.1	87	00
Beefy	5	0.3	2.7	81	00
Obese	5	0.5	1.5	100	00
Porky	5	0.6	2.4	85	00
Pudgy	5	0.6	2.2	97	03
Tubby	5	0.6	2.4	92	04
Plump	5	1.5	3.2	96	00
Jumbo	5	2.8	3.4	87	00
Large	5	41.5	3.3	90	00
Heavy	5	47.3	2.8	97	00
Flabby	6	0.8	1.8	96	04
Chunky	6	1.4	2.5	86	00
Chubby	6	4.2	2.7	97	00
Overfed	7	0.2	2.5	97	00
Weighty	7	0.2	3.1	87	00
Massive	7	10.0	2.9	79	00
Blubbery	8	0.1	2.7	82	06
Heavyset	8	0.2	2.3	91	03
Gigantic	8	3.7	3.6	79	00
Enormous	8	10.3	3.1	100	00
Overweight	10	1.8	1.9	97	00
Potbellied	10	0.2	2.3	97	03

[1]*Frequency Per Million = Frequency of the word in the English language per million words determines with the SUBTLEXus database.*
[2]*Rated Valence = Average of participant rated valences on a scale from 1-7, which were transformed from participant ratings in stimuli development survey on a scale from -3 ("very negative") to +3 ("very positive).*
**Percent Categorized as Fat Word, and Percent Unsure of Meaning were taken from participant ratings in stimuli development survey.*

Table A3. Neutral words used in eye-tracking paradigm

Word	Number of Letters	Frequency Per Million[1]	Rated Valence[2]	Percent Categorized as Neutral Word	Percent Unsure of Word's Meaning
Dry	3	42.8	3.4	79	03
Low	3	59.1	3.0	77	00
Fly	3	85	5.2	78	00
Idle	4	2.8	3.5	83	00
Wavy	4	0.5	4.5	83	00
Damp	4	2.9	3.2	83	00
Tame	4	2.7	4.5	79	00
Mild	4	4.8	4.3	83	00
Mode	4	5.2	4.3	96	04
Dull	4	12.1	2.5	85	00
Tidy	4	3.7	6.0	82	00
Quiz	4	4.9	3.4	82	07
Tied	4	26.7	3.6	90	00
Wild	4	57.3	4.1	93	00
Deep	4	76.4	4.5	78	00
Fake	4	36.3	2.0	78	00
Near	4	83.1	4.4	90	00
Dark	4	88.6	3.3	84	00
Glum	4	1.02	1.9	83	00
Icky	4	1.2	1.7	78	00
Foil	4	1.22	3.8	78	06
Rare	4	21.31	5.1	78	00
Wire	4	27.51	3.8	78	00
Pure	4	24.92	6.3	83	00
Main	4	42.73	4.7	83	00
File	4	44.04	3.9	83	00
Sold	4	52.06	4.2	89	00
Moldy	5	0.6	1.7	91	00
Humid	5	0.9	3.4	75	00
Foggy	5	1.3	3.6	83	00
Dopey	5	1.4	2.9	86	03
Bossy	5	1.7	2.5	74	00
Moist	5	1.8	3.8	74	04
Tough	5	90.51	4.3	78	00
Worse	5	98.08	1.7	83	00

Given	5	95.12	4.9	89	00
Quiet	5	117.2	4.6	85	00
Dream	5	133.3	5.4	86	00
Clear	5	171.8	5.3	86	00
Scaly	5	0.31	2.6	89	00
Noisy	5	5.0	2.7	77	00
Artsy	5	0.33	5.7	89	00
Pouty	5	0.57	2.4	89	00
Fuzzy	5	5.8	4.5	88	00
Shade	5	6.0	4.3	87	00
Cloth	5	6.1	4.2	93	00
Fatal	5	7.1	1.5	86	00
Showy	5	0.29	2.5	83	00
Risky	5	7.7	3.2	84	03
Peppy	5	0.65	4.6	83	00
Dizzy	5	8.4	2.7	69	00
Murky	5	0.61	2.5	89	00
Fated	5	0.63	4.1	83	00
Loopy	5	0.65	3.1	83	00
Plaid	5	1.61	4.3	83	00
Timed	5	1.61	3.2	89	00
Perky	5	1.67	5.2	83	00
Vivid	5	2.0	5.4	85	00
Windy	5	2.6	3.6	88	00
Ledge	5	3.5	3.9	79	07
Stone	5	40.63	3.8	83	00
Loose	5	41.78	3.2	78	00
Older	5	41.86	3.7	83	00
Local	5	41.73	4.7	83	00
Apart	5	47.02	3.1	83	00
Final	5	49.67	3.1	83	00
Floral	6	0.7	5.3	87	00
Novice	6	0.8	3.7	78	06
Steamy	6	0.9	4.3	87	00
Prompt	6	1.2	5.0	90	03
Canine	6	1.7	4.3	81	04
Cloudy	6	2.2	3.4	81	00
Medium	6	7.1	4.3	75	00
Wooden	6	7.2	4.3	79	00
Casual	6	7.3	4.5	91	00
Remote	6	14.0	4.1	83	00

