

## Use Your Imagination: College Women's Responses to a Social-Evaluative Body Image Threat

LARKIN LAMARCHE<sup>1</sup>, K. ALYSSE BAILEY, AND KIMBERLEY L. GAMMAGE

*Department of Kinesiology  
Brock University*

This study examined psychological and heart rate responses to an imagined social-evaluative body image threat in women ( $N = 97$ ). Participants were randomly assigned to picture themselves trying on swimsuits in a store with a group of friends (social-evaluative threat) or alone (non-social-evaluative threat). Measures of state body image and heart rate recordings were completed prior to and following the scenario. A significant group-by-time interaction was found for state body image,  $F(2, 93) = 3.69, p = .03$ , with the highest body shame and social physique anxiety reported in the social-evaluative group. No differences were found for heart rate. The findings highlight the usefulness of imagined scenarios when examining psychological responses and the challenges of capturing changes in physiological outcomes.

Social self-preservation theory (SSPT; Dickerson, Gruenewald, & Kemeny, 2004; Kemeny, Gruenewald, & Dickerson, 2004) states that when we encounter situations in which we are worried about receiving a negative evaluation from other people (social-evaluative threats), we respond psychologically and physiologically. The majority of SSPT-related research has examined shame and cortisol (a stress hormone thought to represent hypothalamic-pituitary-adrenal axis activation) as important indicators of a psychobiological response to social-evaluative threats. These threats have been primarily performance based (i.e., delivering a speech in front of an audience; Kirschbaum, Pirke, & Hellhammer, 1993). In general, studies have shown that self-conscious emotions, particularly shame, and cortisol are elicited when faced with an acute social-evaluative threat (Dickerson & Kemeny, 2004; Dickerson, Mycek, & Zaldivar, 2008; Gruenewald, Kemeny, Aziz, & Fahey, 2004; Het, Rohleder, Schoofs, Kirschbaum, & Wolf, 2009; Kirschbaum et al., 1993). In addition, studies have shown that these

<sup>1</sup>Correspondence concerning this article should be addressed to Larkin Lamarche, Department of Kinesiology, Brock University, 500 Glenridge Avenue, St. Catharines, Ontario, Canada L2S 3A1. E-mail: llamarche@brocku.ca

responses can also be elicited by imagining social-evaluative threats, anticipating social-evaluative threats or when an evaluative audience is present, but unseen to participants (Dickerson, Kemeny, Aziz, Kim, & Fahey, 2004; Kelly, Matheson, Martinez, Merali, & Anisman, 2007; Wadiwalla et al., 2010).

There is also preliminary evidence to show that responses consistent with SSPT are elicited under a specific category of social-evaluative threat—those that are body related (Lamarche, Gammage, Kerr, Faulkner, & Klentrou, 2014; Lamarche, Kerr, Gammage, Faulkner, & Klentrou, 2012; Martin Ginis, Strong, Arent, & Bray, 2012). For example, evidence suggests that social-evaluative body image threats heighten self-conscious body image emotions (i.e., body shame, feeling as though one is a bad person because he/she does not meet the ideal body standard, and social physique anxiety, worry, or concern over one's body being evaluated by others; Gammage, Martin Ginis, & Hall, 2004; Hart, Leary, & Rejeski, 1989; Lamarche et al., 2014). However, researchers know relatively less about the physiological aspects of body image experiences. To our knowledge, there are two studies (Lamarche et al., 2014; Martin Ginis et al., 2012) and one published abstract (Lamarche, Kerr, Gammage et al., 2012) that have examined cortisol responses under an acute social-evaluative body image threat. Findings across two experiments by Martin Ginis et al. (2012) showed that, compared to control conditions, cortisol was higher in the social-evaluative body image threat group (i.e., expecting to exercise in a high physique-evaluative environment and being videotaped wearing revealing exercise clothing to be judged later by a panel). Lamarche, Kerr, Gammage et al. (2012) showed that a body composition assessment (i.e., a social-evaluative body image threat) elicited a psychological and cortisol response consistent with SSPT. Finally, Lamarche et al. (2014) showed that under anticipated social-evaluative body image threat, body shame and social physique anxiety were elicited, but not cortisol. Taken together, evidence of the psychological and cortisol responses to body image threats provides initial support for SSPT in a body image context.

