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Men Respond Too: The Effects of a Social-Evaluative Body Image Threat on Shame and Cortisol in University Men

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Abstract

Framed within social self-preservation theory, the present study investigated men's psychobiological responses to social-evaluative body image threats. University men (n = 66) were randomly assigned to either a high or low social-evaluative body image threat condition. Participants provided saliva samples (to assess cortisol) and completed measures of state body shame prior to and following their condition, during which anthropometric and strength measures were assessed. Baseline corrected values indicated men in the high social-evaluative body image threat condition had higher body shame and cortisol than men in the low social-evaluative body image threat condition. These findings suggest that social evaluation in the context of situations that threaten body image leads to potentially negative psychobiological responses in college men.

Keywords

men, muscularity, social evaluation, cortisol, social self-preservation theory

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The majority of research on body image has focused on adolescent and young adult women, leading to calls to examine more diverse samples, including boys and men (Smolak & Cash, 2011). One reason for this call was that early research focused on the drive for thinness and used questionnaires that were developed to measure women's body image, underestimating the prevalence of men's body image concerns. It was assumed that men were generally satisfied with their bodies because men were less concerned about weight loss, reported fewer eating disorders and dieted less often than women (McCreary, 2011). Early research failed to acknowledge the gender differences in ideals and the importance of muscularity to men's body image (McCreary & Sasse, 2000). For many men, the muscular ideal, one that can be described as being lean and tall, and having broad shoulders, large pectorals and biceps, and well-defined abdominals (Davis, Karviven, & McCreary, 2005; McCreary & Sasse, 2000; Tiggemann, 2011; Tylka, Bergeron, & Schwartz, 2005), is associated with social benefits such as being perceived as strong, powerful, confident, and attractive (McCreary, 2011; Petrie & Greenleaf, 2011). The internalization of this male ideal can lead many men to judge their own bodies against it (Edwards, Tod, & Molnar, 2014), often coming up short, as the male ideal is impossible for the majority of men to achieve, which may lead to the development of an unhealthy drive for muscularity (McCreary, 2011).

With the consideration of the importance of muscularity to men's body image, research has identified that as many as 70% of college men report body dissatisfaction (Neighbors & Sobal, 2007). In addition to body dissatisfaction, a variety of other indicators of negative body image including body

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shame (Castonguay, Pila, Wrosch, & Sabiston, 2015; Mescher & Rudman, 2014) and social physique anxiety (Martin, Kliber, Kulinna, & Fahlman, 2006) have also been reported. Longitudinal research suggests that body dissatisfaction increases in men from middle school to young adulthood (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013). Body image concerns, including body dissatisfaction, have been linked to a number of harmful health-related outcomes in men including general negative affect, depression, anxiety, low self-esteem, eating disorders, muscle dysmorphia, drive for muscularity, impaired sexual functioning, and diminished quality of life (Bergeron & Tylka, 2007; Brennan, Lalonde, & Bain, 2010; Cash & Fleming, 2002; Cash, Morrow, Hrabosky, & Perry, 2004; Cramblitt & Pritchard, 2013; Dakanalis et al., 2015; McFarland & Petrie, 2012; Smolak & Cash, 2011).

Although a number of theories have been applied to the study of body image concerns (i.e., socio-cultural theory [Cash & Pruzinsky, 2002; Jackson, 2002], self-objectification theory [Fredrickson & Roberts, 1997], social comparison theory [Festinger, 1954] and others), these do not explicitly take a psychobiological approach, potentially missing important knowledge to understand body image concerns and their impact on health. One theory that is gaining attention in the understanding of body image concerns which does use a psychobiological lens is social self-preservation theory (SSPT; Dickerson, Gruenewald, & Kemeny, 2004; Kemeny, Gruenewald, & Dickerson, 2004). SSPT is rooted in the idea that humans have a basic need to belong and be accepted by others, and thus they monitor the environment for any threats to their social standing (Baumeister & Leary, 1995). According to SSPT, when one's social acceptance or standing is threatened due to potential negative evaluations from others (termed *social-evaluative threat*), a psychobiological response is initiated. This response includes self-conscious emotions (particularly shame) and cortisol (a stress hormone; Dickerson, Gruenewald, et al., 2004; Kemeny et al., 2004). This psychobiological response is believed to signal to an individual that his or her social status is at risk, leading to the initiation of strategies designed to protect the self from further loss of status, including withdrawal, avoidance, or appeasement (Dickerson, Gruenewald, et al., 2004; Kemeny et al., 2004). These psychobiological responses, if uncoordinated (i.e., responses are excessive relative to the threat or do not stop when the threat is removed) may have a damaging influence on health as they can overexpose individuals to chronic elevations in cortisol or shame. Numerous physical and health consequences have been linked to excessive cortisol levels or chronic shame, including depression, anxiety, low self-esteem, cardiovascular disease, and low bone mineral density (Gilbert & Trower, 1990; Lewis, 1971; McEwen, 1998).