Cotton	6	14.2	4.5	79	00
Recent	6	13.1	4.4	97	00
Acidic	6	0.2	3.1	80	00
Hushed	6	0.5	3.3	80	00
Clammy	6	0.6	2.4	70	00
Glossy	6	0.5	4.7	83	00
Usable	6	0.5	4.6	93	00
Vacant	6	2.6	3.5	83	00
Unreal	6	2.5	4.1	89	00
Fierce	6	4.8	5.2	76	00
Formal	6	8.3	4.9	87	00
Velvety	7	0.2	5.1	78	04
Blurred	7	0.7	3.8	77	00
Offhand	7	0.9	3.6	100	09
Swamped	7	1.6	2.8	73	00
Striped	7	1.7	3.8	70	00
Defiant	7	0.9	2.9	93	03
Bruised	7	2.1	2.3	86	00
Buzzing	7	4.3	3.6	80	03
Rushing	7	6.0	3.2	83	03
Humming	7	4.9	4.6	89	04
Visible	7	5.0	4.9	72	00
Crooked	7	5.7	2.8	74	00
Booming	7	1.0	4.1	73	00
Crusted	7	0.2	3.3	83	00
Finicky	7	0.2	2.9	89	00
Powdery	7	0.1	3.8	84	03
Belated	7	0.4	3.4	96	00
Smudged	7	0.5	3.0	79	00
Intense	7	10.2	3.8	94	00
Lecture	7	10.5	3.6	88	00
Twisted	7	10.6	3.3	90	00
Aromatic	8	0.3	5.0	86	07
Hindered	8	0.3	2.7	80	00
Blissful	8	0.5	6.2	89	00
Diagonal	8	0.5	4.0	91	03
Outdated	8	0.8	2.6	91	00
Rhythmic	8	1.0	5.3	86	00
Concrete	8	7.4	4.5	86	00
Accurate	8	7.8	6.1	96	00
Absolute	8	11.3	4.5	88	00

Creepier	8	0.1	1.4	83	00
Greedier	8	0.1	1.4	76	00
Prideful	8	0.1	3.4	89	00
Carpeted	8	0.2	4.2	78	06
Feathery	8	0.2	4.8	72	00
Intently	8	0.2	4.8	83	00
Distinct	8	3.0	4.6	87	00
Dripping	8	3.4	3.6	85	00
Numerous	8	3.6	4.5	82	00
Occupied	8	5.7	3.8	90	00
Peaceful	8	11.2	6.5	87	00
Standard	8	18.4	4.2	83	00
Triangular	10	0.2	4.0	74	00
Repetitive	10	0.6	3.1	87	00
Reflective	10	0.6	4.9	83	00
Speechless	10	1.75	4.2	89	00
Disposable	10	1.84	2.7	83	00
Continuous	10	1.92	4.2	83	00
Detestable	10	0.2	1.4	78	00
Externally	10	0.2	4.2	72	00
Ineligible	10	0.2	2.6	78	00
Prohibitive	11	0.16	2.9	72	06
Reevaluated	11	0.16	4.1	78	00
Refurbished	11	0.16	4.7	83	06
Homogeneous	11	0.1	4.0	88	03
Instructive	11	0.4	5.3	90	00
Traditional	11	8.1	4.5	91	00
Depressurized	13	0.1	4	72	06
Extravagantly	13	0.1	4.3	83	00
Heterogeneous	13	0.0	4.5	84	06
Unacknowledged	14	0.08	2.3	78	00
Indecipherable	14	0.1	2.8	78	00
Oversimplified	14	0.08	3.3	83	00

[1]Frequency Per Million = Frequency of the word in the English language per million words determines with the SUBTLEXus database.
[2]Rated Valence = Average of participant rated valences on a scale from 1-7, which were transformed from participant ratings in stimuli development survey on a scale from -3 ("very negative") to +3 ("very positive).
**Percent Categorized as Neutral Word, and Percent Unsure of Meaning were taken from participant ratings in stimuli development survey.*

Appendix B: Analyses Comparing Number of Letters, Normative Frequency, and Valence for each of the Word Lists

Table B1. Comparisons of means for word characteristics (word length, frequency, and rated valence) for fat, thin, and neutral word lists

	Fat Words	**Thin Words**	**Neutral Words**	***F***	***p***
N	25	25	150		
Word Characteristic					
Word Length	6.04 (1.84)	7.00 (2.84)	6.52 (2.40)	1.00	.370
Frequency[1]	11.28 (20.66)	13.88 (30.50)	14.01 (28.32)	.10	.901
Rated Valence[2]	2.65 (0.55)	3.62 (1.25)	3.84 (1.05)	36.06	<.001

[1]*Frequency = Frequency of the word in the English language per million words determined with the SUBTLEXus database.*
[2]*Rated Valence = Average participant rated valence from stimuli development survey on a scale -3 ("very negative") to +3 ("very positive).*
Note. Standard deviations in parentheses.

