5-2018

Body Image, Fear of Fat, and Attentional Bias for Thin and Non-thin Bodies

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BODY IMAGE, FEAR OF FAT, AND ATTENTIONAL BIAS FOR THIN AND NON-THIN BODIES

By

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Presented to the Faculty of the Graduate School of

Stephen F. Austin State University

In Partial Fulfillment

Of the Requirements

For the Degree of

Master of Arts in Psychology

STEPHEN F. AUSTIN STATE UNIVERSITY

MAY 2018

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ABSTRACT

The study examined the impact of Attentional Bias Modification (ABM) on body image and fear of fat in college women. Participants were randomly assigned to one of two conditions: an ABM condition or a non-ABM placebo condition in viewing a series of thin and non-thin body stimuli. Extending previous work documenting associations between attentional biases and body dissatisfaction and the effects of ABM on body dissatisfaction, we hypothesized that effects of an ABM task designed to direct attention toward non-thin bodies would: (a) decrease body dissatisfaction, (b) increase body appreciation, and (c) decrease fear of fat. There were no significant differences across experimental conditions on body dissatisfaction, body appreciation, and fear of fat. This was the case for both in-laboratory difference scores and follow-up difference scores. These findings are a conceptual replication of previous work (Loughnan et al., 2015). Methodological explanations are offered with respect to improving the future tests of ABM on attentional biases for thin and non-thin body images.

Keywords: attentional bias modification, body dissatisfaction, positive body image, fear of fat

ACKNOWLEDGEMENTS

I would like to thank my thesis chair and mentor, Dr. Sarah Savoy, who has supported me for the past five years here at SFA. Dr. Savoy's guidance has helped me grow as a researcher throughout my years as an undergraduate student as well as a graduate student.

Additionally, I would like to thank my committee members, Dr. Scott Drury, Dr. Scott Hutchens, and Dr. Nina Ellis-Hervey. Your knowledge and constant support has guided me throughout my thesis and it was a delight working with you all.

I would like to thank my cohort, especially Michael Rice, Tessa Thomas, and Emily Sanchez. Thank you for the words of encouragement, support, and laughs when I needed it the most.

I would also like to thank Niveda Chellappan, Dillon Roulet, Chisom Ogba, Margaret Hance, Sarah Pelfrey, and Jackie Miranda. Each of you have encouraged me throughout this journey and I am very grateful for your friendship.

Lastly, I would like to give the biggest thanks to my family for supporting me throughout my life. I would not be where I am today without your love and endless support. To Lucy, thank you for the endless cuddles for the past seven years.

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BODY IMAGE, FEAR OF FAT, AND ATTENTIONAL BIAS FOR THIN AND NON-THIN BODIES

Body image refers to the perception of one's own physical or outer appearance (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). One component of negative body image, body dissatisfaction, can be described as a multifaceted negative psychological reaction to one's physical appearance. It encompasses the individual's self-perception, attitude, behaviors, and feelings (Cash, 2004). Body dissatisfaction has been so consistently documented among young women that it is often described as a normative discontent (e.g., Rodin, Silberstein, & Striegel-Moore, 1985; Stronge et al., 2015). These high levels of body dissatisfaction in women are a concern because body dissatisfaction is associated with emotional distress (Johnson & Wardle, 2005), depression (Siegel, 2002), and eating disorder-related pathology (Polivy & Herman, 2004). An alarming 50% of young girls and undergraduate women may be dissatisfied with their bodies (Bearman, Presnell, & Martinez, 2006) and eating disorders often emerge during early adulthood, a life stage in which many attend college (Stice, Marti, & Rohde, 2013; Volpe et al., 2016). The transition to college life can be detrimental to diet and physical activity due to heavier workload, increased stress and anxiety, and change in routine (Malinauska, Raedeke, Aeby, Smith, & Dallas, 2006). Weight- and self-related negative evaluation have also been implicated as risks to psychosocial adjustment that can develop during

this period of transition. Within the college experience, in addition to stress, increased weight dissatisfaction, reduced perceived attractiveness, and reduced perceived effectiveness predict worsening of eating disorder symptoms in females (Striegel-Moore, Silberstein, Frensch, & Rodin, 1989). Research suggests that women who compare themselves with others typically experience greater body dissatisfaction (Myers & Crowther, 2009). Women with body dissatisfaction tend to engage in an upward social comparison process, meaning they compare themselves to thin women (Cattarin, Thompson, Thomas, & Williams, 2000). Research also suggests that young women estimate other women to be smaller than they actually are in terms of body mass index (BMI) and to have a thinner body shape ideal than they actually do. Moreover, these errors in estimation have been shown to predict anorexic symptoms (Sanderson, Darley, & Messinger, 2002). It is possible that these misperceptions about the prevalence of thinness and emphasis placed on thinness in one's social world, and associated body dissatisfaction develop in part out of anti-fat bias and direction of one's attention away from real-life or media portrayals of overweight bodies.

Anti-fat Bias, Body Image, and Avoidance of Overweight Targets

College students who make more physical appearance-related comparisons to others in various social situation are more likely to endorse anti-fat attitudes and appearance dissatisfaction (O'Brien, Hunter, Halberstadt, & Anderson, 2007), and those who experience greater anti-fat bias have stronger preferences for thinness (Carels & Musher-Eizenman, 2010). Fear of fat, one's own fear of gaining weight, is described by

some researchers as a component of anti-fat bias (Crandall, 1994; Crandall & Beirnet, 1990). Like other measures of anti-fat bias, it has been linked to appearance dissatisfaction (Tremblay et al., 2016). Anti-fat attitudes (Bessenoff & Sherman, 2000; Vartanian, Trewartha, & Vanman, 2016) and body dissatisfaction have both been shown to predict avoidance of overweight targets (Tremblay et al., 2016) and disgust is reported by those who endorse greater avoidance of an overweight target (Vartanian, Trewartha, & Vanman, 2016). While body dissatisfaction has been linked to increased attention toward thin bodies over neutral stimuli and non-thin bodies (e.g., Dondzillo, Rieger, Polermo, Byrne, & Bell, 2017; Joseph, LoBue, Rivera, Irving, Savoy, & Shiffrar, 2016), to our knowledge, no previous studies have examined anti-fat attitudes in relation to visual attention biases toward thin versus non-thin bodies.