The majority of research examining psychobiological responses to social-evaluative threats using SSPT in men and women has investigated responses in laboratory settings to performance-based tests. The most common performance-based test used is the Trier Social Stress Test (Kirschbaum, Pirke, & Hellhammer, 1993). This test requires participants to prepare and deliver a speech to a panel of judges (i.e., an evaluative audience). These studies have consistently identified that in situations of social-evaluative threat (compared to no social-evaluative threat), higher shame and cortisol result (Dickerson, Mycek, & Zaldivar, 2008; Gruenewald, Kemeny, Aziz, & Fahey, 2004). While the Trier Social Stress Test has most commonly been used to examine contentions of SSPT, subsequent research has also suggested that other types of social-evaluative threat also elicit shame and cortisol responses consistent with the theory, including ballroom dancing and writing about a situation of self-blame (Dickerson, Kemeny, Aziz, Kim, & Fahey, 2004; Rohleder, Beilen, Chen, Wolf, & Kirschbaum, 2007). More recently, research has also reported that body image threats may represent another class of social-evaluative threats, consistent with SSPT. In Western cultures, being physically attractive (e.g., having the ideal body) is linked with social acceptability, rank, and status (Gilbert, 2002). As previously mentioned, the male ideal is associated with numerous social benefits (McCreary, 2011; Petrie & Greenleaf, 2011).

Lamarche, Kerr, Faulkner, Gammage, and Klentrou (2012) conducted a qualitative study in which women reported that uncomfortable body image situations contained elements of social evaluation (e.g., other people present and observing them), led to feelings such as shame and anxiety, and resulted in responses such as avoidance, consistent with SSPT. Subsequent experimental research has identified that body image situations characterized by social-evaluative threat can also elicit shame and cortisol responses (Cloudt, Lamarche, & Gammage, 2014; Lamarche, Bailey, & Gammage, 2015; Lamarche, Gammage, Kerr, Faulkner, & Klentrou, 2014, 2016; Martin Ginis, Strong, Arent, & Bray, 2012).

Lamarche, Gammage, Kerr, Faulkner, and Klentrou (2016) reported support for a cortisol and self-conscious emotional response (e.g., social physique anxiety) to body image social-evaluative threat, as well as evidence that outcomes return to baseline levels after the threat is no longer present, suggesting an efficient response-recovery profile. Women in the social-evaluative threat condition underwent a test to assess percent body fat while wearing spandex shorts and a jog bra, while women in the control group were asked to sit quietly. Women in the social-evaluative threat condition had higher cortisol and reported higher social physique anxiety compared to those in the control group.

Although growing evidence suggests that psychobiological responses occur to social-evaluative body image threats, it is unknown if findings generalize to men. Research to date has examined psychobiological responses to social-evaluative body image threats in women only. Given that men also experience body image concerns (McFarland & Petrie, 2012; Neighbors & Sobal, 2007; Tylka et al., 2005), it is critical to investigate their responses to such threats from a psychobiological perspective. Men's body image concerns differ from women's as previously described and so the nature of the threat is likely to be very different between men and women—it would be impossible to use the same threat that has been used previously in women. This contention is supported by research using the swimsuit/sweater paradigm to test to tenants of self-objectification theory (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998). For example, men reported the swimsuit condition as less shame-provoking than women and instead felt marginally more silly, awkward, or foolish.

It should be acknowledged that there is research to demonstrate that some men respond negatively to a number of body image situations (i.e., viewing media images of the male ideal, wearing speedos; Arbour & Martin Ginis, 2006; Brennan et al., 2010; Cramblitt & Pritchard, 2013; Martins, Tiggemann, & Kirkbride, 2007) and that some factors exacerbate responses (i.e., presence of attractive female, presence of another male who is fit, wearing less clothing; Marquez & McAuley, 2001; Roney, Lukaszewski, & Simmons, 2007). The body of research that has examined responses to body image situations in men has not taken a psychobiological approach grounded in theoretical thinking. SSPT offers theoretical support around contexts in which psychobiological responses are more likely: rejection-laden contexts where one could be deemed unworthy of acceptance, performance-based contexts where one is required to display a valuable trait or skill, and uncontrollable contexts where unfavorable characteristics may be brought to light (Dickerson, Gruenewald et al., 2004). Further, a comprehensive meta-analysis framed within SSPT also identifies contextual factors that characterize situations likely to elicit a psychobiological responses consistent with SSPT (Dickerson & Kemeny, 2008): the presence of an evaluative audience (at least one other person present besides the experimenter); a permanent recording of the performance (e.g., a videotape) for subsequent evaluation and the potential for negative social comparisons with others. Manipulations that included more than one element yielded larger cortisol responses than manipulations with only one evaluative element. The present study also served as a methodological starting point to design and test a threat that could be used in future psychobiological body image research specifically on men that is theoretically grounded.