Appendix C: Informed Consent Form for Stimuli Development Survey

Title of Project:

Word and Image Rating Study

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study

The purpose of this study is to:
(a) Develop a wordlist of fat, thin, and neutral words to be used in future research, based on each word's familiarity, valence, and category.
(b) Determine images of underwear models to be used in future research, based on each image's ratings of its depiction of the thin ideal standard.

What Will I Be Asked To Do?

You will be asked to fill out an online survey where you will be presented words, one at a time. You will be asked to indicate each word's familiarity and valence (how positive or negative you believe the word to be), and to classify it into one of four groups ('fat', 'thin', 'other', or 'unsure'). You will then be presented with images of underwear models, and will be asked to indicate how much each image depicts the thin ideal standard portrayed by the mass media. Participation will take approximately one hour. You will receive 1.0 participation bonus credit in a Psychology course.

Participation in this study is completely voluntary. You may refuse to participate altogether and you may decline to answer any and all questions. You may withdraw from this study at any time without penalty or loss of your participation bonus credit.

What Type of Personal Information Will Be Collected?

Should you agree to participate, you will be asked to provide your gender, age, education, and ethnicity.

Are there Risks or Benefits if I Participate?

There are no known risks to participation in this study. The potential benefits of participation in this study are to inform future research at the University of Calgary and to be able to contribute to research on individual differences in attention.

What Happens to the Information I Provide?

Only study personnel will have access to the information collected (i.e., the principal investigator and the research assistants).

Your contribution to this research will be treated as anonymous and confidential. To ensure anonymity you will be given an identification number on all information collected.

If you decide to withdraw from this study at any point, all of the data you have provided will be deleted.

Participation is completely voluntary, anonymous and confidential. You are free to discontinue participation at any time during the study. Only group information will be summarized for any presentation or publication of results. The anonymous group data will be stored on a computer disk.

By clicking on the link below to continue and completing the survey, this indicates that 1) you understand to your satisfaction the information provided to you about your participation in this research project, and 2) you agree to participate in the research project.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

If you would not like to participate in this project, please close your internet browser.

Appendix D: Debriefing Form for Stimuli Development Survey

DEBRIEFING FORM

Project Title: **Word and Image Rating Task**

Thank you very much for your participation in this study. We ask that you help us preserve the integrity of our research by not discussing your experiences with other students. Thank you for your understanding and consideration of this request.

The current study's aims were to develop a wordlist that will be used in a future study that will incorporate the wordlist into an eye-tracking paradigm, and to determine the underwear model images to be used in the same eye-tracking paradigm. Specifically, participants will be exposed to these words during the eye-tracking paradigm, which will give a continuous measure of their attention towards fat, thin, and neutral words. You gave a rating of each word's familiarity and valence, and these ratings will be used to ensure that all words incorporated into the eye-tracking paradigm will be matched on these features. Your rating of each word's category (i.e., 'fat', 'thin', 'other', or 'unsure') will be used to give support for each of the assigned fat, thin, and neutral words as belonging to those specific categories. Your rating of each image's depiction of the thin ideal as portrayed in mass media will be used to give support for the images as thin ideal models.

The results of this study have to potential to provide a well-supported wordlist to be used in the future eye-tracking study, as well as to provide well supported underwear model images as representing the "thin ideal". The results of the eye-tracking study will have the potential to clarify whether or not non-clinical body-dissatisfied women display attentional biases for weight words and whether or not exposure to thin media images influences attentional biases for weight words, particularly in women who already have body-image difficulties.

Please indicate below whether or not you are willing to have the data obtained from your ratings to be included in the development of the wordlist and image stimuli for the future eye-tracking study:

□ Yes, I am willing to have the data obtained from my ratings to be included in the development of the wordlist and image stimuli.
□ No, I would not like the data obtained from my ratings to be included in the development of the wordlist and image stimuli. Please disregard my ratings.

Once again, thank you for your participation in this study. This research would not be possible without your contribution of time and energy.