Attentional Bias and Body Image

Visual attention bias, or increased gaze duration on threat-relevant stimuli, has recently emerged as a risk factor of interest in research on eating-related concerns and body dissatisfaction. The dot-probe task is one computer-based experimental task that has been utilized to measure attentional biases toward appearance and body related stimuli (Boon, Vogelzang, & Jansen, 2000; Gao et al., 2011; Glauert, Rhodes, Fink, & Grammer, 2010; Placanica, Faunce, & Soames-Job, 2002; Rieger et al., 1998; Shafran, Lee, Cooper, Palmer, & Fairburn, 2007). The dot-probe task is a controlled visual search in which participants are asked to locate a target among various distractors (MacLeod, Mathews, & Tata, 1986). Using the dot-probe task, researchers have observed that both adults and

children exhibit more attentional bias to threatening stimuli than to non-threatening stimuli (LoBue & Rakison, 2013). Researchers are also beginning to explore whether women demonstrate attentional bias to thin body stimuli. Not only do women find thinner bodies to be more attractive than average or overweight bodies (Fallon & Rozin, 1985), dot-probe studies suggest that women demonstrate a greater attentional bias to thin bodies than to non-thin bodies (Glauert et al., 2010) and that this bias is stronger among women who experience body dissatisfaction (Dondzillo et al., 2017; Joseph et al., 2016). Women who experience body dissatisfaction and place an importance on thinness could simply be more motivated to look at thin body stimuli because they represent an ideal they feel pressured to achieve. We propose another explanation for this pattern of findings: Looking more at thin bodies than non-thin bodies may increase opportunity for upward social comparisons and may lead to misperceptions about how many women in one's own social world actually fit the thin ideal. Both of these tendencies have been shown to predict body dissatisfaction (Cattarin et al., Williams, 2000; Myers & Crowther, 2009; Sanderson et al., 2002). This is not a new proposal or a new line of thinking by any means. In fact, many studies have documented a causal relation between exposure to thin ideal images and subsequent increases in body dissatisfaction (e.g., Irving, 1990; Stice & Shaw, 1994). This body of work has played a major role in the development of the sociocultural model of body image disturbance (Tiggemann & Pickering, 1996). According to the sociocultural model of body image and disordered eating, women tend to experience higher levels of body dissatisfaction when repeatedly making appearance-

related social comparison to other women or images of other women (Vartanian & Dey, 2013). Additionally, the sociocultural model purports that media create constant exposure to images of thin women which tends to reinforce Western culture's emphasis on the relationship between physical attractiveness and a thin physique (Cash, 1990). Constant focus on these images may lead to personal acceptance and or internalization of the ideal (Heinberg, Thompson, & Stormer, 1995). With greater internalization of the thin ideal comes increased risk for body image disturbance, disordered eating, and negative affect (Heinberg et al., 1995)

Positive Body Image

Much of the research in the field of body image focuses on the pathology of negative body image symptoms rather than more positive, adaptive, and healthy reactions to one's body. Positive body image comprises appreciation, acceptance, and admiration of the uniqueness of one's own body (Wood-Barcalow, Tylka, & Augustus-Horvath, 2010). Cash, Santos, and Williams (2005) developed a measure of positive rational acceptance, which includes adaptive mental and behavioral activities that result from threats to body image, such as self-care and rational self-talk. Viewing media images that conform to the thin ideal is one example of a threat to body image. Other examples include viewing advertisements containing dieting messages, interacting with someone who engages in negative body talk, being weighed at the physician's office, and realizing an article of clothing has become tighter around the waistband (Cash et al., 2005).

One aspect of positive body image that is considered to be adaptive is body appreciation (Avalos, Tylka, & Wood-Barcalow, 2005). Body appreciation goes beyond the idea of a simplistic positive opinion of one's physical self. Instead, body appreciation involves accepting the body's flaws regardless of size and weight, responding to the body's needs, engaging in self-care for the body, and protecting oneself against the influence of unrealistic media images of the body (Avalos et al., 2005). Research has shown body appreciation is positively associated with body acceptance by others and intuitive eating (Avalos & Tylka, 2006). Additionally, individuals with high levels of body appreciation express increased life satisfaction, self-esteem, optimism, and proactive coping (Avalos et al., 2005). Helping clients adopt positive body image can help them respect, appreciate, celebrate, and honor their bodies, which in turn can promote treatment gains (Tylka & Wood-Barcalow, 2015). Encouraging women to practice the skill in recognizing the unrealistic nature of bodies that appear in media can protect body image and facilitate body appreciation (Klein & Cook-Cottone, 2013). If body image interventions only focus on reducing negative body image and ignore the promotion of positive body image, clients may be limited to the benefit of a neutral body image (e.g., simply tolerating the body rather than hating it; Tylka & Barcalow, 2015).

Attention Bias Modification (ABM)

Smith and Rieger (2006) were the first researchers to test an ABM intervention designed to modify attention to weight and appearance-related stimuli. Their intervention was designed to direct attention toward negative shape/weight related words. ABM has

previously been used to relieve psychological symptoms of anxiety disorders. In one study, a clinical sample that was exposed to ABM, which directed visual attention away from threat-related words, experienced reduced anxiety symptoms (Amir, Beard, Burns, & Bomyea, 2009). ABM has also been used to direct attention away from tempting food cues and exposure to this intervention has reduced chocolate consumption (e.g., Kemps, Tiggemann, Orr, & Grear, 2014)

Current Study and Hypotheses

Smith and Rieger (2006; 2009) documented an increase in body dissatisfaction in women trained to direct attention toward negative shape/weight related words and concluded that helping patients reduce their attentional biases toward negative shape/weight words could reduce their risk for body image concerns. Loughnan, Mulgrew, and Lane (2015) exposed women to an ABM task designed to train attention away from negative shape/weight related words in an effort to translate Smith and Rieger's work into a body image intervention, however their intervention was not successful in reducing body dissatisfaction. Further research was needed to determine whether ABM training may be an effective tool for addressing body image concerns. Loughnan, Mulgrew, and Lane's (2015) findings suggested that ABM training with word stimuli was insufficient to reduce body dissatisfaction. Questions still remained as to whether ABM training using more vivid negative shape/weight stimuli could improve body image. While recent work has documented positive associations between reports of body dissatisfaction and both avoidance of non-thin body stimuli and

greater attention toward thin bodies (Dondzillo et al., 2017, Joseph et al., 2016), no previous studies have tested an ABM protocol utilizing images for body stimuli rather than words. In addition, no previous studies have examined whether associations exist between self-reported positive body image or fear of fat and attentional biases toward body stimuli. In the current study we addressed these gaps, using self-report measures of body image, fear of fat, a modified dot-probe task to assess attentional bias toward images of thin and non-thin body stimuli. We predicted that, when compared to college women who complete a placebo task, college women exposed to an ABM task directing attention toward non-thin body stimuli would exhibit: (a) greater decrease in state body dissatisfaction, (b) greater increase in body appreciation, and (c) greater decrease in fear of fat.