The purpose of this study was to examine shame and cortisol responses to a social-evaluative body image threat in men. Given contentions of SSPT and research in the body image literature identifying psychobiological responses to a social-evaluative threat in women, it was hypothesized that men in a high social-evaluative body image threat would report higher post-threat body shame and would have higher post-threat cortisol compared to men in a low social-evaluative body image threat group.

Methods

Participants

A total of 74 university men from southern Ontario were recruited for a study examining hormones, physical characteristics, and self-beliefs. Participants ranged in age from 17 to 25 years. Men were excluded if they had a history of a clinical eating disorder or were varsity athletes. Men with eating disorders were excluded as studies have reported that undergraduate men with eating disorders are more concerned with body shape and muscle than those without eating disorders (Ousley, Cordero, & White, 2008) and because women with eating disorders have exaggerated cortisol responses to stress (see Gluck, 2006 for review). Male athletes were excluded as they generally have more positive body image than male exercisers or male non-athletes (Varnes et al., 2013; Hausenblas & Symons Downs, 2001), although this can be complicated by the type of sport played (Chapman & Woodman, 2016). Individuals on medications affecting cortisol (e.g., corticosteroids) and those who smoked were excluded as these factors can affect cortisol responses (Kirschbaum, Strasburger, & Langkrar, 1993). Six individuals were removed from the original sample for not meeting inclusion criteria. One participant was removed because he stated he knew "something was up" during the testing (see manipulation check in the procedure section) and one participant was removed because he was missing the post-threat shame measure due to research error. Thus, the final sample consisted of 66 men (31 high social-evaluative threat condition, 35 low social-evaluative threat condition). Participant characteristics by group are reported in Table 1. It should be noted that all participants self-reported being heterosexual.

Measures

Demographic Questionnaire. Participants self-reported demographic variables including age, race, sexual orientation, major, and year in school. Participants were then asked a series of questions to verify study eligibility. In addition, participants were asked to indicate engaging in

Table 1. Sample Characteristics by Group.

	Low social-evaluative body image threat (n = 35)		High social-evaluative body image threat (n = 31)	
Variables	Mean	SD	Mean	SD
Age (years)	21.40	3.00	20.45	1.96
% body fat	20.13	6.62	21.27	6.23
BMI	24.90	3.18	23.55	3.05
PA*	1538.83	919.55	1448.79	1220.90
WT	2.87	1.84	2.73	2.17
DM	2.96	0.91	3.15	0.75
Cortisol	2.83	3.50	3.16	5.88
PET*	0.46	0.66	0.87	1.15

Note. SD = standard deviation; BMI = body mass index; PA = moderate/vigorous physical activity, measured in MET minutes/week; WT = weight training frequency in days/week; DM = drive for muscularity, ranges 1–6; Cortisol = baseline cortisol measured in ng/ml; PET = perceived evaluative threat, ranges 0–4.
*$p < .05$.

or experiencing any behaviors that day that could affect cortisol (e.g., stressful events, physical activity, and food and beverage consumption).

International Physical Activity Questionnaire [short]. To assess habitual physical activity, participants completed the International Physical Activity Questionnaire (IPAQ-S) by indicating the number of days in the past week on which they performed each of vigorous, moderate, and walking physical activity and the amount of time on average they spent doing each intensity of activity per day. The number of days per week was multiplied by the average time per day (minutes per week). Each intensity's minutes per week was multiplied by known metabolic equivalents (METs; 8, 4, 3.3, respectively; IPAQ-S, Craig et al., 2003); these values were then summed to get a total physical activity score in MET minutes/week. For the present study, walking was excluded from analysis based on Health Canada Physical Activity Guidelines (Bryan & Katzmarzyk, 2009). This approach has been successfully used in numerous studies (e.g., Faulkner, Arbour-Nicitopoulos, & Hsin, 2010; Prochaska, Spring, & Nigg, 2008). Evidence of reliability and validity for the IPAQ-S in adults aged 18–65 years has been provided (Craig et al., 2003).

Drive for Muscularity Scale. This 15-item questionnaire (McCreary & Sasse, 2000) assesses individuals' attitudes regarding their muscularity (7 items; e.g., "I wish I were more muscular") and behaviors associated with the desire to be more muscular (8 items; e.g., "I drink weight gain or protein shakes"). Participants rated the extent to which each statement applied to them on a scale ranging from 1 = *always* to 6 = *never*. Items were recoded so higher scores represented higher levels of the drive for muscularity. This scale (using a total score) has demonstrated adequate validity and reliability in college men (Cafri & Thompson, 2004; McCreary & Sasse, 2000; Wojtowicz & von Ranson, 2006). Internal consistency in the present study was adequate (α = .86).

