Body Image 19 (2016) 216–223

Contents lists available at ScienceDirect

Body Image

journal homepage: www.elsevier.com/locate/bodyimage

# An attentional bias for thin bodies and its relation to body dissatisfaction

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ARTICLE INFO

*Article history:*
Received 9 December 2015
Received in revised form 19 October 2016
Accepted 19 October 2016

*Keywords:*
Body dissatisfaction
Body image
Visual attention
Attentional biases

ABSTRACT

Research suggests that humans have an attentional bias for the rapid detection of emotionally valenced stimuli, and that such a bias might be shaped by clinical psychological states. The current research extends this work to examine the relation between body dissatisfaction and an attentional bias for thin/idealized body shapes. Across two experiments, undergraduates completed a gender-consistent body dissatisfaction measure, and a dot-probe paradigm to measure attentional biases for thin versus heavy bodies. Results indicated that men ($n = 21$) and women ($n = 18$) show an attentional bias for bodies that correspond to their own gender (Experiment 1), and that high body dissatisfaction among men ($n = 69$) and women ($n = 89$) predicts an attentional bias for thin same-gender bodies after controlling for body mass index (BMI) (Experiment 2). This research provides a new direction for studying the attentional and cognitive underpinnings of the relation between body dissatisfaction and eating disorders.



## Introduction

Researchers have been interested in examining attentional biases for various emotionally valenced stimuli for decades (LoBue & Rakison, 2013). To date, most of this work has focused on studying attentional biases—defined as increased gaze duration or more rapid response times—for negative or threat-relevant stimuli such as angry faces, snakes, and spiders in human adults and children. Generally this work utilizes controlled visual search or dot-probe paradigms in which participants are asked to detect a target among various distracters, or to indicate the location or direction of a probe after it replaces one of two previously presented images. Using these paradigms and others, research has consistently shown that both adult and child participants detect threatening stimuli more quickly than non-threatening stimuli (see LoBue & Rakison, 2013; for a review).

Although developing individuals typically demonstrate a normative bias for threat in these standard visual attention tasks, studies with clinical populations have documented a strong relationship between attentional biases for specific threats and the onset of anxiety. For example, socially anxious adults detect angry faces even more quickly than their non-anxious counterparts (see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van Ijzendoorn, 2007; for a meta-analysis), and phobic individuals detect the object of their phobias faster than non-phobic individuals (Öhman, Flykt, & Esteves, 2001). Importantly, several studies have shown that heightened attentional biases for social threats *precede* the onset of social anxiety (e.g., LoBue and Pérez-Edgar, 2014; Pérez-Edgar et al., 2011), leading some theorists to implicate attentional biases for threat in the development (Hakamata et al., 2010; LoBue, 2013) and maintenance (e.g., Mogg & Bradley, 1998) of anxiety disorders.

Recent research has demonstrated that visual biases for particular stimuli are not unique to angry faces, snakes, and spiders. A handful of researchers have begun to examine whether women demonstrate selective attention to *thin* or *idealized body stimuli* (Cho & Lee, 2013; Glauert, Rhodes, Byrne, Fink, & Grammer, 2010). Using a classic dot-probe paradigm, Glauert et al. (2010) presented women with images of a thin and an overweight body simultaneously positioned one above the other for a short period of time, and then replaced the location of one of the two images with an arrow probe. Participants were asked to report the direction in which the arrow probe pointed. Faster responding to probes that replaced one type of stimulus over the other is typically interpreted as an attentional bias (via rapid or sustained looking) for that stimulus. Glauert et al. (2010) found that women responded faster to probes that replaced thin versus heavy bodies, thus suggesting a normative attentional bias for thinness in women.

Like the relationship between attentional biases for social threats and social anxiety, Smith and Rieger (2006) suggested

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http://dx.doi.org/10.1016/j.bodyim.2016.10.006
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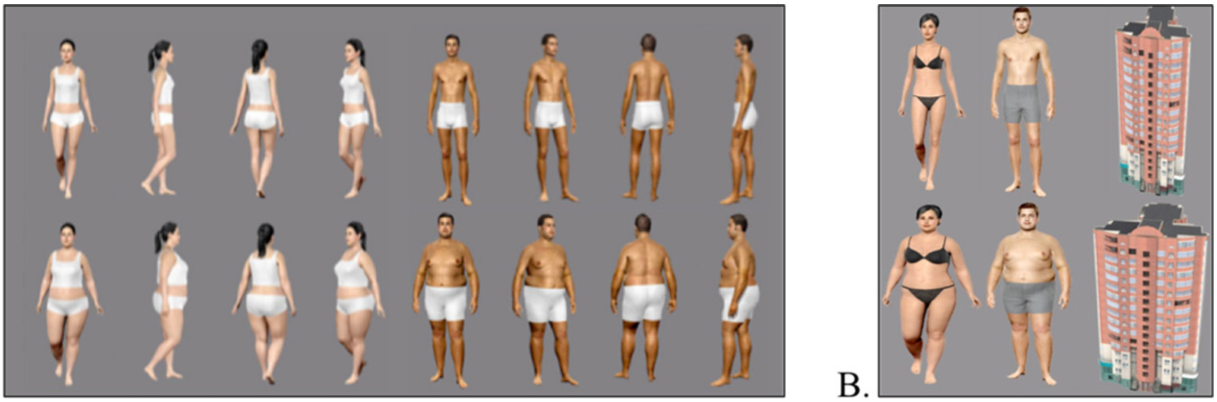