Method

Participants

Eighty-three female undergraduate students were recruited through the department of psychology's SONA system at Stephen F. Austin State University. Only students over the age of 18 were eligible to participate. Racial makeup of the sample was (63.9% White, 21.7% Black, 1.2% Asian, 2.4% American Indian/Alaskan Native, 1.2% Native Hawaiian/Pacific Islander, and 9.6% Other) with a mean age of 19.74. Participants received course credit or extra credit in their psychology courses in return for taking part in this study. Participants who completed all sessions of the study were entered into a drawing for a $50 gift card.

Measures

Trait-level body dissatisfaction. Participants completed the 34-item Body Shape Questionnaire (BSQ), as a measure of trait-level body dissatisfaction (Cooper, Taylor, Cooper, & Fairbum, 1987). Participants rated how often they have experienced body shape/weight-related concerns (e.g., "Have you felt excessively large and rounded?") over the past month using a 6-point Likert scale, ranging from 1 (*never*) to 6 (*always*). A BSQ composite score was computed by averaging responses to all 34 items. Higher scores represented greater body dissatisfaction.

State-level body dissatisfaction. To assess state-level body dissatisfaction, participants completed the 16-item state-level subscale of the Physical Appearance State and Trait Anxiety Scale (PASTAS; Reed, Thompson, Brannick, & Sacco, 1991). The instructions for this subscale asked participants to report how anxious, nervous, or tense they feel about 16 different parts of their body at the very moment in which the subscale is administered. Participants were asked to respond using a 5-point Likert scales ranging from 0 (*not at all*) to 4 (*exceptionally so*). A composite score was computed by averaging responses for all 16 subscale items. Higher scores represented greater levels of physical appearance anxiety.

Positive body image. As a measure of positive body image**,** participants completed the 10-item State Body Appreciation Scale-2 (SBAS-2; Homan, 2016). Participants were asked to respond using a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). A composite score was computed by averaging responses for all 10

items. While this scale is typically computed such that higher scores reflect greater body appreciation, for ease in interpretation alongside our other primary dependent variables, we recoded all items prior to computing the average for the composite score. Higher scores indicated lower levels of body appreciation.

Fear of fat. Participants completed the 4-item fear of fat subscale of the Body Image Attitudes and Beliefs Scale (BIABS; Levitt, 2004). The fear of fat subscale measured an individual's concerns about gaining weight, attitudes toward fat and overweight, and attitudes that indicate avoidance of gaining weight or becoming fat. Participants responded using 4-point Likert scales ranging from 1 (*strongly disagree*) to 9 (*strongly agree*). Higher scores represented less favorable attitudes.

Body mass index. The researcher weighed and measured consenting participants to obtain their current weight and height. Weight and height were used to compute body mass index (BMI) in kg/m^2.

Mood. Participants completed the 16-item Brief Mood Introspection Scale (BMIS) for the assessment of mood (Mayer & Gaschke, 1988). Participants were presented with a list of adjectives to describe their own feelings at that very moment (i.e., grouchy, tired, happy). Participants responded to each adjective item using a 7-point Likert scale ranging from 1 (*I definitely do not feel*) to 7 (*I definitely feel*). A composite score was computed as the average of all items after recoding all negative adjective items. Higher scores indicated more positive mood.

Demographics. Participants completed demographics items regarding their age, sex, ethnicity, and race.

Attention check. An attention check item was included that instructs participants to select response option 4 from a Likert scale provided. Data for all participants who failed two of the three attentiveness checks (selecting an option other than 4), were excluded from the dataset prior to analysis.

Materials and Procedure

As part of a departmental prescreening, participants completed the PASTAS, BAS, BIABS, and BSQ in an online survey at least one day prior to the in-laboratory session (Appendix B). Upon arrival to the laboratory session, participants were randomly assigned to either the ABM condition or the control condition. Once greeted, participants were seated in front of a computer screen and asked to read the informed consent form (Appendix A) and electronically sign if they consent. Consenting participants were asked to complete the BMIS to assess mood (Appendix C). The experimenter read a set of instructions to participants, giving them an opportunity to ask questions before beginning the attentional bias task.

Attentional bias tasks. Participants completed a computer-based modified dot-probe task designed to assess and modify attention towards thin body stimuli and non-thin body stimuli. The modified dot-probe task developed for this study consisted of four phases: pre-assessment of attentional biases, ABM training (or placebo), post-assessment of attentional biases, and booster ABM/placebo training.

The pre-assessment and post-assessment phases measured participant reaction time in pressing the E or the I keyboard keys to indicate the direction in which a dot-probe arrow is pointing when presented on the screen. At the beginning of each trial, participants were asked to direct their attention to a fixation cross (+) at the center of the computer screen. Participants were then instructed to press the spacebar to begin the trial. Next, two image stimuli appeared on the screen, a thin image stimulus and a non-thin stimulus. One of the image stimuli was located on the top part of the computer screen while the other image stimuli was located at the bottom of the computer screen, equally distanced from the fixation cross. The image stimuli were present for 500 milliseconds. Immediately after, the stimuli were replaced with a blank screen containing a one-centimeter arrow (facing either left or right) occupying the position of the middle of one of the image stimuli. Participants were asked to report by pressing the E keyboard key or the I keyboard key as quickly and accurately as possible whether the arrow pointed to the left (E) or right (I). The arrow remained on the screen until a response is made. Once a response was made, the fixation cross appeared on the screen to signal the start of a new trial.

During each of the assessment phases, each of 10 different thin/non-thin stimuli pairs were presented a total of 4 times. In half of the trials the thin body stimuli appeared above the non-thin body stimuli, and in the other half of the trials the non-thin body stimuli appeared above the thin body stimuli. Trials were presented in random order and counterbalanced for location of the thin-body stimuli (top or bottom) and arrow location

(top or bottom). In half of the trials, the dot-probe replaced the thin body stimuli. In the other half of trials, the dot-probe replaced the non-thin body stimuli. There were 40 pre-assessment trials and 40 post-assessment trials.

During the ABM training phase, participants were presented with the same 10 thin/non-thin stimuli pairs. However, the dot-probe always appeared behind the non-thin body stimuli, implicitly directing attention toward the non-thin body stimuli and away from the thin body stimuli. In the ABM training phase, each image stimuli was presented 12 times across the two location combinations with a total of 240 trials. The attentional bias task ended with a booster ABM phase including an additional 40 trials to ensure participants complete the session with a training phase. The control group experienced no manipulation of attention. Instead, they completed 240 placebo training trials plus 40 placebo booster trials. These trials had the same contingencies as the pre-/post assessment phases, counterbalanced for location of the thin-body stimuli (top or bottom) and arrow location (top or bottom). In total, participants completed a total of 360 trials across all phases plus an additional 10 practice trials before starting the attentional bias tasks.