State Weight and Body-Related Shame Scale. The body shame subscale (referring to the failure or shortcomings attributed to oneself as an object) of the **Weight and Body-Related Shame Scale** (Conradt et al., 2007) was used to assess participants' feelings of shame related to their bodies at that moment in time. It is a 6-item scale with each item rated on a 5-point scale, ranging from 0 = *strongly disagree* to 4 = *strongly agree* (e.g., "Right now, I feel ashamed because others can see my body"). This measure has been reported to be psychometrically sound when assessing feelings of body shame in men and women with concerns related to weight (Conradt et al., 2007). Adequate internal consistency reliability in samples of college women of the state version of this measure has been reported (Cloudt et al., 2014; Lamarche et al., 2014, 2015). Internal consistency in the present study for both time points was satisfactory (α = .91 and .94).

Salivary Cortisol. Three **s**aliva samples were collected from each participant. Samples were collected using Salivettes specific for cortisol measurement (Sarstedt, Germany). Participants were asked to sample their own saliva by placing the piece of sterile synthetic swab into their mouth and letting the saliva absorb into the swab for 1 min. Participants were then asked to carefully guide the swab back into the container using their mouth and to avoid touching the edges of the tube with their hands as they put the cap back on the container. Once sealed, participants handed their sample to the researcher which was centrifuged immediately and stored in a −20 °C freezer until analysis. This procedure was hygienic and posed minimal risk to the participant or researcher and is commonly used in research as an indicator of psychosocial stress (Dickerson & Kemeny, 2004).

Cortisol concentration was determined by first centrifuging saliva at 3,000 × g for 15 min; only the supernatant was assayed. All enzyme immunoassays were carried out on NUNC Maxisorb plates. Cortisol antibodies (R4866) and corresponding horseradish peroxidase conjugate were obtained from C. Munro of the Clinical Endocrinology Laboratory, University of California, Berkeley, CA; Davis Steroid standards were obtained from Steraloids, Inc. of Newport, Newport, RI. First, plates were coated with 50 µl of antibody stock diluted at 1:8500 in a coating buffer (50 mmol/L bicarbonate buffer pH 9.6). Plates were then sealed and stored for 12 to 14 hr at 4 °C. A 50-µl wash solution (0.15 mol/L NaCl solution containing 0.5 ml of Tween 20/L) was added to each well to rinse away unbound

antibody; then 50 µl phosphate buffer was added to each well. Plates were incubated for 2 hr at room temperature, then standards, samples, or controls were added. Two quality control salivary samples at 30% and 70% binding (low and high ends of the sensitivity range of the standard curve) were prepared. A 50-µl cortisol horseradish peroxidase conjugate was added to each well, with 50 µl of standard, sample, or control. Plates were loaded and remained incubated for 1 hr. The plates were next washed with 50-µl wash solution, and 100 µl of a substrate solution of citrate buffer, H_2O_2 and 2,2′-azino-bis (3-ethylbenzthiazoline-6-sulfonic acid) was added to each well. The plates were covered and incubated while shaking for 30 to 60 min at room temperature. The plates were read with a single filter at 405 nm on the microplate reader (Titertek multiskan MCC/340). Blank absorbances were obtained, standard curves generated, a regression line was fit to the sensitive range of the standard curve (typically 40–60% binding) and samples were interpolated into the equation to get a value in picograms (pg) per well. Each sample was assayed in duplicate and averages were used. Interplate variation (CV) was 6.45% while intraplate variation was 6.51%.

Physical Measures. Physical measures were selected to emphasize upper body muscularity, leanness, and strength, consistent with the male ideal (Cafri & Thompson, 2004; Pope, Phillips, & Olivardi, 2000) and to maximize focus on, and evaluation of, the body. Also, the time to complete the assessment was considered—attempts were made to choose a battery of assessments that would match the stress duration of the Trier Social Stress Test (e.g., 20 min) and past research in women (e.g., 10–20 min) ensuring that stress duration would not complicate interpretation of the findings of the present study within the current literature. Circumferences for flexed biceps, chest, and waist were taken using a measuring tape and standard laboratory procedures (Taylor & Behnke, 1961). Measurements were taken three times for each arm to ensure accuracy and to emphasize the focus on the body and muscle size.

Percent body fat was measured using a two-site skinfold test (Sloan, 1967), with measures taken from the thigh and subscapula. Standard protocol was followed for this assessment (Bray et al., 1978; Sloan, 1967). Skinfold measures were used to calculate body density using a standard formula. Using this body density value, percent body fat was calculated using the Siri equation (Siri, 1961). This method and the use of calipers have been reported to be reliable in previous research (Sloan & Shapiro, 1972). Percent body fat was used to maximize focus on, and evaluation of, the body's leanness, another characteristic of the male ideal (Davis et al., 2005; McCreary & Sasse, 2000; Tiggemann, 2011; Tylka et al., 2005).

Strength was assessed using a hand grip dynamometer to assess grip strength. Participants stood with the hand grip in one hand with the arm in a straight horizontal line at shoulder height. Participants then took a deep breath, exhaled and squeezed the grip as tightly as they could while slowly lowering it toward their leg without contacting their leg. This procedure was repeated two times on each side (alternating sides) and the highest score for each side was summed to get the total strength score (Mathiowetz, Weber, Volland, & Kashman, 1984). This procedure has been reported to be highly reliable and valid for measuring hand grip strength (Bellace, Healy, Besser, Byron, & Hohman, 2000). Hand grip in particular was used as a measure of strength because it is a relatively low-intensity test which would not confound cortisol measurements (compared to other strength tests such as a one-repetition maximum test of strength which may itself elicit a cortisol response).