**Fig. 1.** A. Male and female body stimuli used in Experiment 1. B. Male and female body and object stimuli used in Experiment 2.

that attentional biases for thin body stimuli should be positively related to *body dissatisfaction*. Body dissatisfaction is the negative self-evaluation of one's physical size, shape, weight, and musculature, and is a well-established predictor of several significant health risks including obesity, depression, eating disorders, and anabolic steroid abuse (Stice & Shaw, 2002). To test their hypothesis experimentally, Smith and Rieger (2006) induced attentional biases towards negative body shape/weight related words (e.g., enormous, huge, blubber), neutral words (e.g., bottle, radio, glove), and negatively valenced emotion words (e.g., awful, desperate, humiliated) using a similar dot-probe task. Women who were induced to attend to negative body shape/weight related words reported higher levels of body dissatisfaction, while women in the other two conditions (neutral & negative emotion words) did not. This work opened the door to the systematic investigation of whether attentional biases for thin/idealized bodies are related to body dissatisfaction.

The current research examines the perceptual mechanisms, specifically attentional biases, that presumably foster and create body dissatisfaction in both men and women. The first goal was to replicate the findings of Glauert et al. (2010) demonstrating an attentional bias—which we define as faster reaction time to an arrow probe—to thin bodies in women, and further, to extend these findings to men. A second and related goal was to ask whether an attentional bias for thin body shapes is related to self-reported levels of body dissatisfaction in both genders. Although body dissatisfaction is most prevalent in women, men also experience significantly high levels of body dissatisfaction (Olivardia, Pope, Borowiecki, & Cohane, 2004; Pope, Phillips, & Olivardia, 2000; Ridgeway & Tylka, 2005). This raises the question of whether men also exhibit a relation between attentional bias for thin body shapes and body dissatisfaction.

Based on findings by Smith and Rieger (2006), we expected to find that attentional biases for thinness in both men and women are related to body dissatisfaction, with no significant differences based on gender. In other words, individuals who report very high levels of body dissatisfaction and are thus at risk for the development of eating disorders should show a particularly strong attentional bias for thin same-gender bodies. Just as anxious individuals demonstrate a particularly strong bias for threatening faces, we predict that individuals high in body dissatisfaction will show a particularly strong bias for thin same-gender bodies.

## Experiment 1

We conducted an initial examination in which new body stimuli were created to determine whether the effects observed in previous work are exclusive to bodies that correspond to the gender of the perceiver. We used a dot-probe methodology identical to that of Glauert et al. (2010) with two exceptions. First, Glauert et al. (2010) used female body stimuli that were nude and emaciated, which are not typically observed in everyday environments. The stimuli in the current study were created to be more consistent with what one typically sees in the real world. Second, we included both male and female body stimuli. This modification allowed us to examine attentional biases for thin bodies in men, and to determine whether attentional biases are specific to the perception of same-gender bodies or whether they generalize to all human bodies.

### Method

**Participants.** Participants were undergraduate students from Rutgers University Newark. Twenty-one male, mean age 19.8 ($SD$ = 2.2) and 18 female, mean age 20.7 ($SD$ = 2.2), participated for course credit. The study was approved by Rutgers University IRB. All participants provided written informed consent before initiating the study.

**Stimuli.** The images of the male and female bodies were constructed using visualization software found online at www.myvirtual-model.com (see Fig. 1A). We used this software to create realistic, full-body figures of a Caucasian man and a Caucasian woman with different BMIs. Body height (8.5 cm/10.4° of visual angle) corresponded to a human body height of 170.2 cm (5 ft, 7 in.), which is between the average height of an American male (175.3 cm; 5 ft, 9 in.) and the average height of an American female (162.6 cm; 5 ft, 4 in.). According to the Centers for Disease Control and Prevention (2000), the average BMIs of adult American men and women are 26.6 and 26.5, respectively, and the BMI range for normal weights in adults is 18.5–24.9. For the thin body stimuli, we used a BMI of 18, just below the healthy weight range (but not emaciated). To create the heavy body stimuli, we used a BMI of 42 for men and 36 for women, values that fall in the obese range (BMIs > 29.9).

For each body type, body postures were presented in four different viewing angles: frontal (0°), left (90°), back (180°), and right (270°) poses. The figures were clothed in "default underwear" as set by the online program. The male default consisted of gray shorts and no shirt, and the female default consisted of white shorts and a fitted white tank top.

