Effects of the Muscular Ideal on Appearance-Related Attentional Biases in Men

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Abstract

Limited research has investigated appearance-related attentional biases in men. This study examined the effects of priming on attentional biases in men and whether the biases were associated with body image. The dot-probe task (DPT), a commonly used reaction time based measure, was adapted to include images between each trial of the task to test the effects of these images on attentional biases for appearance-related word stimuli. Men (*N* = 60) completed body image questionnaires online and attended a laboratory session, completing either (1) an appearance-cued DPT, containing images representing the muscular ideal; (2) a neutral-cued DPT, containing images of forests; or (3) a DPT with time delay in place of an image. Attentional biases for positive- and negative-appearance words did not differ for men who completed the three DPT versions. However, for men who completed the appearance-cued DPT, attentional biases for positive-appearance words correlated with a range of state experiences, including greater levels of muscularity and appearance dissatisfaction and poorer confidence and mood. The results suggest that men may experience poorer body image outcomes by automatically attending to the positive attributes of media depictions of the muscular ideal.

Keywords: attentional biases, body image, dot-probe task, men, muscular ideal

Public Significance Statement

Men who automatically think of attractiveness after seeing images of muscular others likely feel poorer about their own body image as a result. For men exposed to the muscular ideal of appearance, those with poorer body image and mood during a research session showed biases for words such as handsome, muscular, and attractive.

Effects of the Muscular Ideal on Appearance-Related Attentional Biases in Men

The muscular ideal—a male body characterized by a broad and muscular upper body, tapering to a slim, toned waist—is common in contemporary media in western societies. The ideal is seen increasingly in advertisements, TV shows (Dallesasse & Kluck, 2013), and video games (Martins, Williams, Ratan, & Harrison, 2011), each supporting the message that this body is both a normal and attainable standard for the average man to achieve. These changes have been quantified in observational research comparing representation of the male figure in early and late editions of men's magazines, such as *Men's Health* and *Men's Fitness* (Labre, 2005), and *Playgirl Magazine* (Leit, Pope, & Gray, 2001). Action figures have also increased in muscle mass appearance, with figures in the 1990s acquiring physiques unattainable even by the most advanced human body builders (Pope, Olivardia, Gruber, & Borowiecki, 1999).

Men have been shown to desire both losses in body fat and gains in muscle mass (Cafri, Strauss, & Thompson, 2002) consistent with the muscular ideal. Increasing attention has been placed on men's body image as a research topic, shadowed by a literature historically focused on women (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). This trend reflects changing norms regarding gender roles, with traditional emphasis placed on functionality of the male body and aesthetic qualities of the female body (Franzoi, 1995). Progressively, however, muscularity has come to be equated with masculinity (Morrison, Morrison, & Hopkins, 2003) and men consider it to be associated with a range of social, mental, and physical benefits including attractiveness, social success, and health (Morrison et al., 2003; Murray et al., 2016). Men are sold the message that they can, and should, manipulate their appearance to achieve these outcomes and a desirable lifestyle (Murray et al., 2016; Ricciardelli, Clow, & White, 2010).

Although some level of drive for muscularity may be health-enhancing (Parent, 2013), instead of motivating men towards better physical health, excessive body dissatisfaction can contribute to negative outcomes. A range of detrimental effects have been documented including muscle dysmorphia (Olivardia, Pope, & Hudson, 2000), steroid use and overtraining (Cafri et al., 2005; Hale, Roth, DeLong, & Briggs, 2010), disordered eating (Botta, 2003; Olivardia, Pope, Borowiecki, & Cohane, 2004), and poorer psychological wellbeing (Cafri et al., 2002). These findings are concerning given that body dissatisfaction and desire for increased muscularity in men is common, with 51-90% of male respondents across studies reporting these concerns (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Hatoum & Belle, 2004; Frederick et al., 2007).

Sociocultural factors, such as the muscular ideal, have often been considered to have the most wide-ranging impact on body image (Tiggemann, 2012). The Tripartite Influence Model has commonly been used to describe key factors, purporting that three influences, including parents, peers, and the media, directly contribute to body dissatisfaction (Smolak, Murnen, & Thompson, 2005). Indeed, research supports the effects of these sociocultural influences on men’s body dissatisfaction (Barlett, Vowels, & Saucier, 2008; Ferguson, 2013; Stratton, Donovan, Bramwell, & Loxton, 2015). These influences are also posited to affect men through subjecting them to internalization of ideal standards of appearance and social comparison (Smolak et al., 2005). Mass media is considered one of the strongest influences on men (Cafri et al., 2005) and men’s reactions to media may be one of the factors most amenable to change.

Numerous correlational and experimental studies have emerged in the past decade establishing that exposure to media representation of the muscular ideal affects men’s thoughts and feelings about their body (Barlett et al., 2008; Blond, 2008). Correlational studies have examined the relationship between consumption of mass media and self-image, considered as body dissatisfaction, body esteem, or self-esteem (e.g., Botta, 2003; Duggan & McCreary, 2004). Experimental studies have examined the effects of brief exposure to a range of media formats, including magazine images (Humphreys & Paxton, 2004), television commercials (Agliata & Tantleff-Dunn, 2004), music video clips (Mulgrew & Volcevski-Kostas, 2012), and action figures (Barlett, Harris, Smith, & Bonds-Raacke, 2005). Each study design provides useful knowledge: the experimental studies allow conclusions to be made regarding causality, whereas correlational studies provide results with greater generalizability outside of the laboratory environment.