Image stimuli. The thin and non-thin stimuli used in the attentional bias tasks have been matched for arousal in previous work (Appendix D; Dondzillo et al., 2017). Each image was non-copyrighted and was sourced from the internet by Dondzillo et al (2017). Stimuli were cropped to specific body regions (i.e., thighs and abdominal region), which have been documented as particularly salient to body dissatisfaction in women (Nederkoorn, Jansen, Mulkens, & Jansen, 2007).

After the attentional bias tasks, participants completed the BMIS a second time as a manipulation check to ensure that changes in body dissatisfaction or other dependent variables were not due to increases in mood disturbance. After completion of the BMIS, participants completed the PASTAS, BAS, BIABS and the demographics items. Before leaving the laboratory, participants were debriefed and the researcher measured consenting participants' height and weight. Participants were also given information about the follow-up survey, contact information for any further questions (Appendix E), and counseling center information. Lastly, the participant was thanked for their time and was granted two research credits.

Interested participants were then contacted by email one to two weeks after completion of the laboratory session and invited to complete the PASTAS, BIABS, and BAS again in an online Qualtrics survey. Those who completed this online follow-up survey were entered into a prize drawing for a $50 gift card and were granted an additional research credit.

Results

Planned Analyses

To determine whether participants demonstrated a visual attention bias to thin over non-thin bodies before exposure to the ABM or placebo training, mean differences in reaction times across pre-assessment thin and pre-assessment non-thin trials were examined using a paired sample *t*-test. To rule out the possibility that any differences in dependent variables were due to increases in negative mood, paired sample *t*-tests were

performed on difference scores from the pre- to post-attentional training mood assessments. Mood difference scores were also compared across experimental groups using a one-way analysis of variance (ANOVA). Difference scores were computed by subtracting the in-laboratory mood composite score at the beginning of the session from the mood composite score at the end of the in-laboratory session. To ensure that there were no significant differences between experimental groups in terms of age, BMI, and trait-level body dissatisfaction, preliminary analyses included three separate one-way ANOVAs.

Reaction times (i.e., milliseconds) for correct arrow direction judgments were averaged across assessment trials. Consistent with Joseph et al. (2016), attentional bias scores were calculated by subtracting the mean reaction time for arrows that replace thin body stimuli from the mean reaction time for arrows that replaced the non-thin body stimuli, then this difference was divided by the average of the two means. Positive attentional bias scores indicate a bias toward thin body stimuli while negative scores indicated bias toward non-thin body stimuli. Pre-assessment attentional bias scores were subtracted from post-assessment attentional bias scores to create an attentional bias difference score. Higher positive scores difference scores indicate an increase in attention towards the thin body stimuli whereas lower scores indicate an increase in attention to the non-thin stimuli. As a manipulation check, a one-way ANOVA was conducted to determine whether attention bias difference scores varied across experimental conditions.

If the ABM task was successful in increasing attention to non-thin bodies, the difference score would be significantly lower in the ABM condition than the control condition.

For the dependent variables, six separate difference scores were computed by subtracting prescreening composite scores from both in-laboratory and follow-up composite scores for body dissatisfaction, body appreciation, and fear of fat. Our hypotheses tested using two MANOVAs, one conducted on the in-laboratory difference scores and one conducted on the follow-up difference scores. The dependent variables for each of these tests included the difference scores for body dissatisfaction, body appreciation, and anti-fat bias. If the ABM task was successful in reducing body dissatisfaction and fear of fat and increasing positive body image, the difference scores would each be significantly lower in the ABM condition than the control condition.

Data Cleaning and Assumptions

Prior to the main analyses, data were cleaned, tested for assumptions, and analyzed using IBM's SPSS statistical software version 25. A total of 83 participants completed all sessions of the study. All participants passed at least two out of the three attention check items across all sessions. For participants who were missing less than 10% of responses, missing responses were mean imputed (Schafer & Graham, 2002).

Prior to running multivariate analysis of variances (MANOVAs), univariate and multivariate outliers were assessed. Univariate outliers for session difference scores on the attention bias assessment were detected by identifying participant outcomes that were 2.68 standard deviations above or below the mean. One extremely high data point was

identified, which was then removed. Univariate outliers for the dependent variables were detected by identifying participant responses that were 2.68 standard deviations above or below the mean. Two extremely low data points were identified for the in-laboratory BIABS difference scores as well as one extremely low data point in the follow-up session. One extremely high data point was identified for the in-laboratory PASTAS difference scores. Extremely low and high data points were Winsorized (Field, 2016). Multivariate outliers were screened for by computing Mahalanobis' distances for each of the dependent variables. A chi-squared value with 3 degrees of freedom and $p < .01$ yielded a cutoff score of 11.34 (Field, 2013). With this cutoff, no participant responses were identified as multivariate outliers. Histograms for all differences scores for body dissatisfaction, positive body image, and fear of fat revealed adequate normality. All skew values were below one and all kurtosis values were below two for all difference scores for body dissatisfaction, positive body image, and fear of fat. For the in-laboratory session, a Box's M test for the MANOVA yielded a significant value, indicating the assumption of equality of covariance matrices was violated, F (6, 47458) = 2.80, p = .010, Pillai's Trace test statistic is robust to this sort of violation. As such, Pillai's Trace was utilized in the current study. Because Box's M test is extremely sensitive and because the cell sizes in this study were unequal, an alpha of .001 was applied in screening for homogeneity of covariance and Pillai's Trace is reported as our test statistic for the MANOVA (Tabachnick & Fidell, 2007).

Preliminary Analyses

Three separate one-way ANOVAs revealed no significant differences between experimental groups for age (F [1, 79] = 1.02, p = .316), BMI (F [1, 76] = 1.72, p = .193), and trait-level body dissatisfaction (F [1, 79] = 0.17, p = .680). For the manipulation check, the one-way ANOVA revealed there were no significant difference scores across groups in the experimental/control condition, F (1, 81) = 0.12, p = .736.

Effects of ABM Training on Body Image

A between-subjects MANOVA revealed that differences were nonsignificant across experimental groups on the in-laboratory difference scores for body dissatisfaction, positive body image, and fear of fat, Pillai's Trace = .06, F (3, 79) = 1.90, p = .136, η_p^2 = .067. A second between-subjects MANOVA revealed that differences were nonsignificant across experimental groups on the follow-up difference scores for body dissatisfaction, positive body image, and fear of fat, Wilks' Lambda = .02, F (3, 79) = 0.51, p = .676, η_p^2 = .019.