Relative to cortisol, limited SSPT research has examined other physiological outcomes to social-evaluative threats. To address this limitation, Bosch et al. (2009) demonstrated that social-evaluative threats elicit other physiological outcomes. For example, differences in heart rate, sympathetic cardiac activation, and vagal tone, in addition to cortisol, were found between the social-evaluative threat group (audience present) compared to the control group (absence of audience; Bosch et al., 2009). Further, effect sizes suggest that these changes under social evaluation were equally or more sensitive than cortisol changes (Bosch et al., 2009). These findings are consistent with other research showing physiological responses other than cortisol occur under acute social-evaluative threat in a laboratory setting and in a real-life setting (e.g., indicators of proinflammatory cytokine activity, cardiovascular responses; Dickerson, Gable,

Irwin, Aziz, & Kemeny, 2009; Dickerson, Kemeny et al., 2004; Jönsson et al., 2010; Lehman & Conley, 2010). The same limitation holds true in the body image literature; thus far, only cortisol responses to social-evaluative body image threats have been examined. Therefore, it may be important to examine other physiological outcomes of social-evaluative body image threats to provide a more complete picture of the physiology of body image experiences. To the best of our knowledge, the current study will be the first study in the body image literature to examine heart rate responses to a social-evaluative body image threat. Heart rate over other physiological measures was chosen for two reasons. First, heart rate is a methodologically convenient and cost-effective measure. Second, there is evidence that heart rate is affected by social-evaluative threat both in a laboratory setting (Bosch et al., 2009) and real-life setting (Lehman & Conley, 2010).

In addition to contributing to the current body image literature by examining physiological outcomes other than cortisol, the present study sought to address two important research design challenges related to the applicability of SSPT in body image research. First, as noted by Martin Ginis et al. (2012), one challenge is the ethical consideration surrounding the design of the threat manipulation. In particular, these authors indicated that some aspects of the design of their experiments were based on requests from the university ethics board. For example, some details of the experiment were included in recruitment materials. This was one potential reason discussed by the authors for the higher than typical baseline cortisol values in both experiments—prior to participation, women believed the threat (i.e., participate in exercise or try on exercise clothing) would occur which may have led to increased arousal, worry, and anticipation. The authors also noted that because of ethics board guidelines, participants could not *actually* be exposed to the threat. Lamarche et al. (2014) also noted the challenge of designing a threat to which participants could be exposed—these authors examined responses to anticipating (and not actually facing) a social-evaluative body image threat. Given these challenges, particularly in the area of body image, it may be possible to answer research questions regarding the applicability of SSPT in a body image context by manipulating *imagined* social-evaluative threat as it presents less psychological risk to the participant and details central to the manipulation may be omitted from recruitment materials. There are a few SSPT-related and body image studies that have used an imaginary manipulation of social evaluation with success (Carron & Prapavessis, 1997; Dickerson, Kemeny et al., 2004; Wadiwalla et al., 2010). Further, experiences of shame, a key emotional response outlined by SSPT, can occur by just thinking about social evaluation (Tangney, 1999). Although it is clear that actual threats are different from imagined threats, especially framed within SSPT, an imagined manipulation may allow us to examine research questions not feasible using actual exposure (ethically or practically) to a social-evaluative body image threat. The present study examined responses to an imagined social-evaluative threat in an attempt to

understand social-evaluative body image threats and contribute to both the current SSPT and body image literature.

The second research design challenge that was addressed in the current study relates to the design of the control group. Currently, attempts to design a control group that is matched on body image content but that eliminates social evaluation have met with some challenges. For example, the control group used in Lamarche et al. (2014) and Lamarche, Kerr, Gammage et al. (2012) was a non-threatening condition (i.e., quiet rest) while the control groups in Martin Ginis et al.'s (2012) experiments were matched to the experimental condition on body image content but eliminated social-evaluative components. In their second experiment, Martin Ginis et al. found a small increase in cortisol pre- to post-manipulation in the threat group (being videotaped while wearing exercise clothing to be judged by a panel at a later time); however, the authors noted that the control condition (trying on exercise clothing alone) may have weakened the statistical difference between the threat and control groups. They stated that control participants may have engaged in self-evaluative processes by simply trying on the exercise clothing and looking into the mirror, confounding their cortisol measurements, and thus reducing the effects they would have seen had these processes been avoided or limited in their control group. Perhaps an imagined scenario would more effectively eliminate (or at least greatly reduce) self-evaluative processes of the control group, and therefore overcome these challenges.