Below is a list of readings if you are interested in research in this area:

Cassin, S. E., von Ranson, K. M., & Whiteford, S. (2008). Cognitive processing of body and appearance words as a function of thin-ideal internalization and schematic activation. *Body Image, 5*, 271-278. doi:10.1016/j.bodyim.2008.03.006

Dobson, K. S., & Dozois, D. J. A. (2004). Attentional biases in eating disorders: A meta-analytic review of Stroop performance. *Clinical Psychology Review, 23*, 1001-1022. doi:10.1016/j.cpr.2003.09.004

Gao, X., Wang, Q., Jackson, T., Zhao, G., Liang, Y., & Chen, H. (2011). Biases in orienting and maintenance of attention among weight dissatisfied women: An eye-movement study. *Behaviour Research and Therapy, 49*, 252-259. doi:10.1016/j.brat.2011.01.009

Markis, T. A., & McLennan, C. T. (2011). The effect of priming a thin ideal on the subsequent perception of conceptually related body image words. *Body Image, 8*, 423-426. doi:10.1016/j.bodyim.2011.05.001

Appendix E: Informed Consent Form for Screener Survey

Title of Project:
A survey on Individual Differences

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study

The purpose of this study is to gain information on individual differences in body image and eating behaviours.

What Will I Be Asked To Do?

For this study, you will be asked to fill out self-report questionnaires, which will ask you about certain thoughts and behaviours. Some of the questions on the self-report questionnaires may be personal and sensitive, such as: "Has thinking about your shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?" You will receive 0.5 participation bonus credit in a Psychology course.

Participation in this study is completely voluntary. You may refuse to participate altogether, you may refuse to participate in parts of the study, and you may decline to answer any and all questions. You may withdraw from this study at any time without penalty or loss of your participation bonus credit

What Type of Personal Information Will Be Collected?

Should you agree to participate, you will be asked to provide your gender, age, education, academic major, occupation, and ethnicity.

Are there Risks or Benefits if I Participate?

There are a few questions in the self-report questionnaires that have the potential to make some people feel momentarily embarrassed to answer. Additionally, the self-report questionnaires have the possibility of identifying distressed individuals. If you are interested in seeking help after participation in this study, please see the list of mental health treatment and information resources at the end of the survey. The potential benefits of participation in this study are the possibility of increased awareness about yourself, as well as to contribute to future research on attention that will incorporate results from the current study.

What Happens to the Information I Provide?

Only study personnel will have access to the information collected (i.e., the investigators and research assistants).

Your contribution to this research will be anonymous and confidential. To ensure anonymity you will be given an identification number on all information collected.

If you decide to withdraw from this study at any point, all of the data you have provided will be deleted.

Participation is completely voluntary, anonymous and confidential. You are free to discontinue participation at any time during the study. No one except study personnel will be allowed to see any of the answers to the anonymous questionnaires. There are no names on the questionnaires. Only anonymous group information will be summarized for any presentation or publication of results. The anonymous group data will be stored on a computer disk.

By clicking the double arrow below to continue and completing the survey, this indicates that 1) you understand to your satisfaction the information provided to you about your participation in this research project, and 2) you agree to participate in the research project.
In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation via email. If you would not like to participate in this project, please close your internet browser.

Appendix F: Debriefing Form for Screener Survey

DEBRIEFING FORM

Project Title: **A Survey on Individual Differences**

Thank you very much for your participation in this study. We ask that you help us preserve the integrity of our research by not discussing your experiences with other students. Thank you for your understanding and consideration of this request.

The current study's aims were to get an idea of individual differences in behaviours, thoughts and feelings related to body image and eating behaviours in undergraduate females. One of the questionnaires incorporated into the survey was the Body Shape Questionnaire (BSQ; Cooper et al., 1987). This questionnaire was given to gain an understanding of how undergraduate females feel about their body, shape, and weight. The other questionnaire was the Eating Disorder Examination Questionnaire, 6th Edition (EDE-Q 6.0; Fairburn & Beglin, 2008). This questionnaire was used to gain an understanding of undergraduates' eating behaviours and concerns, shape concern, and weight concern.

The results of this study have to potential to provide an understanding of patterns of body image and eating behaviours in undergraduate females at the University of Calgary. The results will also be used to help recruit participants for a future study.

Please indicate below whether or not you are willing to be e-mailed about potential participation in a future study for 1.0 course credit.

□ Yes, I am willing to be emailed to see if I would like to participate in a future study.

□ No, I would not like to be emailed to see if I would like to participate in a future study.

If you checked the "Yes" box above, pleased provide your email address below:

_____

Once again, thank you for your participation in this study. This research would not be possible without your contribution of time and energy.

Below is a list of readings if you are interested in research in this area:

Cook, S. J., MacPherson, K., & Langille, D. B. (2007). Far from ideal: Weight perception, weight control, and associated risky behaviour of adolescent girls in Nova Scotia. *Canadian Family Physician, 53*, 678–684.

Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the body shape questionnaire. *International Journal of Eating Disorders, 6*, 485-494.

Fairburn, C. G., & Beglin, S, B. (2008). Eating Disorder Examination Questionnaire (EDE-Q 6.0). *In Cognitive Behaviour Therapy and Eating Disorders.* Guilford Press, New York.

Appendix G: Slideshow Rating Questionnaires

Shoe Rating Questionnaire

For this task you will view 25 images of shoes. After viewing each shoe, while the screen is blank, please indicate the following:

HOW NICE LOOKING IS THIS SHOE?

Shoe 1:	Not at all 1	2	3	Very much 4
Shoe 2:	Not at all 1	2	3	Very much 4
Shoe 3:	Not at all 1	2	3	Very much 4
Shoe 4:	Not at all 1	2	3	Very much 4
Shoe 5:	Not at all 1	2	3	Very much 4
Shoe 6:	Not at all 1	2	3	Very much 4
Shoe 7:	Not at all 1	2	3	Very much 4
Shoe 8:	Not at all 1	2	3	Very much 4
Shoe 9:	Not at all 1	2	3	Very much 4
Shoe 10:	Not at all 1	2	3	Very much 4
Shoe 11:	Not at all 1	2	3	Very much 4

Shoe 12:	Not at all 1	2	3	Very much 4
Shoe 13:	Not at all 1	2	3	Very much 4
Shoe 14:	Not at all 1	2	3	Very much 4
Shoe 15:	Not at all 1	2	3	Very much 4
Shoe 16:	Not at all 1	2	3	Very much 4
Shoe 17:	Not at all 1	2	3	Very much 4
Shoe 18:	Not at all 1	2	3	Very much 4
Shoe 19:	Not at all 1	2	3	Very much 4
Shoe 20:	Not at all 1	2	3	Very much 4
Shoe 21:	Not at all 1	2	3	Very much 4
Shoe 22:	Not at all 1	2	3	Very much 4
Shoe 23:	Not at all 1	2	3	Very much 4
Shoe 24:	Not at all 1	2	3	Very much 4
Shoe 25:	Not at all 1	2	3	Very much 4

Model Rating Questionnaire

For this task you will view 25 images of models. After viewing each model, while the screen is blank, please indicate the following:

HOW CLOSELY DOES THIS MODEL MATCH THE IDEAL FEMALE BODY AS PORTRAYED IN MASS MEDIA?

	Not at all			Very much
Model 1:	1	2	3	4
	Not at all			Very much
Model 2:	1	2	3	4
	Not at all			Very much
Model 3:	1	2	3	4
	Not at all			Very much
Model 4:	1	2	3	4
	Not at all			Very much
Model 5:	1	2	3	4
	Not at all			Very much
Model 6:	1	2	3	4
	Not at all			Very much
Model 7:	1	2	3	4
	Not at all			Very much
Model 8:	1	2	3	4
	Not at all			Very much
Model 9:	1	2	3	4
	Not at all			Very much
Model 10:	1	2	3	4
	Not at all			Very much
Model 11:	1	2	3	4
	Not at all			Very much
Model 12:	1	2	3	4

	Not at all			Very much
Model 13:	1	2	3	4
	Not at all			Very much
Model 14:	1	2	3	4
	Not at all			Very much
Model 15:	1	2	3	4
	Not at all			Very much
Model 16:	1	2	3	4
	Not at all			Very much
Model 17:	1	2	3	4
	Not at all			Very much
Model 18:	1	2	3	4
	Not at all			Very much
Model 19:	1	2	3	4
	Not at all			Very much
Model 20:	1	2	3	4
	Not at all			Very much
Model 21:	1	2	3	4
	Not at all			Very much
Model 22:	1	2	3	4
	Not at all			Very much
Model 23:	1	2	3	4
	Not at all			Very much
Model 24:	1	2	3	4
	Not at all			Very much
Model 25:	1	2	3	4

Appendix H: Body Dissatisfaction Visual Analogue Scale

Please rate your <u>current</u> level of body dissatisfaction on a scale from 0 to 100

Draw a vertical line anywhere on the line below to indicate your rating.

<u>Current level of body dissatisfaction</u>

Extremely	Extremely
satisfied	***dissatisfied*** with
with your body	your body
0	**100**

Appendix I: Study Credibility Check Form

In your own words, what do you think this study was attempting to learn? Please provide your thoughts below…

Appendix J: Consent Form for Main Study

CONSENT FORM

Title of Project:
Individual Differences in Attention

This consent form, a copy of which has been given to you, is only part of the process of consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study

The purpose of this study is to understand how individuals differ in their attention to different words. In particular, it is to understand how both individual difference factors and exposure to different images can influence attention.