**Stimulus verification.** To ensure that participants readily distinguished between the thin and heavy body stimuli, a separate sample of 19 naïve adult participants viewed and rated the 16 different body images (2 genders × 4 viewpoints × 2 BMIs) in a random order, each presented on a separate page. A printout of the male and female stimulus pairs was handed to each participant with the following instructions: "Rate these bodies from 1 (Skinny) to 10 (Heavy) and write down your rating of each body." Paired-samples t-tests were conducted to evaluate whether the ratings of heavy and thin bodies differed significantly. On average, ratings of the heavy male figures ($M = 8.2$, $SD = 1.2$) were significantly higher than the ratings of the thin male figures ($M = 2.4$, $SD = 1.07$), $t(18) = 18.06$, $p < .01$, $d = 5.10$. Similarly, ratings of heavy female figures ($M = 6.3$, $SD = 1.2$) were significantly higher than the ratings of the thin female figures ($M = 2.1$, $SD = 1.04$), $t(18) = 12.44$, $p < .01$, $d = 3.74$

**Apparatus.** The stimuli were displayed on a Dell 24″ RGB monitor set at a spatial resolution of 1920 × 1200 pixels and a temporal resolution of 60 Hz. The monitor was controlled by a Pentium D 3.00 GHz processor. The experiment was programmed using E-prime 2.0 software (Psychological Software Tools, Inc). The computer monitor was centered at participants' eye level and was positioned at a distance of approximately 46 cm from the participant.

**Body dissatisfaction.** Each participant completed the gender appropriate version of the Body Shape Questionnaire-34 (BSQ-34; Cooper, Taylor, Cooper, & Fairbum, 1987; Vanado-Sullivan, Horton, & Savoy, 2006). The BSQ-34 is a valid and reliable 34-item self-report measure that assesses levels of body dissatisfaction experienced during the past several weeks (Rosen, Jones, Ramirez, & Waxman, 1996; Vanado-Sullivan, Horton, & Savoy, 2006). BSQ-34 scores range from 34 to 204 with higher scores indicating higher levels of body dissatisfaction, $\alpha_{men} = .96$; $\alpha_{women} = .98$.

**Design and procedure.** Each participant was tested individually. They first completed the BSQ-34, and self-reported their height and weight. After completing the questionnaire, participants were seated in front of the computer monitor to begin the dot probe task. First, participants read a set of instructions presented on the computer monitor and clicked a button when they were ready to begin the task. The instructions directed participants to focus on a fixation point (+) in the center of the screen for 1000 milliseconds (ms). Following the fixation point, two bodies appeared for 500 ms, one directly above the other, approximately 4 cm apart and equally distanced from the fixation point. Immediately after, the bodies were replaced with a blank screen containing a 1 cm arrow (facing either left or right) occupying the position of the middle, or belly button region, of one of the bodies. Participants reported with a button press as quickly and accurately as possible whether the arrow pointed to the left or right. The arrow remained on the screen until a response was made. No feedback was given.

Across trials, each pair of body figures always had the same gender and viewpoint, but differed in BMI. In half of the trials the thin body appeared above the heavy body, and in the other half of the trials the heavy body appeared above the thin body. Trials were arranged in 6 blocks of 24 trials for a total of 144 trials. Each block contained only images of either male or female bodies. Blocks alternated between genders, the order of which was counterbalanced across participants. Within each block, trials were presented in a random order and counterbalanced for body pose (front, back, left, and right), location of the thin body (top or bottom), arrow direction (left or right), and arrow location (top or bottom). Once each participant completed the 144 arrow-probe trials, the program automatically indicated to the participant that the experiment had been completed. The entire experiment required approximately 30 min to complete.

Reaction times (ms) for correct arrow direction judgments were averaged across trials. Participants made correct arrow direction judgments on more than 95% of the trials. Consistent with Glauert et al. (2010), bias scores were calculated by subtracting the mean reaction time for arrows that replaced the thin bodies from the mean reaction time for arrows that replaced the heavy bodies, then this difference was divided by the average of the two means. A positive attentional bias score indicates a bias towards thin bodies, while a negative score indicates a bias towards heavy bodies.

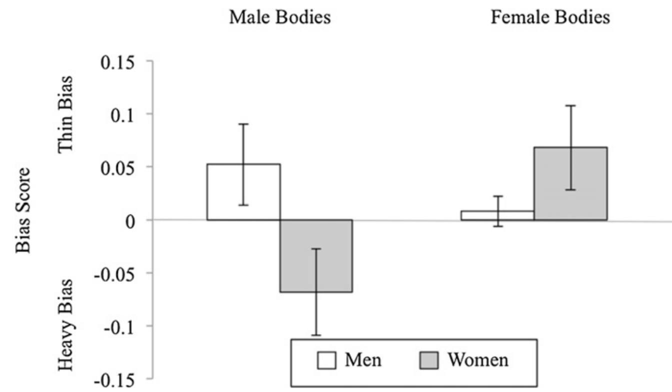


**Fig. 2.** Results of Experiment 1. Positive bias score indicates a bias towards thin stimuli and a negative bias score indicates a bias toward heavy stimuli. Both women and men showed an approaching significant bias for thin same-gender bodies that was greater than zero.