With these current limitations in mind, the purpose of the present study was to examine whether imagining a social-evaluative body image threat would yield a psychobiological response consistent with SSPT. It was hypothesized that participants imagining a social-evaluative threat would report higher body-related self-conscious outcomes and have a higher heart rate response than those imagining a non-social-evaluative body image threat.

## Methods

### *Participants*

Participants were recruited to participate in a study on body image. Women with a history of a clinical eating disorder and varsity athletes were excluded from participation. Furthermore, smokers and those who indicated they did not follow study requirements with respect to eating, drinking, and physical activity participation were excluded from participation because these behaviors may confound heart rate recordings. Of the initial pool of 100 participants who completed the study, two were removed for not complying with study requirements with respect to eating and drinking and one smoker was removed from the dataset. The final sample included 97 female university students. The sample had a mean age of

19.95 years ( $SD = 1.47$ ), a mean height of 65.02 inches ( $SD = 3.15$ ), a mean weight of 140.41 lb ( $SD = 22.03$ ), and a mean body mass index of 23.35 ( $SD = 3.26$ ). The majority of the sample was Caucasian (86.6% of sample) and reported being a kinesiology or physical education student (70.1% of sample) in their second year of studies (60.4% of sample).

### *Measures*

Participants completed demographic information including age, height, weight, university major, race, and year in school in addition to a series of questions ensuring they had complied with study requirements with respect to eating, drinking, and physical activity participation. The following questionnaires measuring trait social physique anxiety, state body shame, and state social physique anxiety have shown evidence of validity and reliability in female university students (Kruisselbrink, Dodge, Swanburg, & MacLeod, 2004; Martin Ginis, Murru, Conlin, & Strong, 2011; Martin, Rejeski, Leary, McAuley, & Bane, 1997). Internal consistency for all measures was deemed satisfactory in the present study ( $\alpha$ s range .86–.94).

*Trait Social Physique Anxiety.* Trait social physique anxiety was measured using the Social Physique Anxiety Scale (Martin et al., 1997). Trait social physique anxiety was used as a covariate in the present study. Nine items were measured on a 5-point scale ranging from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*), with higher values representing higher trait social physique anxiety. Trait social physique anxiety was used in the data analysis as a covariate, as those higher in trait social physique anxiety may respond differently to social-evaluative body image threats (Focht & Hausenblas, 2004).

*State Body Shame.* To measure state body shame, the body shame subscale from the Weight and Body-Related Shame and Guilt Scale (Conradt et al., 2007) was modified with the instruction to participants to respond to each item indicating how they felt *at that moment* to reflect state body shame. Six items assess the frequency an individual feels shame about her body. Items were rated on a 5-point scale ranging from 0 (*never*) to 4 (*always*), with higher values indicating higher levels of state body shame.

*State Social Physique Anxiety.* State social physique anxiety was measured with the 9-item state version of the Social Physique Anxiety Scale (Kruisselbrink et al., 2004). Participants were asked to respond to each item with how they were feeling *at this moment* from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*), with higher values representing higher state social physique anxiety.

*Heart Rate.* Participants were fitted with a heart rate monitor (Polar F1, Polar Canada, 2350 46th Ave. Lachine, Quebec) to measure heart rate. The researcher recorded heart rate every 30 seconds over the 5 minutes prior to and following the scenario. The mean of the recordings was used in analyses.

*Ability to Imagine Scenario.* Participants' ability to imagine themselves in the scenario described was rated on a scale from 0 (*not at all able to imagine myself in the situation*) to 4 (*extremely able to imagine myself in this situation*). This was used as a manipulation check to ensure participants were able to picture themselves in the scenario equally between groups.