Exploratory Analyses

Bivariate correlations were examined to determine whether attentional biases for thin and non-thin stimuli presented prior to exposure to the manipulation (ABM training vs. placebo training) in the laboratory session were associated with prescreening scores on the BSQ, PASTAS, BIABS, and BAS. All bivariate correlations were weak and nonsignificant (max: r = -.030, min: r = -.175).

A between-groups factorial MANOVA was conducted to test the interaction between experimental group and trait-level body dissatisfaction to determine whether the ABM training may have a stronger effect on body image in participants with higher trait-level body]dissatisfaction. Trait-level body dissatisfaction scores were dichotomized using a median split and entered as an independent variable in this analysis along with experimental group. There was a significant main effect for trait-level body satisfaction, Wilks' Lambda = .72, F (3, 75) = 9.87, $p < .001$, $\eta_p^2 = .283$. However, there was not a significant main effect for ABM training, Wilks' Lambda = .93, F (3, 75) = 1.96, p = .127, $\eta_p^2 = .073$, and there was not a significant interaction, Wilks' Lambda = .92, F (3, 75) = 2.09, p = .109, $\eta_p^2 = .077$. ANOVAs were conducted on the three dependent variables as follow-ups. Only the ANOVA for the body appreciation score was significant, F (1, 77) = 27.81, $p < .001$, $\eta_p^2 = .012$. Participants with higher BSQ scores had higher in-laboratory difference scores on body appreciation than participants with lower BSQ scores. Across training type, there were greater decreases in body appreciation from pre-assessment phase to in-laboratory post assessment phase for participants with high trait-level body dissatisfaction (M = 5.2, SD = 1.59) compared to participants with low trait-level body dissatisfaction (M = 4.19, SD = 1.36). The ANOVA for the state-level body dissatisfaction difference scores was nonsignificant, F (1, 77) = .937, p = .336, $\eta_p^2 = .265$. The ANOVA for the fear of fat difference scores was nonsignificant, F (1, 77) = .162, p = .689, $\eta_p^2 = .002$.

Table 1

Descriptive Statistics of In-laboratory from Prescreen Dependent Measures on Experimental Groups

	BAS In-lab			PASTAS In-lab			BIABS In-lab		
Groups	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
ABM	41	4.73	1.55	41	-.01	.43	41	-.18	.49
Control	42	4.78	1.61	42	.18	.39	42	-.04	.30

Table 2

Descriptive Statistics of Follow-up from Prescreen Dependent Measures on Experimental Groups

	BAS Follow-up			PASTAS Follow-up			BIABS Follow-up		
Groups	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
ABM	41	4.67	1.69	41	.04	.50	41	-.07	.53
Control	42	4.70	1.58	42	.14	.36	42	.02	.39

Discussion

Implications

The current study examined whether college women who completed ABM training directing attention toward non-thin body images would exhibit a greater decrease in state body dissatisfaction, a greater increase in body appreciation, and a greater decrease in fear of fat compared to college women who completed placebo training. To our knowledge, no previous studies have used ABM to train individuals to look toward non-thin body images. Results indicated that the ABM task did not successfully train

participants' attention toward non-thin body images and did not impact state-level body dissatisfaction, body appreciation, or fear of fat.

Collectively, results provide no evidence of reductions in attentional bias or negative body image for women who received the ABM training, regardless of trait-level body dissatisfaction. The lack of evidence supporting the ABM as a tool for modifying attentional biases to body image stimuli and state-level body image aligns with Loughnan et al.'s (2015) findings. Loughnan and colleagues (2015) observed no significant effects of their ABM task on attention to negative shape/weight related words and no significant effects on state-level body dissatisfaction. Together, these findings suggest that ABM training may not be sufficient to modify attentional biases for shape/weight related stimuli. Given the current study conceptually replicates the failure of the ABM task to modify visual attention and reduce body dissatisfaction, reevaluation of the ABM task with weight-related stimuli is warranted. It is possible that visual attention biases to image-related stimuli are not malleable during early adulthood and that exposing college women to ABM in one session is not a potent enough manipulation to address bias. However, there are important differences that emerged in the current study's visual attention bias results and results from previous literature that emphasize limitations with respect to image stimuli presented in the assessment and training phases of this study more so than potential problems with the general ABM training approach

Limitations

An overall attentional bias for looking at thin bodies over non-thin bodies did not emerge in the current study (assessed prior to the ABM/placebo training) as it has in previous studies (e.g., Glauert et al., 2010; Joseph et al., 2016). Previous researchers who have documented correlations between trait-level body dissatisfaction and this attentional bias toward thin over overweight bodies (e.g., Joseph et al., 2016) have argued that those who experience body dissatisfaction and place an importance on thinness could be more motivated to look at thin body stimuli because they represent an ideal they feel pressured to achieve. Trait-level body dissatisfaction, however, did not correlate with visual attention toward thin or non-thin body stimuli presented in the current study. This is an important discrepancy to note because it points to a potential explanation for the null results. Images used in the ABM task and in the attention bias assessments of the current study were different than the body image stimuli that have been used by previous researchers who have documented links between body image and attentional biases to larger versus smaller bodies (e.g., Joseph et al., 2016). First, the thin and non-thin stimuli included in the present study were cropped images of specific body parts (arms, legs, abdomens), whereas thin and non-thin image stimuli presented by Joseph et al. (2016) and Glauert et al. (2010) were images of full bodies (i.e., head to toe images with faces visible). The cropped body stimuli used in the current study compared to the full body stimuli with faces, may have had a weaker potential to activate appearance-related social cognition (e.g., anti-fat bias) or appearance-related social comparison. The body stimuli

used in the current study only consisted of female bodies who were White, therefore the images did not represent a diverse population when participants were completing the ABM task. This could explain why attention to these stimuli did not covary with body dissatisfaction and perhaps why our ABM task did not modulate state-level body dissatisfaction, body appreciation, or fear of fat. The size of the non-thin bodies presented in the current study relative to the thin bodies was not as large as the non-thin bodies presented by Joseph et al. (2016) and Glauert et al. (2010). Thus, it is possible that the ABM training did not modulate visual attention to thin or non-thin bodies because body size differences across trials were too subtle. Contingent placement of the arrow behind non-thin bodies in the ABM training may not have been noticeable to participants if they did not detect differences in body sizes across trials.