Finally, height and weight were assessed using standard laboratory procedures, with shoes and socks off. Height was assessed to the nearest millimeter using a stadiometer. Weight was measured to the nearest tenth of a kilogram using a standard scale.

Procedure

Upon clearance from the university research ethics board, participants were recruited via posters placed around campus and through announcements made in classes for a study on hormones, physical measures, and self-beliefs. Interested participants contacted the research team. Eligibility was confirmed via e-mail through self-report. Without their knowledge, participants were then randomly assigned into either the high social-evaluative threat or low social-evaluative threat condition. Participants were asked via email to refrain from eating, drinking, or engaging in physical activity at least 1 hr prior to their scheduled visit.

All data collection procedures took place in a private laboratory on campus between the hours of 3 p.m. and 6 p.m. when cortisol levels are relatively constant, to account for diurnal variations in cortisol (Dickerson & Kemeny, 2004). The two front walls of the laboratory were mirrored. Upon arrival to the laboratory, participants were asked to take a seat and then provided informed consent followed by the baseline saliva sample. Next, participants completed demographic information as well as measures of physical activity and drive for muscularity. These procedures served as a rest period prior to the pre-threat saliva sample.

Next participants completed a baseline measure of state body shame. Once completed, participants provided the researcher with a second saliva sample (pre-threat). Participants were then described the series of physical

measurements (chest circumference, flexed bicep circumference, waist circumference, height, weight, percent body fat via skinfold measurements) and test of strength (handgrip) they would be undergoing. They then underwent their condition consistent with their group assignment (see below for descriptions). After completion of their condition, participants were asked what they believed to be the true purpose of the study, debriefed as to the true purpose of the study, given their assessment results, and provided final consent. Participants were offered $10 or 1 hr research credit as compensation for their time.

High Social-Evaluative Threat Condition. The construction of the high threat condition was based on the three contextual elements identified to more likely elicit psychobiological responses consistent with SSPT (Dickerson & Kemeny, 2004) and other factors in the body image literature to exacerbate negative responses as described earlier. All procedures took place in the front of the room, in full view of the mirrors on two walls. The second author (who served as the principal researcher in both conditions) and a male research assistant were present in both conditions. In addition, a male and female confederate was present for the social-evaluative threat condition only. Participants were told the female confederate was a research assistant and the male confederate was another participant. The male confederate was 24 years of age and had a physique that was consistent with the male ideal; he had a muscular build, including broad shoulders, a narrow waist, well-defined abdominals, and muscular arms and chest (Cafri & Thompson, 2004; Pope et al., 2000). The female confederate, who was 22 years, represented the female thin ideal with a petite build. The same confederates were present for all sessions.

Participants were told that they would have several physical and strength measures taken, and that they would be provided with normative feedback following these tests so they could compare their results to those of other men their age. They were also told that all measures would be taken with their shirts off to ensure accuracy of measurements while the male research assistant videotaped them during these measurements to ensure all procedures were performed correctly. Measurements were taken by the female confederate who read them aloud to the principal researcher who recorded all values. In all instances, the male confederate was chosen to undergo the physical measures first. Once all measures for the confederate were completed, the female confederate passed the clipboard with the recorded measures to the male research assistant who left the room. Participants were told he was going to the lab next door for a few minutes to enter the measured values into a computer program which would calculate body composition scores (percent body fat) and norms based on the male confederate's anthropometric and strength measures. When he returned he passed the "calculated values" to the female confederate who verbally reported them to the confederate so that everyone in the room could hear. Values indicated the male confederate tested in the healthiest range based on norms for men 18–25 years for body mass index and that he had 8% body fat, comparable to an elite athlete. Further, his strength scores described him as stronger than 90% of men his age.

Next, the participant underwent the same anthropometric and strength tests using the same procedures. After all measures were completed, he was told that in the interest of time, while the male research assistant calculated strength and anthropometric measure values in the room next door, participants would complete the next set of questionnaires (post-threat) and then he would receive his results later. Completion of physical measures and the post-threat questionnaires took approximately 20 min. Participants then rested for approximately 10 min before providing the final saliva sample. This rest period was used to ensure the post-threat saliva sample was taken at approximately 30 min following the stressor; the cortisol response peaks between 21 and 40 min following the onset of an acute social-evaluative threat (Dickerson & Kemeny, 2004). Finally, participants completed the manipulation checks, were debriefed and received their assessment results.