### *Procedures*

Data for this study were collected as part of a larger study examining coping responses to body image situations. Prior to study commencement, university ethics clearance was obtained. Upon arrival to the laboratory, participants completed informed consent, followed by demographic information and a series of questions confirming they had followed study requirements with respect to not eating or drinking 2 hours prior to their appointment, and not participating in vigorous physical activity or drinking alcohol 12 hours prior to their appointment. Next, participants completed a measure of trait social physique anxiety. They were then fitted with a heart rate monitor and sat quietly for 15 minutes. Participants remained seated for the remainder of the testing session. Next, measures of state body shame and state social physique anxiety were completed. Heart rate was then recorded every 30 seconds across the next 5 minutes to provide a pre-scenario heart rate value. Participants were then provided with one of two scenarios (see below), varying in level of social-evaluative threat. After carefully reading their randomly assigned scenario, participants were allowed to imagine themselves experiencing the situation then post-scenario heart rate was recorded every 30 seconds over the 5 minutes following reading the scenario, and measures of state body shame and social physique anxiety were completed in addition to the measure of ability to imagine themselves in the scenario. A description of each scenario is detailed below.

### *Scenarios*

These scenarios were based on the social-evaluative threat identified as yielding a physiological response in previous published research (Martin Ginis et al., 2012) and a qualitative study examining contextual factors increasing the perceptions of social-evaluative threats in female university students (Lamarche, Kerr, Faulkner, Gammage, & Klentrou, 2012). Participants were asked to read

the scenario carefully and imagine themselves actually experiencing the situation described. Below is how the scenario descriptions appeared to participants.

*Social-Evaluative Body Image Threat.* Spring break is 2 weeks away and you and three of your girlfriends have booked a vacation to a warm destination. You are very excited to go—you have worked hard this term and feel that it is time for a break and a chance to relax. Your friends have decided to go shopping for new swimsuits at the mall and have invited you to join them. You know that this will entail shopping at multiple stores and trying on multiple swimsuits. You also know that you will have to “model” the swimsuits for each other in order to get everyone’s opinions on how you look in each of the bathing suits. Your friends are very honest and will provide you with an honest assessment of how you look in each of the bathing suits.

*Non-Social-Evaluative Body Image Threat.* Spring break is 2 weeks away and you and three of your girlfriends have booked a vacation to a warm destination. You are very excited to go—you have worked hard this term and feel that it is time for a break and a chance to relax. You have decided to go shopping for a new swimsuit at the mall by yourself. You know that this will entail shopping at multiple stores and trying on multiple swimsuits. However, since you will be by yourself, you will not have to get anyone else’s opinions on how you look in each of the bathing suits. Only your own assessment will matter.

## Results

Data screening showed that the data were normally distributed and all assumptions for statistical analyses were met. Means and standard deviations for body mass index, trait social physique anxiety, and ability to imagine the scenario by group are presented in Table 1. Baseline group differences on body mass index, trait social physique anxiety, and ability to imagine the scenario were investigated through a series of *t* tests. Results showed no significant group differences (all *ps* > .05). Means and standard deviations for pre- and post-scenario state body shame, state social physique anxiety, and heart rate by group are presented in Table 2. Baseline group differences on pre-scenario state body shame, state social physique anxiety, and heart rate were investigated through a series of *t* tests, with no significant group differences detected (all *ps* > .05).

To examine the psychological response to a social-evaluative body image threat, a 2 (group: social-evaluative, non-social-evaluative) × 2 (time: pre-scenario, post-scenario) repeated-measures multivariate analysis of covariance (MANCOVA) was conducted using state body shame and state social physique anxiety as dependent variables. Trait social physique anxiety was

Table 1

*Means (and Standard Deviations) for Body Mass Index, Trait Social Physique Anxiety, and Ability to Imagine Scenario by Group*

Variable	Social-evaluative ( <i>n</i> = 50)	Non-social-evaluative ( <i>n</i> = 47)
Body mass index	23.31 (2.92)	23.39 (3.62)
Trait SPA	2.92 (.89)	3.01 (.77)
AI	2.92 (.91)	3.13 (.82)

AI = ability to imagine scenario, ranges from 0 (*not at all able to imagine myself in the situation*) to 4 (*extremely able to imagine myself in this situation*); SPA = social physique anxiety, ranges from 1 to 5, higher scores represent higher state social physique anxiety.