## Results and Discussion

Participants' BMIs were calculated from self-reported height and weight by taking weight in kilograms and dividing it by the square of height in meters (kg/m$^2$). The average male BMI was 23.8 kg/m$^2$ ($SD = 4.75$) and the average female BMI was 23.6 kg/m$^2$ ($SD = 4.14$). Both of these values fall within the normal BMI range, and BMI did not significantly differ between genders, $t(37) = 0.15$, $p = .89$. Scores on the body dissatisfaction questionnaire (BSQ-34) ranged from 34 to 125 for men ($M = 62.2$, $SD = 24.3$) and from 34 to 148 for women ($M = 80$, $SD = 36.1$). These BSQ scores are comparable to those reported in previous research (e.g., Glauert et al., 2010; $M = 82.2$, Experiment 1). BSQ scores of 80 and above indicate a high risk for the development of eating disorders (Sepulveda, Carrobles, & Gandarillas, 2008). Eight women and five men had BSQ-scores that fell within the high-risk range. Because the number of high-risk participants was so small, we did not include risk group in our analyses reported below. However, we conducted preliminary analyses *removing* these participants, and the results were the same as when high-risk participants were included. Thus, the analyses below include the entire range, and, given the limited range of BSQ scores, we explored the relation between individual differences in body dissatisfaction and attentional bias.

Preliminary analyses indicated that there were no differences in attentional bias scores between views (frontal, left, back, and right), so data were collapsed across the different orientations. First we examined whether there were gender differences in men and women's attentional bias scores, and whether they demonstrated a greater than zero bias for same-gender *thin* bodies. Thus, we ran a 2 × 2 repeated measures ANCOVA on attentional bias scores with participant gender (M, F) as a between-subjects factor and stimulus gender (M, F) as a within-subjects factor while controlling for BMI. The ANCOVA yielded a significant interaction between stimulus gender and participant gender on bias scores after controlling for BMI, $F(1, 36) = 7.50$, $p = .010$, $\eta^2 = .172$ (see Fig. 2). Men demonstrated a higher bias score for male bodies than did women, $F(1, 38) = 4.97$, $p = .032$, $\eta^2 = .121$. According to one-sample t-tests (one-tailed), men ($M = 0.052$, $SD = 0.175$) exhibited a bias approaching significance for *thin male* bodies, $t(20) = 1.365$, $p = .094$, while women showed a bias approaching significance for *heavy* male bodies ($M = -0.068$, $SD = 0.170$), $t(17) = -1.71$, $p = .053$.

There was no significant difference between men and women's response to female bodies, $F(1, 38) = 2.44$, $p = .127$, $\eta^2 = .063$. However, like men, women demonstrated a greater than zero bias that was approaching significance for thin female bodies ($M = 0.068$, $SD = 0.167$), $t(17) = 1.73$, $p = .05$; no bias emerged for female bodies in men ($M = 0.008$, $SD = 0.063$), $t(20) = 0.55$, $p = .294$. Altogether, our data exhibit some support for an attentional bias for thinness in both men and women that is exclusive to bodies of the same gender as the perceiver.

Next we examined whether body dissatisfaction was related to an attentional bias for same-gender and different-gender bodies after controlling for BMI. We conducted two hierarchical regression analyses in which same-gender and different-gender attentional bias scores served as the outcome variables. For each regression, BMI scores were entered in the first step as a control variable, followed by BSQ scores and participant gender in the second step, and the interaction between participant gender and BSQ scores entered as the third and final step. There were no other significant main or interaction effects, $Fs < 0.95$, $p > .05$.

In summary, the primary goal of Experiment 1 was to examine whether women and men demonstrate a biased allocation of visual attention towards thin same-gendered bodies. Glauert et al. (2010) found that women in general selectively attended to thin female bodies. Using newly created body stimuli, the current data partly replicates and extend previous research. Both women and men exhibited some evidence of an attentional bias for thin body shapes that was specific to same-gender bodies. However, we did not find a significant relation between attentional biases for thinness and self-reported levels of body dissatisfaction.

There are several plausible reasons for Experiment 1's tenuous results. First, it is possible that the sample size of the current study was too small to yield enough power to detect significant effects. Previous studies consisted of at least 50 participants (Glauert et al., 2010) and as noted above, the number of high-risk participants was so small (8 women and 5 men); together, these may explain the null relation between individual differences in body dissatisfaction and attentional biases. Second, it is possible that the stimuli were too weak to elicit a strong relation between body dissatisfaction and attentional biases. The female stimuli in Experiment 1 were clothed in tank tops that covered the majority of the body's torso. Previous research implicates the torso as a critical region in the determination of bodily ideals (Crossley, Cornelissen, & Tovée, 2012). Furthermore, prior research on attentional biases for thin bodies in women used stimuli that were nude, exposing the torso of each figure (Glauert et al., 2010).

## Experiment 2

Experiment 2 sought to address the methodological limitations of Experiment 1 and, thus, provide a stronger examination of whether both men and women demonstrate attentional biases for thin body shapes, particularly among those with high body dissatisfaction (i.e., individuals at high risk for developing eating disorders). The procedure for Experiment 2 was similar to that of Experiment 1 with a few important differences. First, we used a larger sample size in order to recruit more individuals who score high on the BSQ measure. Second, we modified the body stimuli to expose the torso of each of the images in order to make weight differences between the thin and heavy bodies clearer. Third, since participants showed some evidence of a bias for same-gender bodies in Experiment 1, participants only viewed same-gender body stimuli in the current experiment. Instead of viewing opposite gender bodies, we included a new control stimulus (i.e., thin and heavy buildings) to determine if attentional biases for thinness are general to all thin shapes or specific to human bodies of the same gender. Lastly, to calculate BMI, participants' height and weight were measured directly by the experimenter to avoid any potential self-reporting biases.