Low Social-Evaluative Threat Condition. The construction of the low threat condition was based on removing or minimizing the three contextual elements identified to more likely elicit psychobiological responses consistent with SSPT (Dickerson & Kemeny, 2004) relative to the high threat condition. All data collection was done in the same room; however, participants were located out of sight of the mirrors, with only the principal researcher and a male research assistant present (i.e., no confederates). The participant underwent all anthropometric and strength measures using the same protocols as the high social-evaluative threat condition; however, all measures were taken while the participant was wearing a t-shirt and in the absence of a video camera. In addition, values were quietly recorded by the male research assistant. No mention of normative values was made. Following completion of all measures, which took about 10 min, participants completed the post-threat state measures (body shame). They then sat quietly for approximately 20 min, before providing the final saliva sample. This rest period ensured that the timing of the final saliva sample was consistent with the high social-evaluative threat condition, approximately 30 min following the threat onset. Lastly, participants completed the manipulation checks, were then debriefed as to the true purpose of the study, provided informed consent, and received results of their assessments.

Manipulation Checks. Participants completed three manipulation check items. Perceived evaluative threat (Focht & Hausenblas, 2004) was a single item that measured an individual's perception of the level of threat in terms of having his body evaluated by others. Participants rated how threatening they perceived the anthropometric and strength assessments using a 5-point Likert scale ranging from 0 = *not at all* to 4 = *extremely*. Participants in the high threat condition also indicated how attractive they found the female confederate on a scale ranging from 1 = *not at all attractive* to 5 = *very attractive*. Finally, they indicated how close the build of the male confederate matched their ideal in terms of muscularity on a scale from *1 = not at all my perception of the muscular ideal* to 5 = *my exact perceptions of the muscular ideal*.

Results

Data were screened to ensure that they met the assumptions of the analyses. The two groups were compared on demographic and anthropometric information to ensure the adequacy of randomization, using a series of independent sample *t*-tests. The only difference was for moderate-vigorous physical activity, $t_{(65)} = 1.07$, $p < .05$, with the low social-evaluative threat group reporting more physical activity than the high social-evaluative threat group (see Table 1 for means and standard deviations). However, both groups were very active and the difference was not considered to be meaningful. Further, weight training behavior, which is closely linked to the male muscular ideal, was not significantly different between the two groups. A *t*-test to examine differences in baseline cortisol values identified no significant difference ($p > .05$).

To ensure the adequacy of the manipulation, a *t*-test was conducted to examine group differences in perceived evaluative threat. The high social-evaluative threat group reported higher perceptions of threat than the low social-evaluative threat group ($p < .05$). With respect to the confederates, men in the high social-evaluative threat group rated the female confederate as very attractive ($M = 3.43 \pm .68$ out of 5) and the male confederate as being close to the male muscular ideal ($M = 2.75 \pm .92$ out of 5). Thus, the manipulation was deemed successful.

Descriptive statistics for pre- and post-threat body shame and cortisol by group are reported in Table 2. A series of *t*-tests identified no significant differences between conditions on any pre-threat measures. In order to examine potential covariates, bivariate correlations were conducted between body mass index, percent body fat, drive for muscularity, physical activity, and weight training frequency and the dependent variables; there were no significant correlations, so no additional covariates were used.

Table 2. Pre- and Post-Psychobiological Variables by Group.

	Low SET (n = 35)		High SET (n = 31)	
	Pre	Post	Pre	Post
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Shame	.54 (.67)	.50 (.70)	.66 (.78)	.83 (.96)*
Cortisol	3.03 (3.40)	2.84 (2.73)	2.98 (3.81)	4.26 (4.03)**

Note. SET = social-evaluative body image threat group; Shame = body shame, ranging from 0 to 4; Cortisol in ng/ml.
*$p < .05$, **$p < .01$ = between group differences at post-threat, controlling for pre-threat value.

Because we were interested in examining differences between the two conditions on body shame and cortisol after the threat, a series of analyses of covariance (ANCOVA) were conducted. For each analysis, the relevant post-threat values served as the dependent variable and the pre-threat scores served as the covariate. This approach is consistent with previous research examining group differences in body image and cortisol outcomes based on amount of social-evaluative threat (Cloudt et al., 2014; Martin Ginis et al., 2012). Further, because participants were randomized to groups, ANCOVA is more powerful than ANOVA, and is generally recommended over analyses of change scores (Dmitrov & Rumrill, 2003; Porter & Raudenbush, 1987; Rausch, Maxwell, & Kelley, 2003; Van Breukenlen, 2006).

For state body shame, the ANCOVA identified a significant group difference, $F_{(1,63)} = 7.09$, $p = .010$, $\eta_p^2 = .10$, with men in the high social-evaluative threat condition reporting higher body shame than men in the low social-evaluative threat condition. Pre-threat state body shame was a significant covariate ($p < .05$). Finally, for cortisol, results indicated there was a significant difference between conditions, $F_{(1,63)} = 7.42$, $p = .008$, $\eta_p^2 = .11$, with cortisol levels higher in the high social-evaluative threat condition than the low social-evaluative threat condition. Again, pre-threat cortisol was a significant covariate ($p < .05$; see Table 2 for all means).