Table 2

*Means (and Standard Deviations) for Dependent Variables by Group*

Variable	Social-evaluative ( <i>n</i> = 50)		Non-social-evaluative ( <i>n</i> = 47)	
	Pre-scenario	Post-scenario	Pre-scenario	Post-scenario
S-BS	.76 (.76)	1.71 (1.03)* <sub>a</sub>	.89 (.83)	1.48 (1.11)* <sub>b</sub>
S-SPA	2.40 (.81)	3.27 (1.03)* <sub>a</sub>	2.31 (.74)	2.94 (.92)* <sub>b</sub>
Heart rate	73.94 (11.21)	73.21 (11.33)	73.97 (8.75)	73.82 (8.50)

S-BS = state body shame, ranges from 0 to 4, higher scores represent higher state shame; S-SPA = state social physique anxiety, ranges from 1 to 5, higher scores represent higher state social physique anxiety.

\* $p < .001$  for within-group differences; different subscripts within the same row indicate between-group differences ( $p < .05$ ).

entered as a covariate. There was a significant group-by-time interaction,  $F(2, 93) = 3.69, p = .03, \eta_p^2 = .07$ . Follow-up univariate analyses showed a significant group-by-time interaction for state body shame,  $F(1, 94) = 7.14, p < .01, \eta_p^2 = .07$ , and state social physique anxiety,  $F(1, 94) = 4.06, p < .05, \eta_p^2 = .04$ . Trait social physique anxiety was a significant covariate,  $F(2, 93) = 165.10, p < .001, \eta_p^2 = .78$ . There was no significant main effect for time ( $p = .23$ ) and there was a significant main effect for group,  $F(2, 93) = 8.05, p = .001, \eta_p^2 = .15$ .

To examine the nature of the time effects within each group, paired *t* tests were conducted for state body shame and state social physique anxiety. Comparisons made within each group showed that participants reported significantly

higher state body shame pre- to post-scenario (social-evaluative threat:  $t(49) = -9.19$ ,  $p < .001$ ; non-social-evaluative threat:  $t(46) = -5.35$ ,  $p < .001$ ) and significantly higher state social physique anxiety pre- to post-scenario (social-evaluative threat:  $t(40) = -9.68$ ,  $p < .001$ ; non-social-evaluative threat:  $t(46) = -6.44$ ,  $p < .001$ ). Further, to examine group differences on post-scenario state body image, a MANCOVA was conducted using post-scenario state body shame and state social physique anxiety as dependent variables and trait social physique anxiety as a covariate. The results showed that those in the social-evaluative threat group reported higher post-scenario state body shame and state social physique anxiety than those in the non-social-evaluative threat group (overall:  $F(2, 93) = 6.89$ ,  $p < .01$ ,  $\eta_p^2 = .13$ ; state body shame:  $F(1, 96) = 4.87$ ,  $p = .03$ ,  $\eta_p^2 = .05$ ; state social physique anxiety:  $F(1, 96) = 13.74$ ,  $p < .001$ ,  $\eta_p^2 = .13$ ). Trait social physique anxiety was a significant covariate,  $F(2, 93) = 100.49$ ,  $p < .001$ ,  $\eta_p^2 = .68$ .

To examine the heart rate response to a social-evaluative body image threat, a 2 (group: social-evaluative, non-social-evaluative)  $\times$  2 (time: pre-scenario, post-scenario) repeated-measures analysis of variance (ANOVA) was conducted. There was no significant group-by-time interaction,  $F(1, 87) = .55$ ,  $p = .46$ ,  $\eta_p^2 = .01$ . There were also no significant main effects for time or group (time:  $F(1, 87) = 1.26$ ,  $p = .27$ ,  $\eta_p^2 = .01$ ; group:  $F(1, 87) = .02$ ,  $p = .88$ ,  $\eta_p^2 < .001$ ).

## Discussion

The purpose of the present study was to examine psychological and heart rate responses to an imagined social-evaluative body image threat. The findings partially support the hypotheses. It was found that participants in the social-evaluative versus non-social-evaluative body image threat group reported higher post-scenario state body shame and social physique anxiety, supporting the hypotheses. Contrary to the hypotheses, no between-group differences were found for heart rate.

The present findings with respect to state body shame and state social physique anxiety are consistent with existing research showing that social-evaluative body image threats elicit negative body image outcomes. Specifically, these findings compliment studies examining responses to an imagined or anticipated (but not actual) body image threat (Carron & Prapavessis, 1997; Gammage et al., 2004; Martin Ginis et al., 2012). Further, the finding that state body shame was elicited by imagined social evaluation with respect to the body supports the notion that shame (and specifically body shame) can be triggered by imagined social evaluation (Tangney, 1999).