### Method

**Participants.** Participants were undergraduate students from Rutgers University Newark. Sixty-nine males, mean age 21.6 ($SD = 5.3$) and 89 females, mean age 21.7 ($SD = 5.8$), participated for course credit. The study was approved by Rutgers University IRB. All participants provided written informed consent before initiating the study.

**Stimuli.** New realistic full-body male and female figures were created with the same on-line graphic visualization program used in Experiment 1 (see Fig. 1B). Thin and heavy versions of each body were constructed using the parameters from Experiment 1, except that the BMI of the heavy male bodies was 44 as opposed to 42. The change in BMI was intended to increase the perceptual differences between the thin and heavy male figures. Further, previous research suggests that the torso is a critical region in the determination of bodily ideals (Crossley et al., 2012) and should thus be exposed on the stimuli. To accomplish this, male figures were clothed with shorts and no shirt and female figures wore black bikinis exposing the full torso of stimuli. As in Experiment 1, the figures were dressed down to underwear. The female figures wore a bra instead of a tank top to expose more of the torso to match the amount of exposed skin on the shirtless male figures. Skin tone was held constant.

Experiment 2 also included object stimuli consisting of thin and wide buildings. The buildings were constructed to match the vertical and horizontal extents of the human bodies in the thin and heavy conditions. In creating the object stimuli, multiple views of the buildings did not render visual differences. That is, the front, back, left, and right views of the building stimuli were essentially identical. Further, since Experiment 1 found no differences in attentional biases between the various body views, only the frontal views of the bodies and buildings were presented.

**Procedure.** The apparatus and procedure were similar to that of Experiment 1 with three exceptions. First, instead of 6 blocks of 24 trials per block (144 total trials) of the arrow-probe task, participants in the current study completed 3 blocks of only same-gender body trials (72 total trials), followed by 3 blocks of building trials (72 total trials). Second, the order of the BSQ and arrow-probe task was counterbalanced across participants to account for any potential measurement and task order effects. Third, the experimenter directly measured participant's height and weight to compute objective and unbiased BMI scores.

### Results and Discussion

As in Experiment 1, BMI was calculated from height and weight measurements taken by the experimenter. The average BMI was 26.0 $kg/m^2$ for men and 24.8 $kg/m^2$ for women. BMI did not significantly differ between genders, $t(156) = 1.17$, $p = .24$. Scores on the body dissatisfaction questionnaire (BSQ-34) ranged from 34 to 143 for men ($M = 71.1$, $SD = 29.6$) and from 34 to 148 for women ($M = 84.6$, $SD = 32.1$, $\alpha_{men} = .97$; $\alpha_{women} = .97$). Forty-five women and twenty-one men (42% of our sample) had BSQ-scores that fell within the high range (80 and above) indicating a high risk for the development of eating disorders (Sepulveda et al., 2008).

First, we examined whether there were gender differences in men and women's attentional bias scores, and whether they demonstrated a greater than zero bias for same-gender thin bodies. We ran a $2 \times 2$ repeated measures ANCOVA on attentional bias scores with participant gender (M, F) as a between-subjects factor