What Will I Be Asked To Do?

You will be asked to perform several tasks for this study. You will be asked to fill out self-report questionnaires throughout the study, which will ask you about certain thoughts and behaviours. Some of the questions on the self-report questionnaires may be personal and sensitive, such as: "Has thinking about your shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?" You will also be asked to provide your current weight and height. You will be asked to view some images on a computer screen on two separate occasions during the study. You will also be asked to participate in two eye-tracking tasks where you will view some words on a computer screen while being recorded by the eye-tracking device. Participation will take approximately one hour. You will receive 1.0 participation bonus credit in a Psychology course.

There is a second part to this study that will be conducted approximately one week from today. It will be conducted online and will involve recognition of different words. If you would like to participate in the second part of the study, you will receive an additional 0.5 participation bonus credit in a Psychology course

Participation in this study is completely voluntary. You may refuse to participate altogether, you may refuse to participate in parts of the study, and you may decline to answer any and all questions. You may withdraw from this study at any time without penalty or loss of your participation bonus credit.

What Type of Personal Information Will Be Collected?

Should you agree to participate, you will be asked to provide your gender, age, education, academic major, occupation, ethnicity, weight, and height.

Are there Risks or Benefits if I Participate?

There are a few questions in the self-report questionnaires that have the potential to make some people feel momentarily embarrassed to answer. Additionally, the self-report questionnaires have the possibility of identifying distressed individuals. If you are interested in seeking help after participation in this study, please see the attached list of mental health treatment and information resources. The potential benefits of participation in this study are the possibility of increased awareness about yourself, as well as to contribute to research on attention.

What Happens to the Information I Provide?

Only study personnel will have access to the information collected (i.e., the investigators and research assistants).

Your contribution to this research will be anonymized and confidential. You will be given an identification number on all information collected and the name you provide below on this form will only be traceable to your identification number on a password-protected list to ensure we can match information collected today with the information you provide in the second part of the study in one week's time. This list will be deleted immediately after data collection for the second part of the study is complete. Study personnel have taken confidentiality training and will be required to keep information confidential.

If you decide to withdraw from this study at any point, all of the data you have provided will be destroyed. Paper and pencil data will be confidentially shredded in the Psychology Department, and electronic data will be deleted.

Participation is completely voluntary and confidential. You are free to discontinue participation at any time during the study. No one except the researcher, her supervisor, and study personnel will be allowed to see or hear any of the answers to the questionnaires. There are no names on the questionnaires. Only group information will be summarized for any presentation or publication of results. Only anonymous data will be used in reporting research findings. The questionnaires will be kept in a locked cabinet only accessible by the researcher and her supervisor. The anonymized group data will be stored on a computer disk.

Signatures

Your signature on this form indicates that 1) you understand to your satisfaction the information provided to you about your participation in this research project, and 2) you agree to participate in the research project.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (please print) _____

Participant's Signature: _____ Date: _____

Researcher's Name: (please print) _____

Researcher's Signature: _____ Date: _____

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

Appendix K: Informed Consent Form for Main Study

INFORMED CONSENT FORM

Name of Researcher, Faculty, Department, Telephone & Email:
Leah Tobin, MSc Student
Department of Psychology

Supervisor:
Dr. Kristin von Ranson
Department of Psychology

Title of Project:
Individual Differences in Attention

This informed consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study

The purpose of this study is to understand how individuals differ in their attention to different words. In particular, it is to understand how both individual difference factors and exposure to different images can influence attention.

What Was/Will I Be Asked To Do?

You performed several tasks for this study. You were asked to fill out self-report questionnaires throughout the study, which asked you about certain thoughts and behaviours. Some of the questions on the self-report questionnaires may have been personal and sensitive, such as: "Has thinking about your shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?" You were also asked to provide your current weight and height. You were asked to view some images on a computer screen on two separate occasions during the study. You were also asked to participate in two eye-tracking tasks where you viewed some words on a computer screen. You were told at the beginning of the study that your pupil dilation would be measured by the eye-tracking device while viewing the images on the screen. In addition to your pupil dilation being measured, the direction of your eye-gaze (i.e., which of the four words on the screen you spent more time looking at) was also measured by the eye-tracking device. The direction of your eye-gaze was the measure of interest for the current study. You were not given this information at the beginning of the study in case this knowledge influenced which words you spent more time looking at.

Participation took approximately one hour. You will receive 1.0 participation bonus credit in a Psychology course.

There is a second part to this study that will be conducted approximately one week from today. It will be conducted online and will involve recognition of different words. If you would like to participate in the second part of the study, you will receive an additional 0.5 participation bonus credit in a Psychology course

Participation in this study is completely voluntary. You may refuse to participate altogether, you may refuse to participate in parts of the study, and you may decline to answer any and all questions. You may withdraw from this study at any time without penalty or loss of your participation bonus credit.