Contrary to the hypotheses, no group differences on heart rate responses were found. Three reasons may explain the lack of heart rate responses in the current study. The primary reason for this may be because participants imagined, and did

not actually experience, the social-evaluative threat. The majority of the SSPT research has examined physiological responses, particularly cortisol, to actual threats (i.e., Trier Social Stress Test; Kirschbaum et al., 1993). One study examined psychological and physiological responses to an imagined social-evaluative threat by having participants write about a traumatic experience in which they blamed themselves (social-evaluative threat) or a neutral experience (Dickerson, Kemeny et al., 2004). These authors found that their manipulation elicited a psychological response (i.e., increased shame and guilt) but did not affect cortisol. The authors argued that had participants revealed their self-blame experience in a social-evaluative context, perhaps to the researchers (and not in an anonymous and confidential setting), cortisol may have been altered. However, it should be noted that they did find an increase in proinflammatory cytokine activity in response to the social-evaluative threat, although the reason for this is still unclear. In the body image literature, Lamarche et al. (2014) reported changes in body shame and social physique anxiety, but not cortisol, to anticipating a social-evaluative body image threat. These authors suggested that had participants been exposed to the threat, cortisol changes may have been found. A similar argument may hold true for heart rate responses. Second, it may be that some physiological outcomes are more sensitive to social-evaluative threats than others. Third, the way in which heart rate was measured may explain the lack of significant differences in heart rate between conditions. Bosch et al. (2009), who found heart rate responses to a social-evaluative threat, measured cardiac outcomes through impedance cardiography and electrocardiography, a more sensitive and complete method of quantifying cardiac outcomes compared to the method in the current study which measured heartbeats per minute by a heart rate monitor. Although challenges incorporating physiological measures into research on body image concerns can be expected, past research has shown it is possible and findings have contributed to our understanding of body image experiences (Lamarche, Kerr, Gammage et al., 2012; Martin Ginis et al., 2012; Putterman & Linden, 2006; Sabiston, Castonguay, Barnett, O'Loughlin, & Lambert, 2009). Future researchers need to continue to investigate the physiological aspects of body image experiences to provide a more complete understanding of body image concerns.

The present study attempted to address two methodological issues surrounding the area of SSPT and body image highlighted by Martin Ginis et al. (2012) and Lamarche et al. (2014). First, as previously stated, there are challenges related to ethical guidelines of actually exposing participants to a social-evaluative body image threat. With this in mind, it is proposed that imagined threats may offer a more feasible and ethically viable method to test the tenets of SSPT. The evidence demonstrating a psychological response in the present study supports this point—imagined scenarios are capable of eliciting psychological responses consistent with SSPT. However, imagined scenarios may not be as

useful to examine physiological responses, at least heart rate responses, as outlined by SSPT. To improve the usefulness of imagined scenarios in the examination of physiological responses to a social-evaluative threat, future research will need to identify which physiological outcomes are responsive to such threats—it appears that some physiological responses may be sensitive to imagined threat while others may not be (Dickerson, Kemeny et al., 2004).

Second, this study attempted to design a control group matched on body image content but devoid of social evaluation with the intention that using an imagined scenario may eliminate, or at least greatly reduce, self-evaluative processes, thus showing little difference in state body image pre- to post-scenario. The within-group analyses in the control group showed significant increases in state body shame and social physique anxiety pre- to post-scenario; however, increases for both measures were greater in the social-evaluative threat group compared to the non-social-evaluative. Taken together, the present findings with respect to the control group and those of Martin Ginis et al. (2012) highlight the challenges of designing a control group matched on body image content but without social evaluation. Research framed within self-objectification theory (Fredrickson & Roberts, 1997) has demonstrated that trying on a swimsuit in front of a mirror (with no one else present) may increase the feeling of being on display and body shame (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998). It may be that any body image threat, regardless of the explicit social-evaluative nature of the situation, will initiate negative self-evaluative processes, leading to responses consistent with SSPT. In fact, Tangney, Miller, Flicker, and Barlow (1996) found that although the majority of shame experiences described by participants were within a social context, a significant proportion of experiences occurred when participants were alone. Future research will need to determine if a body image-related control condition can be designed that minimizes self-evaluative processes to better understand the impact of social evaluation in a body image context and better assess SSPT's applicability in a body image context. It may be possible that all body image situations, regardless of the presence or absence of explicit social evaluation by others, are at least somewhat social-evaluative by their very nature.