Discussion

The aim of the present study was to examine the psychobiological responses to a social-evaluative body image threat in university men. Consistent with the hypotheses, the results of the study indicated body shame and cortisol were all significantly higher in the high social-evaluative threat condition compared to the low social-evaluative threat condition. The present study contributes to both the body image literature and the understanding of SSPT.

These results are consistent with SSPT (Dickerson, Gruenewald, et al., 2004; Kemeny et al., 2004), as a situation with explicit social-evaluation was associated with greater shame and cortisol responses. These responses are

thought to serve as a warning that a potential loss of social status exists. The findings are also consistent with a large body of literature reporting that in non-body image-related social-evaluative threats, both shame and cortisol are higher in situations of social-evaluative threat than without it (Dickerson et al., 2008; Gruenewald et al., 2004; Roehleder et al., 2007). These results support contentions that body image situations may indeed be another class of social-evaluative threat, aside from performance-based tasks (Martin Ginis et al., 2012). Men who are concerned they fail to meet the muscular ideal, which is associated with numerous social benefits, may be concerned that they will be looked upon less favorably by others, and risk social rejection.

Within the body image literature, the results with respect to the psychological responses are consistent with previous research examining body shame and social physique anxiety responses to social-evaluative body image threats in female samples. In women, these self-conscious emotions have been reported to increase in response to social-evaluative body image threats (Cloudt et al., 2014; Gammage, Martin Ginis, & Hall, 2004; Lamarche et al., 2014, 2016). Findings with respect to cortisol in response to social-evaluative body image threats have been less consistent in the literature (Cloudt et al., 2014; Lamarche et al., 2014, 2016; Martin Ginis et al., 2012). For example, Lamarche et al. (2014) identified no differences in cortisol between threat and control conditions, whereas Cloudt et al. (2014), Lamarche et al. (2016), and Martin Ginis et al. (2012) reported significant differences in cortisol between participants in social-evaluative versus non-social-evaluative body image threat conditions. Further, there has been inconsistency with respect to group differences being primarily driven by significant decreases in cortisol in control conditions, and not increases in cortisol in threat conditions (Cloudt et al., 2014; Lamarche et al., 2014; Martin Ginis et al., 2012). The present study identified significant increases in cortisol in response to a social-evaluative body image threat, consistent with Lamarche et al. (2016). It has been suggested that actually undergoing the threat (Lamarche et al., 2016), compared to just imagining or anticipating that threat, elicits greater responses (Cloudt et al., 2014; Lamarche et al., 2014; Martin Ginis et al., 2012). This contention is supported by research using other types of social-evaluative threats, which show that cortisol responses under imagined or anticipated threat are lower than those to actual threats (Dickerson, Kemeny et al., 2004; Dickerson et al., 2008; Jönsson et al., 2010; Kelly, Matheson, Martinez, Merali, & Anisman, 2007). The present findings would support the argument that actual exposure may be necessary for significant increases in cortisol in response to a threat.

This is not to downplay the importance of investigating responses to anticipated threats. Anticipated or imagined threats have consistently yielded significant increases in psychological responses (Bailey, Lamarche, & Gammage, 2014; Cloudt et al., 2014; Gammage et al., 2004; Lamarche et al., 2014; Martin Ginis et al., 2012). These increases could have significant behavioral implications; for example, people may choose to avoid situations in which they anticipate a social-evaluative threat, even without experiencing them. Exercise may be one such setting; individuals who believe they will be evaluated negatively by others in an exercise setting, leading to feelings of shame or social physique anxiety, may ultimately lead them to avoid this healthy activity (Gammage et al., 2004).

The present study extends the current research in several significant ways. Previous studies using SSPT to examine the impact of social-evaluative body image threats have investigated only female samples. The present study is the first to investigate these responses in men. Thus, the current study provides evidence of the robustness of SSPT applied to social-evaluative body image threats in more diverse samples and to different types of threats. It also provides further evidence that men experience negative body image, and that in response to a body image threat they experience potentially negative outcomes such as shame and cortisol, which have been linked to poor well-being and negative health outcomes (Gilbert & Trower, 1990; Lewis, 1971; McEwen, 1998).

A methodological strength of the present study was the construction of the threat, which was based on theory and robust empirical evidence and which can be used in future research. However, despite being a methodological strength, it should be noted that several contextual factors were used to maximize/minimize the evaluative nature of the condition and so knowing which factor or combination of factors were "effective" is impossible. It is likely a combination of factors working together that elicited the psychobiological responses (Dickerson & Kemeny, 2004). It should also be highlighted that characteristics that make a body image situation "threatening" are different for men than women. From a research perspective, it appears that the precise social-evaluative threats need to be specifically designed for the population being studied, particularly when investigating body-related threats. For example, in a series of two interview studies (Lamarche et al., 2012; Lamarche et al., in progress) women and men were asked about specific situations they would find uncomfortable leading them to feeling anxious or ashamed of their bodies. While women reported that wearing a bathing suit, wearing unflattering clothes, being intimate and having others present were perceived as threatening elements, men reported that being in the presence of others who met the North American ideal (men and women) and when they were shirtless were factors that increased perceptions of the threat. Perhaps this means a direct comparison of psychobiological responses

to social-evaluative body image situations between men and women cannot be made because the threats will be different; however, using a theory such as SSPT to construct the situations and measure responses can help the level of understanding of body image experiences from a psychobiological lens. This may be particularly true as the present findings support the use of SSPT in understanding psychobiological responses to social-evaluative body image threats in men.