The results of these study designs have been summarized in two meta-analyses. Barlett et al. (2008) found significant modest effects from both correlational (d = -0.19, p < .001) and experimental studies (d = -0.22, p < .001), supporting the notion that exposure to the media negatively affects men's body esteem and body satisfaction. However, in a later meta-analysis with more stringent methods, Ferguson (2013) found little evidence for experimental effects for men at a general population level and concluded effects were less than trivial. Ferguson argued that too few studies have been conducted to address the issue of whether pre-existing body dissatisfaction or other moderators influenced outcomes. Thus, present evidence does not allow conclusions to be made regarding whether *some* men experience detrimental effects following media exposure.

It is apparent from qualitative studies that men have a complex relationship with idealized representations of muscularity. Young men want to be lean and muscular, but are critical of hyper-muscular appearances (McNeill & Firman, 2014). They desire a look that is functionally athletic to maintain an image of masculinity rather than vanity, but retain emphasis on aesthetic qualities of specific regions of the body, such as the abdominal, chest, and arm muscles (McNeill & Firman, 2014). They critique advertisements containing the muscular ideal as something deserving of mockery, but simultaneously consider the idealized portrayal of men in women's magazines as what is desirable to women and as something to emulate (Diedrichs, Lee, & Kelly, 2011). Questions remain regarding whether media exposure negatively affects specific subsets of men and the qualities that place men at risk of such outcomes. For example, it might be that men with low body esteem are more susceptible to poorer outcomes (Barlett et al., 2008).

Cognitive-behavioral theories focus on information-processing biases and the interaction of these biases with behavior, and may provide insight into individual differences in responses to media exposure. Williamson et al.'s (2004) model posits that, in people with body image and eating disturbances, activating events can trigger a maladaptive, appearance-related self-schema, constructed over time based upon an individual's learning experiences. This self-schema results in cognitive biases and subsequent maladaptive cognitions, emotions, and behaviors (Markus et al., 1987). Attentional biases are key amongst these biases through the necessity of an individual to selectively filter incoming information (Yiend, 2010).

Few studies have investigated attentional biases in men (Rodgers & DuBois, 2016). Early studies, using the emotional Stroop paradigm, suggested limited evidence of appearance-related information-processing biases in men (Ben-Tovim, Walker, & Douros, 1993; Channon & Hayward, 1990; Fairburn, Cooper, Cooper, McKenna, & Anastasiades, 1991). Although many studies have examined attentional biases using the dot-probe task (DPT) in women (Glauert, Rhodes, Fink, & Grammer, 2010; Lane, Mulgrew, Mahar, White, & Loughnan, 2017; Rieger et al., 1998), or samples with mostly women (Rosser et al., 2010), there is an absence of equivalent studies in men. Instead, recent studies have examined operationalization of attentional bias through eye-movement tracking methodologies (Cho & Lee, 2013; Cordes, Vocks, Düsing, & Waldorf, 2017; Cordes, Vocks, Düsing, Bauer, & Waldorf, 2016; Nikkelen et al., 2012; Warschburger, Calvano, Richter, & Engbert, 2015) and these provide the core evidence in this literature. There has been considerable heterogeneity, with seemingly contradictory results in some instances. Cho and Lee (2013) found that, compared to men with low body dissatisfaction, young Korean men (*N* = 45) with high body dissatisfaction gazed longer on computer-generated images of muscular than on normal body shapes. Nikkelen et al. (2012) found that undergraduate men (*N* = 50; ages 19-33 years) who gazed for a longer duration on the abdominal region of models of varying muscularity demonstrated healthier body image following exposure to muscular-ideal media in a later experiment than those who gazed for a shorter duration on this region. Given that the abdominal region has been identified as a key region in attractiveness ratings (Warschburger et al., 2015) and Cho and Lee (2013) found that greater gaze duration on muscular bodies was related to body dissatisfaction, this finding is surprising as it might be expected that men gazing at this region in attractive others would experience body dissatisfaction.

The studies have also provided evidence for eye-movement patterns in relation to self-images, with similarly conflicting findings. Warschburger et al. (2015) found that adult men (ages 20 to 51 years) who were overweight and had high body dissatisfaction gazed longer on self-nominated attractive regions of their own body than did normal weight participants, who gazed longer at self-nominated unattractive regions (*N* = 24). Likewise, in a sample of men who were regular resistance exercisers (*N* = 45), Cordes et al. (2016) found that those with a low drive for thinness gazed for a longer duration on their own self-nominated attractive regions compared with attractive regions in other bodies. These results may reflect that men focus on their own attractive body regions as a self-enhancement strategy regardless of their body weight. Indeed, in another sample of men who were regular resistance exercisers (*N* = 49), Cordes et al. (2017) found that those who gazed for longer durations towards disliked parts of their own body demonstrated poorer body image and mood post exposure. However, attention to one’s own attractive regions may also reflect an attentional avoidance pattern in that attractive regions are favored to avoid distress felt about unattractive regions (Warschburger et al., 2015). Although the behavioral eye-tracking measures indicate attentional allocation is on attractive body regions, the nature of the thoughts accompanying the behavior is unclear.

The Current Study

Appearance-related attentional biases remain an under-investigated phenomenon in men. Although eye-movement tracking used in previous studies provides behavioral data about men's gaze patterns, little is known about men's performance on the reaction time tasks used widely in understanding attentional biases related to women's body image as well as anxiety disorders (e.g., Bar-Haim et al., 2007; Rodgers & DuBois, 2016). Furthermore, although cognitive-behavioral theory emphasizes the effects of activating events on cognitive biases (Williamson et al., 2004), no studies have examined the influence of priming on appearance-related attentional biases in men, representing another significant gap in the literature. Thus, in this study, a series of DPTs were used to examine appearance-related attentional biases in men.