What Type of Personal Information Was/Will Be Collected?

In agreeing to participate, you were asked to provide your gender, age, education, academic major, occupation, ethnicity, weight, and height.

Are there Risks or Benefits in Participating?

There were a few questions in the self-report questionnaires that have the potential to make some people feel momentarily embarrassed to answer. Additionally, the self-report questionnaires have the possibility of identifying distressed individuals. If you are interested in seeking help after participation in this study, please see the attached list of mental health treatment and information resources. The potential benefits of participation in this study are the possibility of increased awareness about yourself, as well as to contribute to research on attention.

What Happens to the Information I Provide?

Only study personnel will have access to the information collected (i.e., the investigators and research assistants).

Your contribution to this research will be anonymized and confidential. You will be given an identification number on all information collected and the name you provide below on this form will only be traceable to your identification number on a password-protected list to ensure we can match information collected today with the information you provide in the second part of the study in one week's time. This list will be deleted immediately after data collection for the second part of the study is complete. Study personnel have taken confidentiality training and will be required to keep information confidential.

If you decide to withdraw from this study at any point, all of the data you have provided will be destroyed. Paper and pencil data will be confidentially shredded in the Psychology Department, and electronic data will be deleted.

Participation is completely voluntary and confidential. You are free to discontinue participation at any time during the study. No one except the researcher, her supervisor, and study personnel will be allowed to see or hear any of the answers to the questionnaires. There are no names on the questionnaires. Only group information will be summarized for any presentation or publication of results. Only anonymous data will be used in reporting research findings. The questionnaires will be kept in a locked cabinet only accessible by the researcher and her supervisor. The anonymized group data will be stored on a computer disk.

Signatures

Your signature on this form indicates that after learning that we tracked your eye-gaze, 1) you understand to your satisfaction the information provided to you about your participation in this research project, 2) you agree to participate in the research project, and 3) you approve the use of your data in the current study after learning what the eye-tracker was measuring. If you disagree to the use of the data collected from your participation, do not sign this informed consent form below, and all data collected from your participation will be destroyed. Paper and pencil data will be confidentially shredded in the Psychology Department, and electronic data will be deleted.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (please print) _____

Participant's Signature: _____ Date: _____

Researcher's Name: (please print) _____

Researcher's Signature: _____ Date: _____

Please indicate below whether or not you would still like to participate in the second part of this study in approximately one week's time for an additional 0.5 participation bonus credit. Again, it will involve completing an online survey regarding your recognition of different words. You will still receive 1.0 participation bonus credit for your participation in the current part of the study if you choose not to participate in the second part.

□ Yes, I would like to participate in the second part of the study.

□ No, I would not like to participate in the second part of the study.

If you have any concerns about the way you've been treated as a participant, please contact the Research Ethics Analyst, Research Services Office, University of Calgary.

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

Appendix L: Debriefing Form for Main Study

DEBRIEFING FORM

Project Short Title: **Individual Differences in Attention**
Project Full Title: **Tracking Attention: Relationships of Media Images to Women's Body Image**

Thank you very much for your participation in this study. We ask that you help us preserve the integrity of our research by not discussing your experiences with other students. Thank you for your understanding and consideration of this request.

Recently, researchers have started to apply the methods of cognitive science to the study of body image. The essence of the cognitive perspective is that an individual's attitude towards his or her physical attributes will bias the manner in which stimuli related to body shape are processed. In other words, people who are preoccupied with body dissatisfaction may attend to, encode, store, and retrieve body shape stimuli differently than neutral stimuli. For example, individuals may process information pertaining to negative body image more extensively than they process information associated with positive body image, which in turn would reinforce their negative beliefs about their own body. Such information processing biases serve to maintain negative body shape and weight attitudes and may explain the persistence of body dissatisfaction in some individuals.

Information processing biases can been seen through an individual's attention; for example, individuals diagnosed with an eating disorder have been shown to display attentional biases towards weight words when compared to neutral words. However, it is unclear whether non-clinical samples of women (women without a diagnosis of an eating disorder) with body dissatisfaction display attentional biases towards weight words. Previous research has used attentional bias paradigms that only measure the initial orienting of attention based on inferences made from reaction times for behavioural responses. The current study uses an eye-tracking paradigm instead, as a continuous measure of attention for weight words in body-satisfied and body-dissatisfied women. You were told at the beginning of the study that your pupil dilation would be measured by the eye-tracking device while viewing the images on the screen. In addition to your pupil dilation being measured, the direction of your eye-gaze (i.e., which of the four words on the screen you spent more time looking at) was also measured by the eye-tracking device. The direction of your eye-gaze was the measure of interest for the current study. You were not given this information at the beginning of the study in case this knowledge influenced which words you spent more time looking at. Specifically, we are interested in the proportion of time gazing at weight words compared to the proportion of time gazing at neutral words.