There are several limitations to the present study that should be acknowledged. First, the present results can only be generalized to female university students with a normal body mass index. Furthermore, it should be noted that the majority of the sample was Caucasian and was physical education and kinesiology university majors, thus limiting the generalizability to other populations. Second, the scenario used in the present study was based on past research indicating being seen in a bathing suit was identified by female participants as the most uncomfortable body-related situation (Lamarche, Kerr, Faulkner et al., 2012). Efforts were made to vary the description of the scenarios only on social evaluation; however, how this situation was mentally constructed may have

varied between participants. For example, details of the characteristics of the best friends, the physical surroundings (i.e., the degree of visibility of the change rooms within the stores), and even imagined comments made by the best friends were not included in the scenarios but may have been spontaneously imagined by participants. Third, other potential covariates should be examined. Variables such as self-objectification may be important variables to consider especially given the conceptual overlap based on the importance of shame as an emotional response described by SSPT and self-objectification theory.

The present study provides additional support for SSPT in a body image context. Findings also provide support for the use of imagined scenarios to examine psychological responses to social-evaluative body image threats and highlight the challenges to examine physiological measures to such threats. Using imagined scenarios, over actual threat exposure, may be one method to assess the tenets of SSPT within a body image context.

#### Acknowledgment

Funding for this project was provided by the Social Sciences and Humanities Research Council of Canada (SSHRC).

#### References

- Bosch, J. A., de Geus, E. J. C., Carroll, D., Goedhart, A. D., Anane, L. A., Veldhuizen, J. J., et al. (2009). A general enhancement of autonomic and cortisol responses during social evaluative threat. *Psychosomatic Medicine*, *71*, 887–885.
- Carron, A. V., & Prapavessis, H. (1997). Self-presentation and group influences. *Small Group Research*, *28*, 500–516.
- Conradt, M., Dierk, J. M., Schlumberger, P., Rauh, E., Hebebrand, J., & Rief, W. (2007). Development of the weight- and body-related shame and guilt scale (WEB-SG) in a nonclinical sample of obese individuals. *Journal of Personality Assessment*, *88*, 317–327.
- Dickerson, S. S., Gable, S. L., Irwin, M. R., Aziz, N., & Kemeny, M. E. (2009). Social-evaluative threat and proinflammatory cytokine regulation. *Psychological Science*, *20*, 1237–1244.
- Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2004). When the social self is threatened: Shame, physiology, and health. *Journal of Personality*, *72*, 1191–1216.
- Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, *130*, 355–391.