The study draws from the methodology introduced by Lane et al. (2017), which found that women (N = 103) who completed an appearance-cued DPT, containing images of swimsuit models between each trial of the DPT, demonstrated greater attentional biases for positive-appearance words compared to those who completed a neutral-cued DPT, containing images of forests, typical DPT, or time-delayed DPT, with additional time allocated between each trial. Lane et al. (2017) further found that the extent of bias correlated with poorer state and trait body image, including appearance evaluation, self-evaluative salience of appearance, body shape dissatisfaction, and state body dissatisfaction.

Therefore, this study examined appearance-related attentional biases, and the effects of priming on these biases, in men using the cued DPT task. It was hypothesized that men who completed the appearance-cued DPT, containing images representing the muscular ideal instead of the thin ideal, would demonstrate higher attentional bias scores than those who completed the neutral-cued or time-delayed DPTs. A secondary aim of the study was to assess relationships between appearance-related attentional biases and body image in men. It was hypothesized that men with poorer trait muscle, leanness, appearance, and fitness satisfaction, greater internalization of muscularity and leanness ideals, and greater feelings of pressure from media would demonstrate stronger attentional biases for appearance-related stimuli in the appearance-cued DPT, but not the neutral-cued or time-delayed DPTs. It was also hypothesized that men with poorer state muscularity, leanness, appearance, and fitness satisfaction, lower confidence, and greater state feelings of depression and anxiety would demonstrate stronger attentional biases for appearance-related stimuli in the appearance-cued DPT, but not the neutral-cued or time-delayed DPTs.

Method

Participants

Participants were 60 men recruited from a regional university and the general public. The sample size was determined through an *a priori* power analysis with G*Power (version 3; Faul et al., 2007), using an alpha level of .05, power level of .80, and the effect size found for the ANCOVA model for positive-appearance words in Lane et al.'s (2017) study (η^2_p = .120). Men were approached in lectures, on campus, and through general community boards. Ages ranged from 17 to 60 years (*M* = 31.98, *SD* = 10.13), and most participants were currently studying (82%), and were currently engaged in work (68%). A small proportion of participants identified as Aboriginal (5%), Pacific Islander (1.5%), and Hispanic (1.5%), with remaining participants identifying as White (92%). Most participants identified as being exclusively or predominately heterosexual (73%), with some identifying as bisexual (13%), gay (13%), or asexual (3%). Body mass index (BMI) ranged from underweight (17.44) to obese (33.63; *M* = 25.44, *SD* = 3.13). Participants reported exercising, on average, between 0 and 30 hr each week (*M* = 6.11, *SD* = 5.20). Reported exercise was mostly a combination of aerobic and muscle-building exercise (37%) or predominately aerobic exercise (33%). Some participants reported mostly muscle-building exercise (17%) or no exercise (10%). Ethical approval was granted by the Human Research Ethics Committee of the home institution. Participants were entered into a draw to win an AUD$50 voucher at completion of the study.

Materials

Cue stimuli. Ten images were chosen for the appearance-cued and neutral-cued versions of the DPT. The initial selection criteria were that the images presented a man who appeared attractive and shirtless, with a muscular body shape, low waist-shoulder ratio, and low body-fat, meeting the muscular ideal. Images were discarded if they had low picture quality. A shortlist of 20 images was obtained using online search engines. A convenience sample of nine men (ages ranging from 18 to 31 years, *M* = 23.50, *SD* = 4.41) rated the images on four dimensions, including whether: the model was attractive, others would find the model attractive, the model's body represented society's ideal standard of appearance, and the model looked fit and healthy. Images were ranked based on composite scores across these dimensions, and the ten images with the highest scores were chosen for inclusion. The mean rating was 8.65 (*SD* = 0.23) out of 10, indicating most agreed or strongly agreed with the before mentioned statements. The 10 neutral images were of forests, sourced from online search engines and selected based on being of high resolution with no human figures present. All images were resized for consistency and presented in the center of the screen on a black background. Images were presented in a randomized order, with each appearing 12 times in the respective cued DPT.

Word stimuli. Words were sourced from previous research (Loughnan, Mulgrew, & Lane, 2015; Unterhalter, Farrell, & Mohr, 2007). Several general appearance words with high frequency of use in the English language were also used (e.g., *handsome*, *attractive*, *ugly*; Leech, Rayson, & Wilson, 2001), totaling 10 words for each word type. The appearance words were matched with neutral words of a single theme (household words and geography words) based on word length and frequency of use (Leech et al., 2001) to form the positive-appearance and neutral and negative-appearance and neutral word pairs. Neutral-neutral word pairs (space and music themed-words), also matched on word length and frequency of use, were formed to provide filler trials in the task (total 40). These word pairs helped to disguise the purpose of the experiment and prevent participants from expecting an appearance-related word on every trial of the task. Furthermore, having each word list conform to a single theme (e.g., music) helps control for effects caused by repeated priming of the related associative networks (Green et al., 1999). Matching words on word length and frequency of use helps control any artefacts that may arise due to these qualities and not the emotional relevance of the words (Larsen et al., 2006). Independent samples *t*-tests confirmed that there was no difference between word pairs for word length or frequency of use (all *p*s > .05, *d*s < .15). The lists of word-pairs are provided in Table 1. The word pairs were presented in randomized order.

[Table 1 about here]

Dot-probe task. Three versions of the DPT were prepared using ePrime 2.0 and based on previous research (Lane et al., 2017): an appearance-cued, neutral-cued DPT, and time-delayed DPT. The appearance- and neutral-cued tasks presented an image cue for 2000 ms prior to the commencement of each trial of a DPT. The time-delayed DPT presented a blank screen for 2000 ms in lieu of an image to control for the passage of time. In each version, the task then presented a central fixation cross to which participants refocused their gaze. After the participant pressed spacebar, two words appeared on the screen for 500 ms, one each in the lower and upper portions of the screen. Then, an asterisk (the probe) appeared in the location of one of the words. The participants' task was to indicate the location of the probe as quickly, but as accurately, as possible. Participants used one hand as demonstrated by the researcher. Each task was run on a 15-inch laptop and began with 10 practice trials, followed by 120 test trials in randomized order, 40 each with positive-appearance, negative-appearance, and neutral word pairs. ePrime 2.0 recorded participants' responses and reaction times for each trial.