Brief exposure to images of thin models can temporarily increase women's levels of body image dissatisfaction, particularly if they are already dissatisfied with their bodies. However, it is also unclear if exposure to thin media images affects attentional biases for weight words. Therefore the second aim of the current study is to explore the role of thin media images on women's attentional bias patterns towards weight words. Your attention towards weight and neutral words

after exposure to the shoe images will be compared to your attention allocation after exposure to the thin model images.

The results of this study have to potential to clarify whether or not non-clinical body-dissatisfied women display attentional biases for weight words. Additionally, the results have the potential to clarify whether or not exposure to thin media images influences attentional biases for weight words, particularly in women who already have body-image difficulties. If attentional biases are found in a nonclinical sample, this finding would have implications for prevention. For example, attentional bias modification techniques have been used to successfully reduce attentional bias in anxious individuals, and the use of these techniques for the reduction of attentional biases in individuals with an eating disorder has been proposed. The current study would possibly inform the use of attentional bias modification in individuals with body image difficulties, thereby aiding in eating disorder prevention.

It is important to note that the images of thin models you viewed while participating in this study are, in fact, very atypical. Not only are these models of extremely below average weight, these types of images are often digitally altered to make the models appear thinner and more flawless than in real life. Additionally, viewing the bodies seen in these images as cultural ideals can lead to negative consequences, such as increases in body dissatisfaction. Dissatisfaction with one's body image can have negative health implications. Therefore, one must keep in mind the negative impact that these thin, atypical, digitally altered images of models can have on his or her body image while being exposed to them.

If you have any concerns about body image or other issues and would like to speak to a trained counselor, we suggest contacting the Student Counseling Centre. Initial consultation sessions are free of charge. See the attached Mental Health Resources Information sheet for other contact information. Once again, thank you for your participation in this study. This research would not be possible without your contribution of time and energy. If you have any questions or concerns about this study or issues that arose during the study, please feel free to ask them now or contact me at a later time. Please contact me if you would like me to email you the study results upon completion.

Below is a list of readings if you are interested in research in this area:

Cassin, S. E., von Ranson, K. M., & Whiteford, S. (2008). Cognitive processing of body and appearance words as a function of thin-ideal internalization and schematic activation. *Body Image, 5*(3), 271-278. doi:10.1016/j.bodyim.2008.03.006

Dobson, K. S., & Dozois, D. J. A. (2004). Attentional biases in eating disorders: A meta-analytic review of Stroop performance. *Clinical Psychology Review, 23*(8), 1001-1022. doi:10.1016/j.cpr.2003.09.004

Gao, X., Wang, Q., Jackson, T., Zhao, G., Liang, Y., & Chen, H. (2011). Biases in orienting and maintenance of attention among weight dissatisfied women: An eye-movement study. *Behaviour Research and Therapy, 49*(4), 252-259. doi:10.1016/j.brat.2011.01.009

Markis, T. A., & McLennan, C. T. (2011). The effect of priming a thin ideal on the subsequent perception of conceptually related body image words. *Body Image, 8*(4), 423-426. doi:10.1016/j.bodyim.2011.05.001

Appendix M: Demographic Comparisons for Body Dissatisfaction Groups

Table M1. Demographic comparisons of participants in the top and bottom Body Shape Questionnaire (BSQ) tertiles (N = 82)

	Body-Satisfied Women	**Body-Dissatisfied Women**
N	40	42
Age in Years		
Mean (Standard Deviation)	22.18 (4.22)	22.33 (4.42)
Range	18-38	18-38
BSQ Total[1]		
Mean (Standard Deviation)	60.13 (8.25)	135.24 (25.20)
Range	43-70	99-182
Education		
First Year	7.7%	19.0%
Second Year	20.5%	21.4%
Third Year	20.5%	19.0%
Fourth Year	23.1%	14.3%
Fifth Plus Year	15.4%	11.9%
Undergraduate Degree	5.1%	4.8%
Master's Degree	5.1%	7.1%
Doctor of Philosophy	2.6%	2.4%
Ethnicity		
Arab/West Asian	12.8%	7.1%
Black	7.7%	0%
Chinese	10.3%	14.3%
Filipino	2.6%	0%
Korean	0%	2.4%
South Asian	0%	7.1%
South East Asian	2.6%	9.5%
White (Caucasian)	59.0%	47.6%
Other	5.1%	11.9%

[1]BSQ total = sum of scores on all items on the Body Shape Questionnaire