The use of a university sample may limit the generalizability of our findings to a broader population. This study only included women, therefore the study's implications cannot be applied to men. Second, the PASTAS, BAS, and BIABS measures are evaluative or attitudinal measures of body image. Thus, findings of the current study do not extend to perceptual or behavioral components of body image. This study included a greater amount of trials in the dot-probe task than previous studies that have used ABM training with weight/shape related word stimuli (i.e., Smith & Rieger 2006; 2009). The redundant exposure to the same body stimuli during the training and the assessment phases may have resulted in fatigue effects or reduced focus when completing the task. The sample size of the current study was larger than that of the Loughnan et al. study (*N*

= 62; 2015), however it was smaller than the sample recruited by Smith and Rieger (*N* = 172, 2009) in detecting a significant ABM effect on body dissatisfaction. The power of our study could therefore have benefited from a larger sample size.

Future Research

Using the same ABM training and testing its effects on attentional bias toward body-related stimuli that are not presented in an ABM training phase may allow future researchers to avoid fatigue effects. Incorporating thin and non-thin body stimuli that are more noticeably different in size could also bolster the effect of ABM on visual attention to non-thin over thin bodies. To gain a better understanding as to where individuals are focusing their gaze when viewing body images, eye-tracking, which measures one's eye-gaze, could offer an alternative to the dot-probe task for assessment phases in future ABM studies. Researchers could use eye-tracking to determine whether participants are changing their focus of attention on thin versus non-thin body stimuli after completing an ABM task.

Conclusion

In sum, this study resulted in a conceptual replication of Loughnan et al. (2015). We observed null effects for ABM training in reducing attentional bias toward thin over non-thin body image stimuli as well as null effects of ABM training on three state-level body image measures. Replicating a study's results allows for greater confidence in their generalizability. Conceptual replication minimizes concerns regarding threats to internal validity stemming from methods unique to the original study. Our results point to a need

consider alternative body-related stimuli for use in ABM training and alternative assessment methods for detecting effects of ABM on attention toward body-related stimuli.

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APPENDIX A
Informed Consent Form

PURPOSE: The purpose of this study is to explore college student's thoughts, feelings, and behaviors and how they relate to visual attention.

DURATION: The length of time you will be involved with this study is approximately 30 minutes.

PROCEDURES: If you agree to be in this study, we will ask you to do the following things: complete a computer-based task viewing bodies and complete a set of survey items asking about your thought, feelings, and behaviors.

RISKS: The tasks that are included in this experiment could lead to emotional and psychological distress (e.g., nervousness, anxiety), frustration, or boredom in some. We therefore want you to be aware that if at any point during the experiment, you are uncomfortable completing a task or answering a survey question, you are free to skip that task.

CONFIDENTIALITY: The records of this study will be kept private. Your name will only be attached to your answers for the purpose of tracking your responses across prescreening and this laboratory session. Only the investigators involved in the research project will have access to the raw data. In any sort of report that is published or presentation that is given, we will not include any information that will make it possible to identify a participant. Once collected, all data will be kept in secured files, in accord with the standards of SFA, federal regulations, and the American Psychological Association. In addition, please remember that the researchers are not interested in any individual person's responses. We are interested in how people in general respond to the measures.

VOLUNTARY NATURE OF THE STUDY: Your participation in this study is voluntary. In addition, you may choose to not respond to individual items in the survey. Your decision whether or not to participate will not affect your current or future relations with SFA or any of its representatives. If you decide to participate in this study, you are free to withdraw from the study at any time without affecting those relationships.

CONTACTS AND QUESTIONS:
Dr. Sarah Savoy: savoysc@sfasu.edu; (936) 468-5117
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If you have questions or concerns regarding this study and would like to speak with someone other than the researchers, you may contact The Office of Research and Sponsored Programs at (936) 468-6606.

BENEFITS: Students recruited from participating introductory psychology classes will receive 1 credit for every 30 minutes of research participation. This study is worth 2 research participation credits. Students from other classes will receive credit in that class in an amount that is considered appropriate by the course instructor (e.g., 5 points extra credit or 1-2% of the overall points possible in the class). Benefits of college student participation include the educational aspects of experiencing laboratory based empirical research in psychology first hand. The current study could also add to the current understanding of attentional biases as mechanisms that may explain differences in social and psychological adjustment.

STATEMENT OF CONSENT

The procedures of this study have been explained to me and my questions have been addressed. The information that I provide is confidential and will be used for research purposes only. I am 18 years of age and I understand that my participation is voluntary and that I may withdraw anytime without penalty. I have read the information in this consent form and I agree to be in the study.

Signature of Participant: _____

APPENDIX B
Prescreen Questionnaire

Body Shape Questionnaire (BSQ; Cooper et al., 1987)

Directions: We would like to know how you have been feeling about your appearance over the PAST FOUR WEEKS. Please read each question and circle the appropriate number to the right. Please answer all the questions.
OVER THE PAST FOUR WEEKS

	Never	Sometimes	Rarely	Often	Very often	Always
Has feeling bored made you brood about your shape?	1	2	3	4	5	6
Have you been so worried about your shape that you have been feeling you ought to diet	1	2	3	4	5	6
Have you thought that your thighs, hips or bottom are too large for the rest of you?	1	2	3	4	5	6
Have you been afraid that you might become fat (or fatter)?	1	2	3	4	5	6
Have you worried about your flesh being not firm enough?	1	2	3	4	5	6
Has feeling full (e.g. after eating a large meal) made you feel fat?	1	2	3	4	5	6
Have you felt so bad about your shape that you have cried?	1	2	3	4	5	6
Have you avoided running because your flesh might wobble?	1	2	3	4	5	6

Has being with thin women made you feel 1self-conscious about y1our shape?	1	2	3	4	5	6
Have you worried about your1 thighs spreading out when sitting down?	1	2	3	4	5	6
Has eating even a small amount of food made you feel fat?	1	2	3	4	5	6
Have you noticed the shape of other women and felt that your own shape compared unfavorably?	1	2	3	4	5	6
Has thinking about your shape interfered with your ability to concentrate (e.g. while watching television, reading, listening to conversations)?	1	2	3	4	5	6
Has being naked, such as when taking a bath, made you feel fat?	1	2	3	4	5	6
Have you avoided wearing clothes which make you particularly aware of the shape of your body?	1	2	3	4	5	6
Have you imagined cutting off fleshy areas of your body?	1	2	3	4	5	6
Has eating sweets, cakes, or other high calorie food made you feel fat?	1	2	3	4	5	6
Have you not gone out to social occasions (e.g., parties) because you have felt bad about your shape?	1	2	3	4	5	6