Male Body Attitudes Scale-Revised (MBAS-R). The MBAS was originally developed as a 29-item measure of men's body dissatisfaction (Tylka, Bergeron, & Schwartz, 2005). Ryan, Morrison, Roddy, and McCutcheon (2011) later validated a revised 15-item version, confirming subscales pertaining to muscularity, body-fat, and height dissatisfaction, as were present in the original, through an exploratory factor analysis. The revised version improved content validity by incorporating terminology more explicit to men's body image (e.g., *lean* rather than *thin*, *muscular* rather than *larger*; Ryan et al., 2011). Items are scored on a 5-point scale measuring the frequency respondents experience each statement, ranging from *Never* to *Always*. Higher scores indicate greater dissatisfaction. The MBAS-R has shown appropriate correlations with other body image measures, supporting construct validity (Ryan et al., 2011). Cronbach's alpha coefficients in past research have indicated acceptable internal consistency (α = .85-.90; Ryan et al., 2011). The present sample's coefficients were similarly acceptable or excellent for the muscularity (α = .87), leanness (α = .92), and height (α = .87) subscales, and composite score (α = .88).

Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). The SATAQ-4 was developed to improve upon conceptual limitations of earlier versions (Schaefer et al., 2015). Exploratory and confirmatory factor analyses support the presence of five subscales covering internalization of leanness and muscular/athletic ideals, and pressures perceived from family, media, and peers. Items are scored on a 5-point Likert scale, ranging from *definitely disagree* to *definitely agree* with higher scores indicating greater levels of internalization or pressure. Evidence supports convergent validity through correlations with disordered eating, body satisfaction, and self-esteem (Schaefer et al., 2015). Correlations were stronger with internalization of the leanness ideal than the muscular ideal, suggesting this subscale had greater relevance to pathology (Schaefer et al., 2015). Cronbach's alpha coefficients were all in the acceptable range ($\alpha > .75$), supporting internal consistency (Schaefer et al., 2015). The Cronbach's alpha coefficients for the present sample were acceptable or excellent for the Internalization of the Muscularity Ideal ($\alpha = .86$), Internalization of the Leanness Ideal ($\alpha = .72$), Family Pressure ($\alpha = .92$), Peer Pressure ($\alpha = .84$), and Media Pressure ($\alpha = .92$) scales.

Multidimensional Body-Self Relations Questionnaire (MBSRQ). The MBSRQ considers body image as a multifarious construct (Cash, 2000). Only the Appearance Evaluation and Orientation and Fitness Evaluation and Orientation subscales were used. Evaluation subscales measure the respondents' appraisal of themselves in relation to the construct (e.g., whether they consider their body to be sexually appealing), whereas orientation subscales assess to the level of importance respondents place on the construct (e.g., level of grooming; Cash, 2000). Several items are reverse-scored and then summed to provide totals for each subscale. In men, the applicable subscales have shown acceptable internal consistency ($\alpha = .77$-$.91$) and test-retest reliability (.73-.89; Cash, 2000). The Cronbach alpha coefficients for the present sample were acceptable for the Appearance Evaluation ($\alpha = .86$), Appearance Orientation ($\alpha = .85$), Fitness Evaluation ($\alpha = .74$), and Fitness Orientation ($\alpha = .86$) subscales.

Visual analogue scales (VAS). VAS were used to measure a series of state body image variables, including muscularity, leanness, body fat, confidence, fitness, and overall appearance satisfaction, and mood variables, including depression, anxiety, calmness, and happiness. These variables were chosen to capture the breadth of men's body image. Two distractor items were also included (thoughtfulness and creativity). Each item began, *Right now I feel*, for example, *Right now I feel satisfied with my muscularity*, and was anchored by *Not at all* and *Very Much*. Items were scored through physical measurement of the participant's marking along a 16-cm line, presented on A4 paper, which was converted to a score out of 10 for ease of interpretation. Higher scores indicated healthier levels of satisfaction, happiness, and calmness, but poorer levels of anxiety and depression. VAS have benefit through being quick to administer and useful in appropriating continuous data. VAS measuring body dissatisfaction have been used widely (e.g., Agliata & Tantleff-Dunn, 2004; Mulgrew, Johnson, Lane, & Katsikitis, 2014), and have shown appropriate relationships with other body dissatisfaction measures (Garner, Olmstead, & Polivy, 1983). Mood VAS have also shown appropriate significant relationships with corresponding subscales of the Profile of Mood States questionnaire (Heinberg & Thompson, 1995).

Procedure

Participants were invited to complete the trait body image measures (MBSRQ, SATAQ-4, and MBAS-R) and demographic items online at a time and place of their choosing. Within a week of completing the survey, participants attended an individual laboratory session. Completing the survey and laboratory session at separate times allowed mitigation of any priming effects from questionnaires. The laboratory session was conducted double-blind, with steps taken to ensure proper randomization. Before commencing any testing, the second author coded the ePrime 2.0 files and generated a list of 1s, 2s, and 3s corresponding to the coded conditions in randomized order, determined using online randomization software. Each number was placed in a sealed envelope with the participant's number written on one side. At the time of the laboratory session, the lead author opened an envelope and commenced the corresponding ePrime 2.0 file. Participants and the researcher were unaware of the condition to which they had been allocated.