Limitations

Although this study makes numerous contributions to both the understanding of SSPT and to the body image literature, there are several limitations that should be acknowledged. The current sample consisted of college men, with the majority enrolled in physical education or kinesiology degree programs and thus the present results can be generalized only to this group. The majority of the men in the present sample were active and were considered to have a "healthy weight" based on BMI (BMI < 25), as men of different BMI values may not have felt comfortable volunteering for this study due to feeling embarrassed or uncomfortable in putting their bodies on display. Although the true purpose of the study was concealed, the institutional research ethics board where the present study took place required that the posters placed around campus informed men the study was body-related; it is likely those who volunteered for a study examining physical characteristic, self-beliefs, and cortisol responses were more comfortable with their bodies than individuals who struggle with weight or body image concerns.

As with any self-report measures, social desirability may an issue. This is particularly true given that men may be reluctant to disclose negative body image feelings (Grogan & Richards, 2002). However, this explanation is unlikely as the differences in psychological responses were consistent with differences in the cortisol responses, which are not subject to social desirability biases. Similarly, concerns that participants knew the true purpose of the study or did not believe the manipulations used in the current study (e.g., videotape, normative feedback) are unlikely. When queried following the final debrief, only one participant admitted being suspicious about the nature of the study manipulations.

Finally, participants were asked to follow specific directions on the day of study participation. Participants indicated that they followed instructions (i.e., they did not eat, drink, workout, or have anything stressful happen to them) but there is no way to know if they responded honestly. Given that baseline cortisol levels were consistent with previous studies (Kirschbaum et al., 1993; Rohleder et al., 2007), it is likely that these directions were followed correctly.

Future Directions

Given that this is the first study to investigate psychobiological responses to social-evaluative body image threats in men, replication is certainly warranted. It is important that researchers investigate the health effects of cumulative social-evaluative threats, rather than exposure to a single instance of these threats. In addition, the high threat condition utilized numerous manipulations, but it is unclear which aspect or aspects of the condition were most closely linked to the psychobiological changes. Factors moderating responses (e.g., self-esteem, internalization of the male ideal) would also be important to investigate (Lupis, Sabik, & Wolf, 2016). According to SSPT, responses are not inherently damaging, but uncoordinated responses may be such that prolonged exposure to shame or cortisol (slow return to baseline levels of shame and cortisol when the threat is no longer present) may be health damaging. Although the present study's aim was to examine responses to threats, measuring what occurs after the threat is no longer present would provide a better understanding of how such threats may be linked to negative health outcomes. Although cortisol and shame are salient outcomes with SSPT, extending body image research to examine other psychological and physiological outcomes is also important for theoretical and methodological development. Research within SSPT has examined variables such as indicators of immune function and guilt (i.e., Dickerson et al., 2004). Within the body image literature other outcomes have been examined framed within SSPT (i.e., social physique anxiety, heart rate; Lamarche et al., 2015, 2016), but this research is relatively limited. Finally, examining the response pattern in other subsamples of men (i.e., athletes, varying ethnic backgrounds and sexual orientations, older adult men) will be an important methodological and theoretical extension of SSPT.

Practical Applications

The present study suggests that shame and cortisol both increase in response to a social-evaluative body image threat in university men. According to SSPT, these responses should initiate several coping responses (e.g., appeasement, withdrawal, disengagement) to reduce the potential loss of social status. Many of these responses are consistent with the body image coping literature (Cash, Santos, & Williams, 2005; Smith-Jackson, Reel, Thackeray, 2011). Thus, it may be possible to help men identify situations that they may encounter in their lives (e.g., going to the gym) and potential coping strategies that they may engage in to reduce these potentially harmful responses.

Conclusion

The present study provided insight to the psychobiological responses to a social-evaluative body image threat in university men. Consistent with SSPT, significant differences were identified post-threat, with men in the high social-evaluative body image threat condition reporting higher body shame and having higher cortisol, than those in the low threat condition. This study contributes to the body image literature, in particular by identifying a social-evaluative body image threat that can be used in future research to test other contentions of SSPT in a body image setting. Further, these results emphasize that body image is not just a "women's concern"; men also experience negative body image. The results of the current study confirm the need to further explore men's body image concerns to gain a better understanding of the different psychobiological responses and negative health implications that may occur.

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