- Dickerson, S. S., Kemeny, M. E., Aziz, N., Kim, K. H., & Fahey, J. L. (2004). Immunological effects of induced shame and guilt. *Psychosomatic Medicine*, *66*, 124–131.
- Dickerson, S. S., Mycek, P. J., & Zaldivar, F. (2008). Negative social evaluation—But not mere social presence—Elicits cortisol responses in the laboratory. *Health Psychology*, *27*, 116–121.
- Focht, B. C., & Hausenblas, H. A. (2004). Perceived evaluative threat and state anxiety during exercise in women with social physique anxiety. *Journal of Applied Sport Psychology*, *16*, 361–368.
- Fredrickson, B. L., & Roberts, T. (1997). Objectification theory: Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly*, *21*, 173–206.
- Fredrickson, B. L., Roberts, T., Noll, S. M., Quinn, D. M., & Twenge, J. M. (1998). That swimsuit becomes you: Sex differences in self-objectification, restrained eating, and math performance. *Journal of Personality & Social Psychology*, *75*, 269–284.
- Gammage, K. L., Martin Ginis, K. A., & Hall, C. R. (2004). Self-presentational efficacy: Its influence on social anxiety in an exercise context. *Journal of Sport & Exercise Psychology*, *26*, 179–190.
- Gruenewald, T. L., Kemeny, M. E., Aziz, N., & Fahey, J. L. (2004). Acute threat to the social self: Shame, social self-esteem, and cortisol activity. *Psychosomatic Medicine*, *66*, 915–924.
- Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport & Exercise Psychology*, *11*, 94–104.
- Het, S., Rohleder, N., Schoofs, D., Kirschbaum, C., & Wolf, O. T. (2009). Neuroendocrine and psychometric evaluation of a placebo version of the “Trier Social Stress Test”. *Psychoneuroendocrinology*, *34*, 1075–1086.
- Jönsson, P., Wallergard, M., Osterberg, K., Hansen, A. M., Johansson, G., & Karlson, B. (2010). Cardiovascular and cortisol reactivity and habituation to a virtual reality version of the Trier Social Stress Test: A pilot study. *Psychoneuroendocrinology*, *35*, 1397–1403.
- Kelly, O., Matheson, K., Martinez, A., Merali, Z., & Anisman, H. (2007). Psychosocial stress evoked by virtual audience: Relation to neuroendocrine activity. *Cyber Psychology & Behavior*, *10*, 655–662.
- Kemeny, M. E., Gruenewald, T. L., & Dickerson, S. S. (2004). Shame as the emotional response to threat to the social self: Implications for behavior, physiology, and health. *Psychological Inquiry*, *15*, 153–160.
- Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The Trier Social Stress Test—A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, *28*, 76–81.
- Kruisselbrink, L. D., Dodge, A. M., Swanburg, S. L., & MacLeod, A. L. (2004). Influence of same-sex and mixed-sex exercise settings on the social physique

- anxiety and exercise intentions of males and females. *Journal of Sport & Exercise Psychology*, 26, 616–622.
- Lamarche, L., Gammage, K. L., Kerr, G., Faulkner, G., & Klentrou, P. (2014). Examining psychobiological responses to an anticipatory body image threat in women. *Journal of Applied Biobehavioral Research*, 19, 127–143.
- Lamarche, L., Kerr, G., Faulkner, G., Gammage, K. L., & Klentrou, P. (2012). A qualitative examination of body image threats using social self-preservation theory. *Body Image*, 9, 145–154.
- Lamarche, L., Kerr, G., Gammage, K. L., Faulkner, G., & Klentrou, P. (2012). Examining psychobiological responses to an actual body image threat in women: An application of social self-preservation theory. *Journal of Sport & Exercise Psychology*, 34, S249.
- Lehman, B. J., & Conley, K. M. (2010). Momentary reports of social-evaluative threat predict ambulatory blood pressure. *Social Psychological & Personality Science*, 1, 51–56.
- Martin, K. A., Rejeski, W. J., Leary, M. R., McAuley, E., & Bane, S. (1997). Is the Social Physique Anxiety Scale really multidimensional? Conceptual and statistical arguments for a unidimensional model. *Journal of Sport & Exercise Psychology*, 19, 359–367.
- Martin Ginis, K. A., Murru, E., Conlin, C., & Strong, H. A. (2011). Construct validation of a state version of the Social Physique Anxiety Scale among young women. *Body Image*, 8, 52–57.
- Martin Ginis, K. A., Strong, H. A., Arent, S. M., & Bray, S. R. (2012). The effects of threatened social evaluation of the physique on cortisol activity. *Psychology & Health*, 27, 990–1007.
- Putterman, E., & Linden, W. (2006). Cognitive dietary restraint and cortisol: Importance of pervasive concerns with appearance. *Appetite*, 47, 64–76.
- Sabiston, C., Castonguay, A., Barnett, T., O'Loughlin, J., & Lambert, M. (2009). Body image and C-reactive protein in adolescents. *International Journal of Obesity*, 33, 597–600.
- Tangney, J. P. (1999). The self-conscious emotions: Shame, guilt, embarrassment, and pride. In I. T. Dalglish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 541–568). New York: John Wiley & Sons Ltd.
- Tangney, J. P., Miller, R. S., Flicker, L., & Barlow, D. H. (1996). Are shame, guilt, and embarrassment distinct emotions? *Journal of Personality & Social Psychology*, 70, 1256–1269.
- Wadiwalla, M., Andrews, J., Lai, B., Buss, C., Lupien, S. J., & Pruessner, J. C. (2010). Effects of manipulating the amount of social-evaluative threat on the cortisol stress response in young healthy women. *Stress*, 13, 214–220.