Participants first gave written consent to participate in the laboratory session. Before beginning one of the three DPTs (appearance-cued, neutral-cued, or time-delayed DPT), the researcher gave participants verbal instructions to respond as quickly but as accurately as possible. Participants were then monitored to ensure they were responding appropriately to the practice trials. Upon finishing the task, participants completed the VAS. Participants were asked what they thought was the purpose of the experiment. None guessed the specific purpose and all were debriefed accordingly.

Data Analysis

Results were considered significant at $p < .05$. In preparing the DPT data, all trials where the incorrect response was given were identified and removed ($M = 2.05$, $SD = 2.27$). One participant was removed entirely due to an excessive error rate (>10%, greater than 2 standard deviations above the mean). Trials with response times outside of two standard deviations of the mean were also identified and removed, resulting in removal of about 2% of trials per participant ($M = 2.72$, $SD = 1.42$). From the remaining data, attentional bias indices were created for positive- and negative-appearance words, using a formula from previous research (attentional bias = [upper target/ lower probe – upper target/ upper probe] + [lower target/ upper probe – lower target/ lower probe]/2; Bar-Haim et al., 2007). A score of 0 suggests no bias, positive scores suggest a bias towards the target words, and negative scores a bias away from the target words.

Questionnaire item missing data accounted for 0.25% of the total questionnaire data. These data were replaced with the average of available items for each individual participant in cases where over 80% of the scale had been completed, resulting in all missing data being replaced. The theoretical limitations of this approach are mitigated by the low percentage of missing data, the requirement of a high percentage of scale completion, and the high internal consistency of the scales used (Schafer & Graham, 2002). All assumptions were met for the analyses.

To assess the first hypothesis, a three (condition; appearance-cued DPT, neutral-cued DPT, time-delayed DPT) by two (word type; positive-appearance, negative-appearance) mixed design analysis of covariance (ANCOVA) was conducted, with attentional bias as the dependent variable and repeated measures on the second factor. Age and BMI were controlled for in the analyses as covariates, as is standard in body image research (Bessenoff & Snow, 2006; Williamson, Cubic, & Gleaves, 1993). Effect sizes were deemed small between η^2_p = .010 and .060, moderate between η^2_p = .060 and .140, and large greater than η^2_p = .140 (Cohen, 1988).

To assess the second hypothesis, bivariate correlations were conducted between attentional bias for positive- and negative-appearance words and various dimensions of body image, including BMI, appearance evaluation and orientation, fitness evaluation and orientation, muscularity dissatisfaction, leanness dissatisfaction, total body dissatisfaction, and various sociocultural aspects of body image. Bivariate correlations were also conducted between attentional bias scores and the VAS measures of appearance and mood. Effect sizes for correlations were considered small between r = .10 and .30, moderate between r = .30 and .50, and large greater than r = .50 (Cohen, 1988).

Results

Group Characteristics

The mean scores for age, BMI, and trait body image for each group are presented in Table 2. Despite random assignment, there were significant differences of large effect size between groups for the Internalization of the Muscularity Ideal subscale of the SATAQ-4, F (2, 59) = 6.37, p = .003, η^2_p = .175, and moderate effect size for the Media Pressure subscale of the SATAQ-4, F (2, 59) = 3.27, p = .045, η^2_p = .107, and the Appearance Evaluation subscale of the MBSRQ, F (2, 59) = 3.98, p = .024, η^2_p = .115. There were also nonsignificant differences (ps > .05) of moderate effect size between groups for the Fitness Orientation (η^2_p = .089) subscale of the MBSRQ and age (η^2_p = .075). All other differences between groups were nonsignificant (ps > .05) and of small effect size or lower (η^2_p < .06). The variables for which there were group differences were not included as covariates in the ANCOVA, as recommended by Gruijters (2016). Including the covariates did not change the pattern of results.

[Table 2 about here]

Effect of Condition and Word Type on Attentional Bias

The ANCOVA revealed no significant interaction between condition and word type, F(2, 53) = 0.05, p = .953, η^2_p = .002, and no significant main effects for condition, F(2, 53) = 0.53, p = .595, η^2_p = .019, or word type, F(1, 53) = 0.07, p = .792, η^2_p = .001. Therefore, no follow-up analyses were conducted. Conducting the analyses without the covariates did not affect the results. These analyses indicated that attentional bias scores were not influenced by condition or word type.

Correlations between Attentional Bias and Body Image

For trait variables, irregular correlations appeared between body image and attentional bias (see Table 3). For the appearance-cued DPT, greater attentional bias for positive-appearance words was significantly and strongly correlated with greater perceived pressure from media (p = .012), and moderately correlated with internalization of the leanness ideal (p = .076) and leanness dissatisfaction (p = .072). In contrast, for the neutral-cued DPT, greater perceived pressure from media correlated strongly with greater attentional bias for negative-appearance words (p = .018). Greater attentional bias for positive-appearance words correlated moderately with internalization of the muscularity ideal (p = .083). For the time-delayed DPT, greater attentional bias for negative-appearance words correlated with greater internalization of the leanness ideal (p = .009) and poorer fitness self-evaluation (p = .044).

For state appearance and mood VAS, a pattern of correlations appeared for men who completed the appearance-cued DPT in which attentional bias for positive-appearance words was moderately to strongly associated with poorer state experiences across a range of factors, including confidence (p = .002); satisfaction with muscularity (p = .005) and body tone (p = .003); overall appearance satisfaction (p = .045); and anxiety (p = .015), depression (p = .007), and calmness (p = .036; see Table 4). The findings also suggested that lower confidence (p = .035) and evaluation of fitness (p = .037) were moderately associated with attentional avoidance of negative-appearance words. The only other significant correlation was between body fat satisfaction and attentional bias for positive-appearance words for men who completed the time-delayed DPT (p = .007).