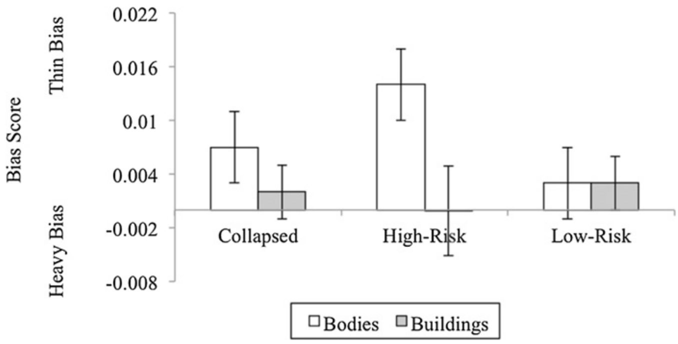


**Fig. 3.** Results of ANOVA from Experiment 2.

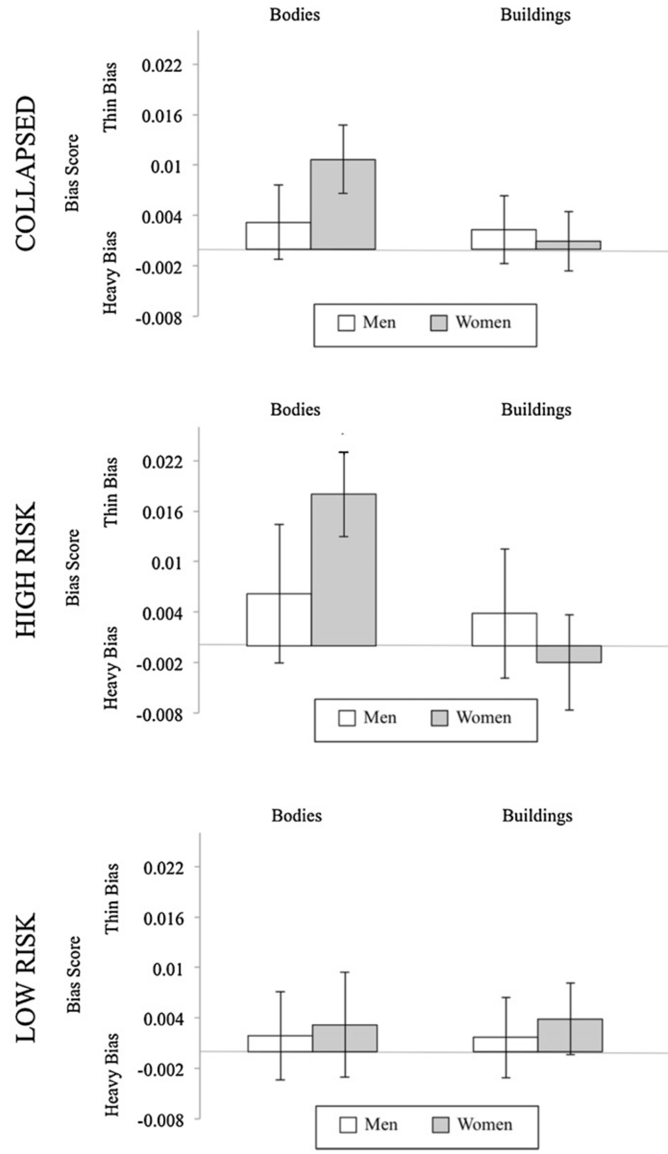


**Fig. 4.** Results of ANOVA from Experiment 2 by gender. *Top.* Bias scores collapsed across all men and women. *Middle.* Results from men and women in the high-risk group only, demonstrating a bias for same-gender bodies that was significantly greater than zero. *Bottom.* Results from the low-risk group only, showing no significant biases for thin same-gender bodies.

and stimulus type (bodies, buildings) as a within-subjects factor while controlling for BMI. The ANCOVA yielded no significant main or interaction effects, $p > .05$. Next, we ran one-sample t-tests (one-tailed) comparing participants' attentional bias scores to zero; all participants demonstrated a significant bias for thin same-gender bodies ($M = 0.007$, $SD = 0.038$), $t(157) = 2.48$, $p = .007$ (see Fig. 3 for bias scores, and Fig. 5 for bias scores separated by gender). By comparison, no such bias emerged for buildings, ($M = 0.002$, $SD = 0.033$), $p = .15$. No order effects were observed, $p > .05$.

Next we examined whether body dissatisfaction was related to an attentional bias for same-gender thin bodies (but not for building stimuli) after controlling for BMI. To do this, we conducted two hierarchical regression analyses in which attentional bias scores for same-gender bodies and buildings served as the outcome variables. For each regression, BMI scores were entered in the first step as a control variable, followed by BSQ scores and participant gender in the second step, and their interaction in the third and final step. The second step of the model produced a significant BSQ main effect, $t(157) = 3.23$, $p = .002$, $R^2 = .063$, demonstrating that, for both men and women, higher levels of body dissatisfaction significantly predicted attentional bias scores for thin same-gender bodies (see Fig. 5).

To further understand this relation, we ran an ANCOVA on bias scores with risk group (high versus low) as a between-subjects variable and BMI as a covariate, which yielded a significant effect of risk group, $F(1, 157) = 4.17$, $p = .043$, $\eta^2 = .026$. Finally, follow-up one-sample t-tests (one-tailed) confirmed the importance of risk-group in driving men and women's attentional bias for same-gender bodies. In the low-risk group, participants did not show a significant bias for thin same-gender bodies, ($M = 0.003$, $SD = 0.039$), $t(92) = 0.62$, $p = .268$. Conversely, in the high risk group, participants did show a bias for thin same-gender bodies, ($M = 0.014$, $SD = 0.035$), $t(66) = 3.29$, $p = .001$, that was significantly greater than zero (see Fig. 3 for bias scores, and Fig. 4 for bias scores separated by gender). There were no significant main or interaction effects when the outcome variable was bias scores for buildings, $F < 0.95$, $p > .05$. Again, no order effects were observed, $p > .05$.

In summary, these analyses suggest that both men and women with high body dissatisfaction—i.e., those at high risk for developing eating disorders—show a particularly strong attentional bias toward thin same-gender bodies. This relation was not moderated by the gender of the participant in either the regression or the ANCOVA, demonstrating a consistent relation between body dissatisfaction and attentional biases among men and women.

## General Discussion

Body dissatisfaction, or the negative subjective evaluation of the weight or shape of one's own body, is a well-established predictor of several significant health risks including obesity, depression, eating disorders, and anabolic steroid abuse. According to socio-cultural theories of body image, body dissatisfaction arises when individuals compare their body to what they perceive as the "ideal" (Heinberg, 1996; Levine & Chapman, 2011; Trottier, Polivy, & Herman, 2007). In general, women (and possibly men) characteristically strive for the thin body ideal that is glamorized in Western media (Cohen, 2006; Smolak & Murnen, 2008), and research has suggested that social comparison—specifically, comparing ones own body to one's ideal—gives rise to negative emotions, concerns, and assessments of one's body (Agras, 2010; Myers & Crowther, 2009). The current research was aimed at increasing our understanding of the underlying attentional processes that might lead to the development of body dissatisfaction and subsequent eating disorders.