Have you felt excessively large and rounded?	1	2	3	4	5	6
Have you felt ashamed of your body?	1	2	3	4	5	6
Has worry about your shape made you diet?	1	2	3	4	5	6
Have you felt happiest about your shape when your stomach has been empty (e.g. in the morning)?	1	2	3	4	5	6
Have you thought that you are in the shape you are because you lack self-control?	1	2	3	4	5	6
Have you worried about other people seeing rolls of fat around your waist or stomach?	1	2	3	4	5	6
Have you felt that it is not fair that other women are thinner than you?	1	2	3	4	5	6
Have you vomited in order to feel thinner?	1	2	3	4	5	6
When in company have your worried about taking up too much room (e.g. sitting on a sofa, or a bus seat?	1	2	3	4	5	6
Have you worried about your flesh being dimply?	1	2	3	4	5	6

Has seeing your reflection (e.g. in a mirror or shop window) made you feel bad about your shape?	1	2	3	4	5	6
Have you pinched areas of your body to see how much fat there is?	1	2	3	4	5	6
Have you avoided situations where people could see your body (e.g. communal changing rooms or swimming baths)?	1	2	3	4	5	6
Have you taken laxatives in order to feel thinner?	1	2	3	4	5	6
Have you been particularly self-conscious about your shape when in the company of other people?	1	2	3	4	5	6
Has worry about your shape made you feel you ought to exercise?	1	2	3	4	5	6

Body Image Attitudes and Beliefs Scale (BIABS; Levitt, 2004)

	Strongly disagree	Disagree	Agree	Strongly agree
I am afraid of getting fat.	1	2	3	4
Fat people are unattractive, weak, and too lazy to exercise.	1	2	3	4
I would rather be poor than fat.	1	2	3	4
If I changed my eating habits and became overweight, it would be disastrous.	1	2	3	4

State Body Appreciation Scale-2 (SBAS-2; Homan, 2016)

Directions: Please indicate whether the question is true about you never, seldom, sometimes, often, or always.

	Never	Seldom	Sometimes	Often	Always
I respect my body.	1	2	3	4	5
I feel good about my body.	1	2	3	4	5
I feel that my body has at least some good qualities.	1	2	3	4	5
I take a positive attitude towards my body.	1	2	3	4	5
I am attentive to my body's needs.	1	2	3	4	5
I feel love for my body.	1	2	3	4	5
I appreciate the different and unique characteristics of my body.	1	2	3	4	5
My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile.	1	2	3	4	5
I am comfortable in my body.	1	2	3	4	5
I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).	1	2	3	4	5

Physical Appearance State and Trait Anxiety Scale State Subscale (PASTAS; Reed, Thompson et al., 1991)

Instructions: Right now, I feel anxious, tense, or nervous about:

	Not at all	Slightly	Moderately	Very much so	Exceptionally so
The extent to which I look overweight.	0	1	2	3	4
My thighs.	0	1	2	3	4
My buttocks.	0	1	2	3	4
My hips.	0	1	2	3	4
My stomach (abdomen)	0	1	2	3	4
My legs.	0	1	2	3	4
My waist.	0	1	2	3	4
My muscle tone	0	1	2	3	4
My ears.	0	1	2	3	4
My lips.	0	1	2	3	4

Physical Appearance State and Trait Anxiety Scale State Subscale, Cont.
(PASTAS; Reed, Thompson et al., 1991)

My wrists.	0	1	2	3	4
My hands.	0	1	2	3	4
My forehead.	0	1	2	3	4
My neck.	0	1	2	3	4
My chin.	0	1	2	3	4
My feet.	0	1	2	3	4

Attention Check Item

Research shows that participants who are paying attention to the study will answer the question by selecting the number 4.

0	1	2	3	4	5	6

APPENDIX C
In-laboratory questionnaire

Demographics

1. Age (in years): _____

2. Sex
   a. Male
   b. Female

3. Classification
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior
   e. Graduate

4. Race
   a. Caucasian (White)
   b. Black
   c. Hispanic
   d. Asian
   e. Pacific Islander or Native American
   f. Other

5. Ethnicity
   a. Hispanic or Latino
   b. Not Hispanic or Latino

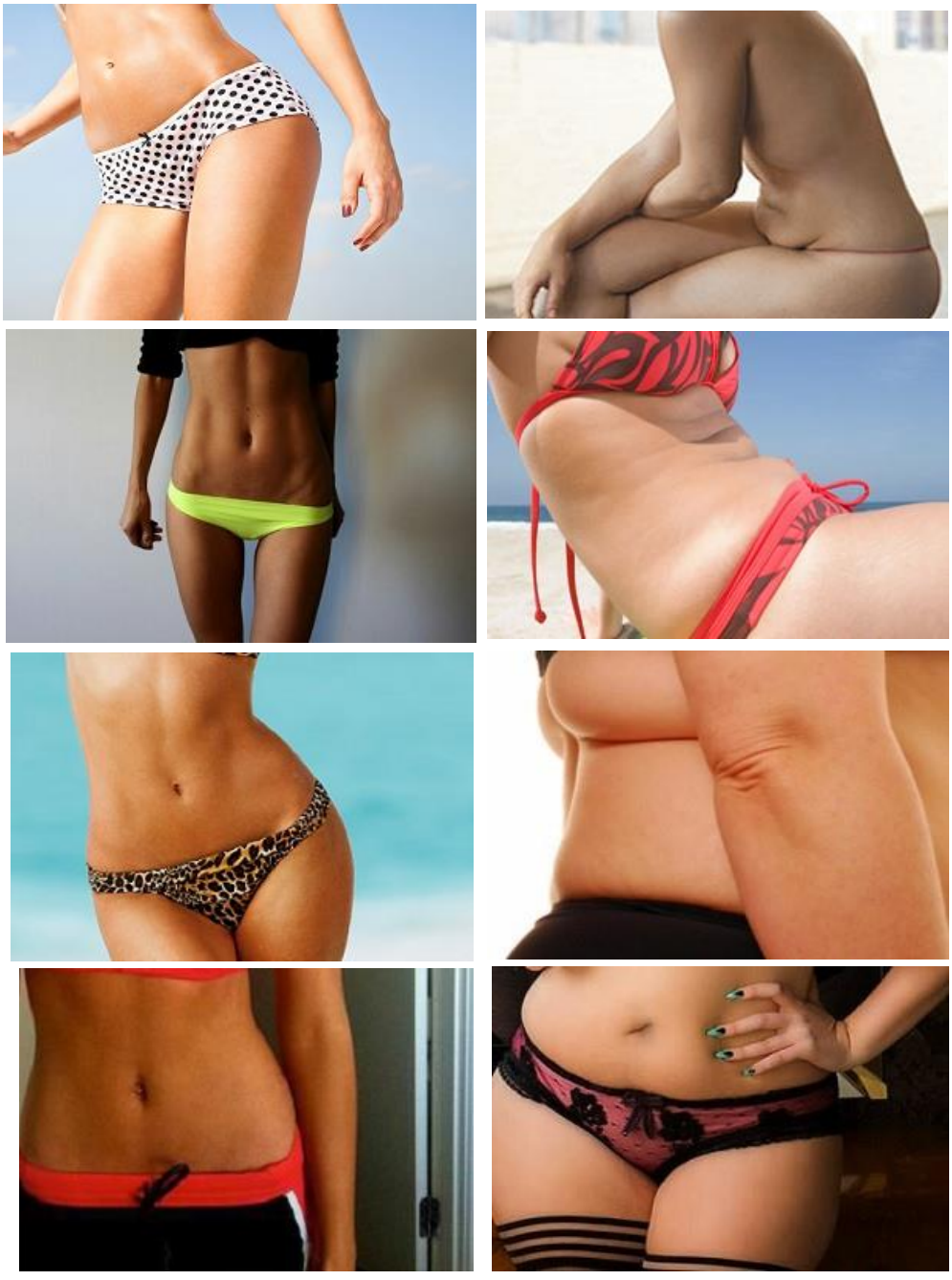
Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988)