[Tables 3 and 4 about here]

Discussion

This study sought to investigate appearance-related attentional biases in men using a cued DPT and examine associations with body image. It was found that priming men with muscular-ideal media did not affect the magnitude of attentional biases across the sample. However, for men who completed the appearance-cued DPT, poorer state body image and mood correlated with stronger attentional biases for positive-appearance word stimuli. The few studies that have examined attentional biases in men have used a limited methodology and a broad definition of attentional bias (Cho & Lee, 2013; Cordes et al., 2016, 2017; Nikkelen et al., 2012; Warschburger et al., 2015). Only one study with a mixed gender sample (with a small proportion of men) has used a DPT methodology (Rosser et al., 2010). Thus, this study represents a significant step forward in this literature.

The Effects of Priming in the Cued DPT on Attentional Biases

The first hypothesis predicted that men who completed the appearance-cued DPT would demonstrate greater attentional biases than those who completed the neutral-cued or time-delayed DPTs. The results show no support for this hypothesis, with no significant difference in attentional biases between any of the DPTs. There are several potential explanations for this result, which contrasts with results of the prior study on which the methodology was based (Lane et al., 2017). First, although early evidence suggested that media representations of the muscular ideal affected men generally (Barlett et al., 2008), later evidence suggested that effects may be limited to subsets of men (Ferguson et al., 2013). Diedrichs et al. (2011) found that men are likely to disregard images, laugh at them, and actively reject advertisements featuring the images. They may also be less inclined to consider the images seriously in a social context, such as in the laboratory environment, given that some men consider discussing their own body image socially unacceptable and not masculine (Diedrichs et al., 2011). Through such competing priorities, the images may not have affected men strongly enough to prime them to consider their body image.

An alternative explanation for the results is that the images were potent, but they did not trigger an attentional bias for the word stimuli under investigation. Men engage in few appearance conversations and are unlikely to discuss appearance generally or comment on the attractiveness of members of the same gender (Jankowski, Diedrichs, & Halliwell, 2014). When appearance conversations do occur, research has suggested that they tend to center on muscularity (Jones & Crawford, 2006) and either encouragement or teasing related to muscularity is related to muscle dissatisfaction (Jones & Crawford, 2005). Online sources of socialization also tend to focus on encouraging men to engage in restrictive dieting practices and conform to rigid exercise rules to achieve muscularity rather than to improve appearance more generally (Murray et al., 2016). Thus, biases might be seen for muscle-related words, such as *muscular* and *lean* (or colloquialisms such as *ripped*), but not general appearance words, such as *attractive* and *handsome*. Focusing on the aesthetic qualities of other men may be a threat to masculinity given that men traditionally have conceptualized the body in terms of its functionality (Franzoi, 1995) and would prefer to acquire a physique that was functionally athletic (McNeill & Firman, 2014). Men may also be motivated to disregard appearance qualities of others to avoid being considered vain (McNeill & Firman, 2014).

The focus of men on masculinity and functionality highlights that another consideration related to the effects of the muscular ideal images is their conceptualization of the male body (Franzoi, 1995). Research has suggested that idealized media images with a functionality focus have greater negative effects on appearance satisfaction than those with aesthetic focus (Mulgrew et al., 2014). Most of the images in the current study may be considered as having aesthetic focus, with high emphasis on the attractiveness of the models. Although these images received the highest ratings in pilot testing, images rated as more athletic, even though less attractive, may have greater potency in affecting men in the general population, especially if linked with functionality-based word stimuli. This would align with men's desires to maintain a masculine image (Franzoi, 1995; McNeill & Firman, 2014).

A final consideration is that men in the general population simply do not demonstrate appearance-related attentional biases consistently, regardless of context. Cognitive-behavioral theory makes predictions for people with body image concerns rather than those in the general population. In considering the potency of the muscular ideal images with aesthetic focus and related word stimuli, it may be that attentional biases are present only for a subset of men. This consideration has support in light of the results for Hypothesis 2.

Associations between Attentional Biases and Body Image

The second hypothesis predicted that men with poorer trait and state body image would demonstrate stronger attentional biases for appearance-related stimuli in the appearance-cued DPT, but not the neutral-cued or time-delayed DPTs. This hypothesis received partial support. For men who completed the appearance-cued DPT, attentional bias for positive-appearance words correlated consistently with a range of state, but not trait variables. Stronger attentional biases were related to greater levels of muscularity, leanness, and overall appearance dissatisfaction, as well as poorer confidence and depression, anxiety, and calmness mood states, all measured following completion of the appearance-cued DPT. In comparing the findings to past research, consistency can be found despite the use of different methodologies (Cho & Lee, 2013; Cordes et al., 2017; Warschburger et al., 2015). Cho and Lee (2013) and Cordes et al. (2017) found that men with high body dissatisfaction gazed longer at stimuli considered muscular and attractive. The current study's findings, that men demonstrated an attentional bias for positive-appearance words in response to the muscular-ideal images, reflects this tendency. Men with state body dissatisfaction may preferentially attend to the attractive qualities of others, which in turn could be a factor exacerbating the body dissatisfaction.

The correlations with many state, but few trait, measures of body image may reflect the diversity of men's reactions to body ideals (Diedrichs et al., 2011; McNeill & Firman, 2014). Men who reported trait, but not state body dissatisfaction may not have found these particular images relevant targets for social comparison. Indeed, the only trait measure to significantly correlate with attentional bias for positive-appearance words for men who completed the appearance-cued DPT was the extent of perceived media pressure, aligning with the selection of appearance cues used. Other men with body dissatisfaction may find people they encounter in day-to-day life more suitable targets for social comparison, which has been reported in qualitative research with young Australian men (Diedrichs et al., 2011), or may have greater focus on behaviors, such as dieting and exercise (Murray et al., 2016).