In two experiments, we examined whether men and women demonstrate an attentional bias for thin bodies, and whether such a bias is related to body dissatisfaction. The results of Experiment 1 partially replicated previous work demonstrating that women have an attentional bias for thin female bodies, and extend it to show a

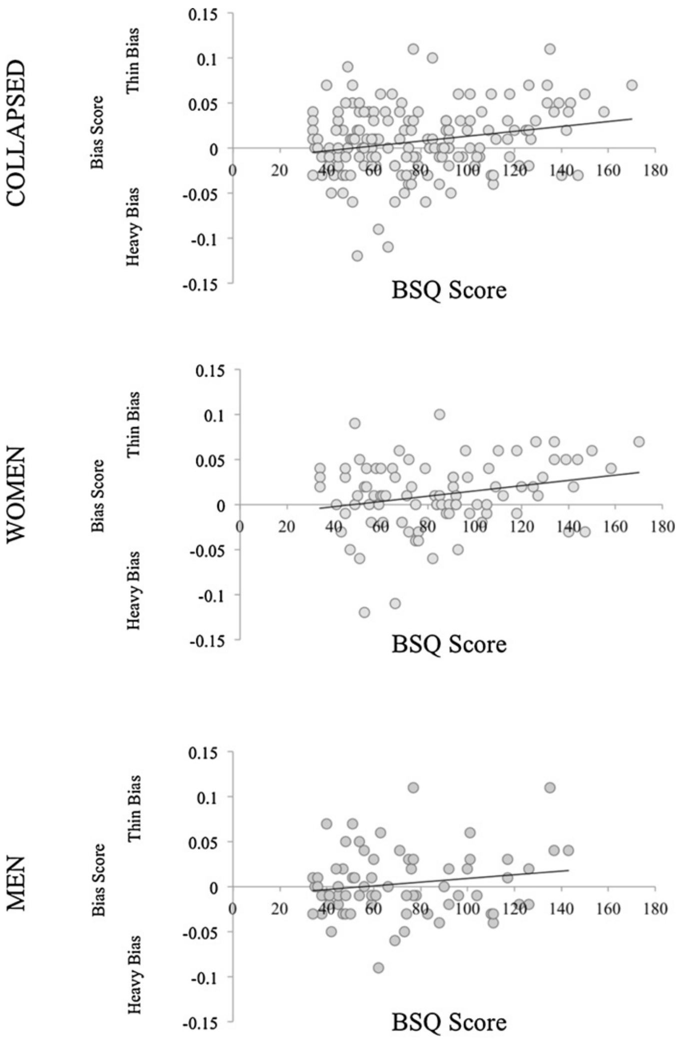


**Fig. 5.** Results of regression analysis from Experiment 2. *Top.* Data collapsed across all men and women, demonstrating a significant relationship between bias scores and BSQ. *Middle.* Results from women only. *Bottom.* Results from men only.

similar pattern of responding in men. Experiment 2 provides evidence that an attentional bias for thinness is unique to individuals with high levels of body dissatisfaction. These findings are consistent with previous research reporting a bias for thin body shapes in women (Glauert et al., 2010) and a relation between attentional biases and body dissatisfaction (Smith & Rieger, 2006). It is worth noting that 42% of our sample from Experiment 2 had BSQ scores that fell into the high-risk range. Further, the mean BSQ scores we obtained were not necessarily higher than those reported in previous research (Glauert et al., 2010), suggesting that a large number of college-aged men and women might commonly fall into this high-risk range.

It is important to note that the relationship between attentional bias scores and body dissatisfaction was found while controlling for the effects of body mass index (BMI), indicating that attentional biases for thinness are driven by individuals' feelings about their bodies and cannot not be accounted for by differences in actual body size relative to perceived size of a stimulus. In other words, our findings suggest the attentional biases for thinness are related to negative thoughts and feelings about one's body and do not simply reflect a perceptual phenomenon. This finding is important because it sheds light on the fact that body dissatisfaction entails more than just being physically bigger or smaller than an ideal body, but that the subjective, experienced difference between a person and the ideal has an aversive emotional effect on an individual.

Further, the current findings extend previous work by demonstrating that individuals with high levels of body dissatisfaction have an attentional bias for thin same-gender bodies in particular, and that such a bias does not generalize to thin shapes (i.e., buildings) or bodies of the opposite gender. These findings are in line with classic theories of social comparison positing that individuals generally compare themselves to similar others. Based on Festinger's classic view (1954), individuals actively search out standards to which they can compare themselves. Indeed, previous research suggests that women frequently compare their own bodies to the bodies of thin women, despite the fact that such comparisons might be damaging to their self-image (Engeln-Maddox, 2005; Leahey, Crowther, & Mickelson, 2007). Thus, considering that women, for example, are more likely to seek out and compare their own bodies to those of other women and not to those of men, it is not surprising that attentional biases for thinness was specific to thin same-gender bodies (Kruglanski & Mayseless, 1990).