Please use the following adjectives to report how you are feeling RIGHT NOW. Please circle the number that most describes the way you are feeling for each word

	Definitely Do Not Feel		Do Not Feel		Slightly Feel		Definitely Feel
Grouchy	1	2	3	4	5	6	7
Tired (in general)	1	2	3	4	5	6	7
Gloomy	1	2	3	4	5	6	7
Happy	1	2	3	4	5	6	7
Loving	1	2	3	4	5	6	7
Calm	1	2	3	4	5	6	7
Active	1	2	3	4	5	6	7
jittery	1	2	3	4	5	6	7
Fed up	1	2	3	4	5	6	7
Drowsy	1	2	3	4	5	6	7
Sad	1	2	3	4	5	6	7
Lively	1	2	3	4	5	6	7
Caring	1	2	3	4	5	6	7
Content	1	2	3	4	5	6	7
Peppy	1	2	3	4	5	6	7
Nervous	1	2	3	4	5	6	7

APPENDIX D
Dot-probe Task

Image Stimuli



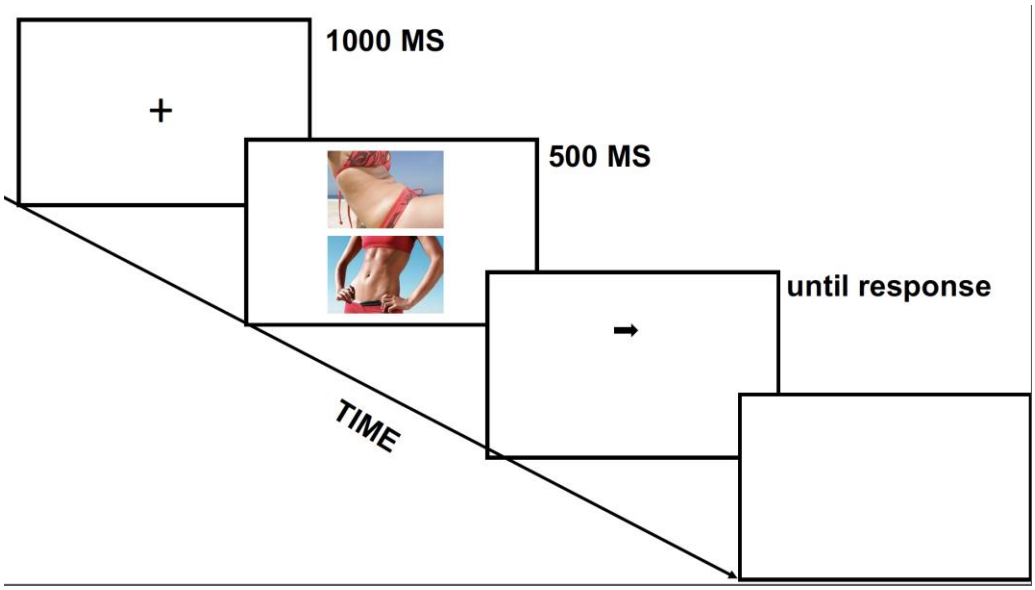




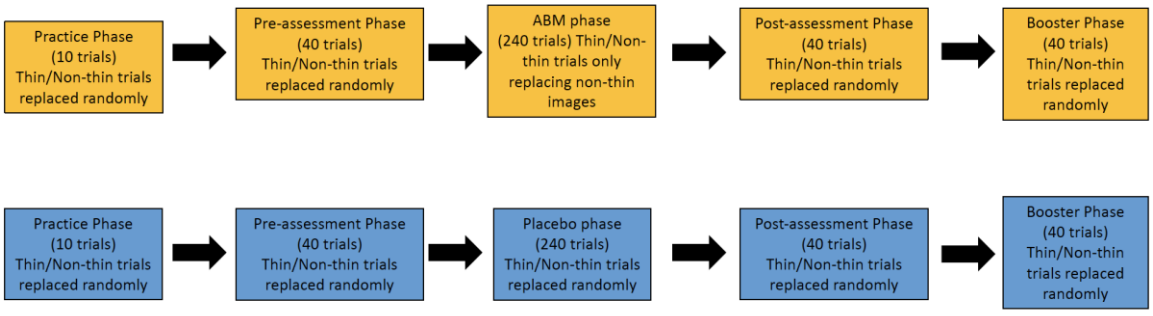





Dot-probe Paradigm



ABM Training versus Placebo Flow Chart



APPENDIX E
Debrief Form

Earlier, you were told that this study was about college student's thoughts, feelings, and behaviors and how they relate to visual attention. More specifically, we are interested in how attentional biases toward thin vs. non-thin bodies relates to positive and negative body image.

You have the right to choose to not give us permission to use your data. If you choose not to give us permission, we will not include your data in the analysis process.

Would you like to give us permission to use your data? (Select ONE)

- ☐ Yes
- ☐ No

If you experience any emotional distress, please contact our campus counseling center at (936) 468-2401 or counseling@sfasu.edu.

The Counseling Services office is located in the Rusk Building on the third floor. Appointments may be made in person or by telephone. If you are in need of assistance after hours or on the weekend, please call: University Police: (936) 468-2608 or MHMR Crisis Line: (800) 392-8343.

If you have further questions in the future, please feel free to contact:

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VITA

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This thesis was typed by Neusha Khaleghi