Given that the findings are correlational, there are three possible explanations to consider. First, it may be that the attentional bias for positive-appearance words during the appearance-cued DPT caused men to experience poorer body image and mood, through a moderation effect. This explanation would be consistent with social comparison theory in that focusing on the positive qualities of others likely leads to upward social comparisons which reflect poorly on the self (Festinger, 1954). A second explanation for the results is that men who experienced low confidence, poorer mood, and poorer body image prior to the experiment were more likely to demonstrate an attentional bias for positive-appearance stimuli in response to the idealized images. This explanation would suggest that men with pre-existing concerns are more readily drawn to these positive-appearance qualities in others. Such attentional biases could facilitate negative social comparisons, which in turn further exacerbate negative effects from media exposure and lead to detrimental body image outcomes. The final explanation is that, for men who were affected by the media images, as reflected in poorer state body image and mood, attentional bias was an outcome or signal of this detrimental processing rather than a causal or maintenance factor.

In assessing the plausibility of the three explanations, it is unlikely that attentional biases have unidirectional causal relationships with disorder-relevant variables (Van Brockstaele et al., 2014). Directly manipulating the attentional bias through attentional bias modification would alleviate negative effects (e.g., Mogoaşe, David, & Koster, 2014), which would support inferences that the attentional biases casually contributed to poorer state outcomes. However, cognitive-behavioral therapy has also been shown to reduce attentional biases in women with disordered eating (Shafran et al., 2008). These findings support inferences that other, unmeasured processes affect attentional biases. Furthermore, Smith and Rieger (2010) found greater levels of attentional bias following an emotion induction, which supports inferences that pre-existing state body dissatisfaction and mood would affect the level of attentional biases measured. As such, the observed correlations between attentional bias and state variables may reflect both moderating and outcome effects, with attentional bias interacting with pre-exposure state factors to influence the extent to which the images affected men.

Strengths and Limitations

This study had several strengths, such as including men of diverse ages, using a double-blind experimental design with random assignment, and including word stimuli carefully matched to reduce confounding influences. Compared to the existing studies that used reaction time paradigms (Ben-Tovim et al., 1993; Channon & Hayward, 1990; Fairburn et al., 1991; Rosser et al., 2010), this study also has strength through using word stimuli with direct relevance to men's body image. For example, the emotional Stroop studies used general fatness words (e.g., plump, heavy, fat; Ben-Tovim et al., 1993; Channon & Hayward, 1990; Fairburn et al., 1991) and the single DPT study used general words assessed by both male and female participants as either appearance or non-appearance related (Rosser et al., 2010).

Several limitations are noted. First, the measurement of state variables following the task helped reduce demand characteristics by avoiding priming participants to think about their body image, but this also complicates the interpretation of the associations between body image and attentional bias, with several explanations considered above. A second limitation is that although the word stimuli covered a range of thoughts men may have about their body image, the positive- and negative-appearance categories were heterogeneous. For example, the negative-appearance category included words related to fatness (e.g., overweight, fat), weakness (e.g., scrawny, frail), and general appearance (e.g., unattractive, ugly). These words were chosen for two reasons. First, to cater to the range of thoughts men may have regarding body image. Second, to maintain the potency of the word stimuli by limiting selection to words with high frequency of use and relevance. In focusing on one of the subcategories, these two aspects would be compromised. Relatedly, we avoided words with double meanings such as “ripped”, where context is difficult to establish, although consideration of such colloquial terms is warranted in future research. The heterogeneity of the sample is also a limitation, as what constitutes the muscular ideal may differ between men of different ages and sexual orientations. Furthermore, there were significant differences between the groups for trait body image variables. It is possible that these differences contributed to attentional bias scores, which may have affected the final results. However, including these scores as covariates in post-hoc analyses to account for such potential influence did not change the pattern of results and, given the negligible effect sizes, it seems unlikely that a more evenly distributed sample would have changed the results.

A final limitation of this study is the modest sample size. The sample size was determined through an *a priori* power analysis to be adequate to detect between-groups differences and therefore test our primary hypotheses. Furthermore, it is larger than sample sizes of past studies investigating attentional biases in men, which have ranged from $N = 15$ to $N = 45$ (e.g., Ben-Tovim et al., 1993; Cho & Lee, 2013). However, although many significant correlations were observed relating to our secondary research hypotheses, there were some trend-level correlations for both state and trait variables in the moderate effect size range (*r*s approximately .40), with the expected direction of effects. For example, internalization of the leanness ideal and leanness dissatisfaction trended towards a significant correlation with attentional bias for positive-appearance words for men who completed the appearance-cued DPT. This finding would align with those of past research (Lane et al., 2017). Despite some of the correlations not reaching significance, the consistency and magnitude of the effects for state variables suggests that these variables have stronger relationships with attentional bias for positive-appearance words following exposure to the muscular ideal than do trait characteristics. However, the inconsistent patterns for the trait variables suggests that significant results may have occurred by chance as opposed to there being a true effect in the population. As such, these results are best viewed tentatively until replicated with a larger sample.

Conclusion

This study provides evidence for appearance-related attentional biases in men and has two key outcomes. First, the results suggest that exposure to the muscular ideal does not trigger appearance-related attentional biases in men generally. Second, correlations between state variables and attentional bias suggest that these biases are present in a subset of men. Broadly, the findings are consistent with cognitive-behavioral and information-processing theory (Williamson et al., 2004), aligning with theoretical assumptions that men with state experiences of body image disturbance following an activating event will exhibit attentional biases. Although the study's evidence is limited by the correlational design and the specific type of attentional bias investigated, it contributes to the developing literature establishing these biases in men (Cho & Lee, 2013; Cordes et al., 2016; Nikkelen et al., 2012; Warschburger et al., 2015). These findings have implications for understanding how and why men may experience negative outcomes when exposed to media depictions of the muscular ideal.