The current study has implications for the design of future interventions aimed at reducing attentional biases for thin/idealized bodies and potentially reducing body dissatisfaction. Given that attentional biases for threat-relevant stimuli have been implicated as an underlying mechanism in causing clinical anxiety, researchers have hypothesized that reducing attentional biases for threat might also then be an effective method in reducing anxiety (Craske & Pontillo, 2001; Hakamata et al., 2010). Using the classic dot-probe methodology, several studies have demonstrated that highly anxious individuals who are trained to repeatedly direct their attention *away* from threatening stimuli (e.g., respond to dot probes that appeared in the place of neutral as opposed to threatening words or faces) show a reduced attentional bias for threat after training, and report significantly lower levels of anxiety than before training (see Hakamata et al., 2010; for a meta-analysis). Such a procedure—called Attention Bias Modification Treatment—is now being piloted as a treatment for several types of clinical anxiety. Future research can use similar methods aimed at reducing attentional biases for thin/idealized bodies, and thereby potentially reducing body dissatisfaction as well.

Although this work is an important first step in studying the relationship between body dissatisfaction and biased attention, it is only a first step, and opens the door to various possibilities for future research. First, our use of the arrow-probe paradigm does not allow us to differentiate between whether participants responded faster to thin stimuli or whether they were simply looking longer at them. Here we defined an attentional bias as faster responding to the arrow probe, which could indicate either faster or longer looking, but future studies using an eye-tracker can allow us to make this distinction and examine the mechanisms (e.g., rapid attention towards thin bodies versus difficulty disengaging from thin bodies) by which men and women respond more quickly to thin same-gender stimuli.

Second, although we report a significant relation between attentional biases for thin same-gender bodies and body dissatisfaction (Experiment 2), Glauert et al. (2010) reported that women with a *reduced* attentional bias toward thin bodies exhibited greater levels of body dissatisfaction. It is unclear why such differences were found. One possibility is that Glauert et al. (2010) used body stimuli that were emaciated, which might have produced different patterns of responding than the bodies used here, which were thin but not emaciated. Further, their sample was predominantly made up of Caucasian women, and although we did not collect demographic information on participants, another possibility is that individual differences may have contributed to differences among our results and those of Glauert et al. (2010). Indeed, adults have varied experiences with exposure to thin versus heavy body stimuli based on cultural factors, and for example, might be more heavily exposed to thin women's bodies in Western media than thin men's bodies. Future research should examine individual differences based on experience, race/ethnicity, and sexual orientation that may moderate the relation between attentional biases for thinness and body dissatisfaction and thus demonstrate the boundary conditions of this relation.

One final direction for future research is to examine the relation between attentional biases and body dissatisfaction developmentally. Although we were able to identify attentional biases for thin bodies in adults, it is likely that such a bias is acquired early in development. Sadly, body dissatisfaction has already been documented in girls and boys as young as 6 years of age (e.g., Lowes & Tiggemann, 2003; Ricciardelli & McCabe, 2001). Experimental research indicates that exposure to Barbie dolls—who's waists are 39% smaller, proportionally, than the waists of anorexic patients (Rogers, 1999)—increases body dissatisfaction in young girls (Dittmar, Halliwell, & Ive, 2006), and exposure to impossibly muscular action figures like Superman and G.I. Joe increases body dissatisfaction in boys (Bartlett et al., 2005). Thus, it is likely that the relationship between body dissatisfaction and attentional bias for thin bodies does not begin in adulthood. A developmental examination of when attentional biases for thin bodies begin might be informative for when to implement potential intervention strategies.

In conclusion, the current findings provide evidence for a meaningful relationship between attentional biases and body dissatisfaction in women and men. Establishing this relation is important for future interventions aimed at reducing body dissatisfaction and its associated clinical disorders. Indeed, body dissatisfaction consistently predicts several major health risks including depression, obesity, body dysmorphic disorder, and anabolic steroid use (e.g., APA, 2013; Hildebrandt, Langenbucher, Lai, Loeb, & Hollander, 2011; Kanayama, Pope, & Hudson, 2001; Keel & Klump, 2003; Thompson, 2004; Tylka, 2004) as well as the likelihood of plastic surgery (Crerand, Franklin, & Sarwer, 2006). Further, body dissatisfaction is considered one of the best predictors of the development and persistence of eating disorders such as anorexia nervosa and bulimia nervosa (e.g., Keel et al., 2003; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; Tylka, 2004; Wilson, 1999). It is again worth noting that almost half the sample (42% of men and women) from Experiment 2 exhibited high-risk levels of body dissatisfaction. Considering the predictive power of body dissatisfaction for eating disorders and other maladaptive behaviors, and the high incidence of body dissatisfaction in our college-aged sample, this line of research provides a promising new direction for studying the attentional and cognitive underpinnings of various emotional and clinical issues.

## Acknowledgements

The authors thank Adam Doerrfeld for his assistance and the Minority Biomedical Research Support Program (MBRS) for partial funding to conduct this research.

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