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Table 1

Negative-Appearance, Positive-Appearance, and Neutral Word Pair Stimuli

Negative-appearance pairs		Positive-appearance pairs		Neutral word pairs	
Experimental	Neutral	Experimental	Neutral	Neutral	Neutral
fat	box	sexy	dirt	nova	bass
weak	bath	lean	clay	comet	banjo
ugly	desk	strong	desert	rocket	guitar
frail	futon	healthy	valley	meteor	fiddle
chubby	kettle	muscular	mushroom	galaxy	violin
skinny	drawer	athletic	horizon	eclipse	piccolo
scrawny	keyboard	handsome	weather	planets	trumpet
unhealthy	fireplace	powerful	mountain	celestial	accordion
overweight	tablecloth	masculine	waterfall	astronomy	saxophone
unattractive	conservatory	attractive	environment	spacecraft	harmonica

Table 2

Group Means and Standard Deviations for Age, BMI, and Body Image Constructs

	Appearance-cued DPT (*n* = 21)	Neutral-cued DPT (*n* = 20)	Time-delayed DPT (*n* = 19)
Age (years)	29.38 (11.07)	31.00 (8.02)	35.89 (10.34)
BMI (kg/m^2)	24.51 (3.43)	26.24 (2.97	25.63 (2.87)
SATAQ-4			
Media*	2.13 (0.94)	2.53 (1.03)	2.97 (1.17)
Peers	1.58 (0.65)	2.01 (0.83)	1.63 (0.63)
Family	1.79 (1.01)	2.14 (1.15)	1.78 (0.92)
Muscularity*	2.85 (1.06)	2.85 (0.77)	3.72 (0.74)
Leanness	2.51 (0.91)	2.49 (0.85)	2.65 (0.44)
MBAS-R			
Total	38.21 (12.61)	39.79 (10.06)	36.14 (8.60)
Muscularity	19.40 (6.70)	18.70 (6.02)	18.45 (5.40)
Leanness	12.48 (5.59)	14.79 (5.24)	12.89 (4.08)
MBSRQ			
Appearance Evaluation*	3.33 (0.68)	2.90 (0.87)	3.50 (0.46)
Appearance Orientation	3.09 (0.66)	3.32 (0.67)	3.36 (0.63)
Fitness Evaluation	3.65 (0.80)	3.44 (0.73)	3.84 (0.56)
Fitness Orientation	3.89 (0.79)	3.40 (0.68)	3.85 (0.58)

Note. DPT = dot-probe task, BMI = body mass index, SATAQ-4 = Sociocultural Attitudes Towards Appearance Questionnaire-4, MBAS-R = Men's Body Attitudes Scale-Revised. MBSRQ = Multidimensional Body-Self Relations Questionnaire. *significant difference between groups ($p < .05$).

Table 3

Bivariate Correlations between Attentional Bias and Trait Body Image according to Condition

	Appearance-cued DPT (*n* =21)		Neutral-cued DPT (*n* = 20)		Time-delayed DPT (*n* = 19)	
Attentional bias	Positive	Negative	Positive	Negative	Positive	Negative
SATAQ-4						
Media	.54*	-.06	.22	.50*	.18	-.15
Peers	.17	.28	-.07	.18	-.05	-.34
Family	.10	.20	-.02	-.00	.20	-.20
Muscularity	.29	.13	.40†	.36	-.20	-.06
Leanness	.40†	.05	.01	.04	.33	.53*
MBAS-R						
Total	.35	-.10	.02	.03	.30	.19
Muscularity	.23	-.15	.25	.10	.16	.17
Leanness	.40†	-.05	-.03	.08	.35	.14
MBSRQ						
Appearance Evaluation	-.35	.21	.06	.03	-.24	-.32
Appearance Orientation	-.05	.19	.21	.06	.00	.27
Fitness Evaluation	-.02	-.24	.03	-.01	-.20	-.50*
Fitness Orientation	-.27	.22	.14	.11	.00	-.38
M[a] (*SD*)	10.30 (36.89)	2.84 (28.67)	12.83 (42.99)	10.59 (48.23)	20.41 (30.53)	12.95 (30.62)

Note. DPT = dot-probe task, SATAQ-4 = Sociocultural Attitudes Towards Appearance Questionnaire-4, MBAS-R = Men's Body Attitudes Scale-Revised, MBSRQ = Multidimensional Body-Self Relations Questionnaire. [a]Mean attentional bias scores (reaction time in ms for incongruent minus congruent trials). †$p < .10$, *$p < .05$

Table 4

Bivariate Correlations between Attentional Bias and State Appearance and Mood according to Condition

	Appearance-cued DPT (*n* =21)		Neutral-cued DPT (*n* = 20)		Time-delayed DPT (*n* = 19)	
Attentional bias	Positive	Negative	Positive	Negative	Positive	Negative
Appearance						
Muscularity	-.59**	.30	-.23	-.05	-.24	-.40†
Tone	-.61**	.37†	.04	.15	-.35	-.28
Body fat	-.39†	.20	-.03	.10	-.59**	-.18
Confidence	-.65**	.46*	-.05	-.22	-.21	-.26
Fitness	-.42†	.46*	.05	.19	-.28	-.33
Overall	-.44*	.21	.19	-.09	-.05	-.26
Mood						
Anxious	.52*	-.32	.09	.28	-.04	-.19
Happy	-.42†	.23	-.02	-.10	-.24	-.14
Calm	-.46*	.25	.20	-.04	-.28	.01
Depressed	.57**	-.28	.10	.32	.40†	.29

Note. DPT = dot-probe task. †p < .10, *p < .05, **p < .01