



The psychological and physiological effects of interacting with an anti-fat peer

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ARTICLE INFO

Article history:

Received 13 January 2018

Received in revised form

10 September 2018

Accepted 10 September 2018

Keywords:

Weight stigma

Anti-fat bias

Social identity threat

Anticipated rejection

Cardiovascular reactivity

Higher body weight

ABSTRACT

This experiment tested whether interacting with a peer who holds explicitly anti-fat attitudes leads to cognitive performance deficits and poorer psychological and cardiovascular outcomes among higher body weight women by increasing anticipated rejection. One hundred and forty six higher body weight women were randomly assigned to interact in a non-romantic context with a same-sex peer who endorsed explicit anti-fat or unbiased attitudes. All women showed greater heart rate reactivity and anger when interacting with an anti-fat peer. The heavier women were, and the more they thought they were overweight, the more they anticipated rejection when interacting with an anti-fat peer. This anticipated rejection was in turn associated with poorer cognitive performance, lower state self-esteem, and increased negative emotions, rumination, compensatory efforts, and thoughts related to anxiety and evaluation. These effects were not observed among women in our sample categorized as slightly “overweight” or who perceived themselves as only slightly overweight.

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1. Introduction

Social identity threat is a psychological state that occurs in situations in which individuals anticipate being devalued, judged negatively, or rejected based on their social identity – an aspect of self that is linked to group membership (Steele, Spencer, & Aronson, 2002). Social identity threat has been shown to lead to a host of negative outcomes, such as underperformance on challenging tests (Nguyen & Ryan, 2008; Steele & Aronson, 1995), reduced cognitive flexibility (Carr & Steele, 2010), decreased willpower (Inzlicht & Kang, 2010), increased social deviance (Belmi, Barragan, Neale, & Cohen, 2015), and increased stress and stress-related responses (Sawyer, Major, Casad, Townsend, & Mendes, 2012; Schmader, Johns, & Forbes, 2008). These effects have been found among a wide variety of social groups, including women and men, ethnic minority and majority groups, people with lower socioeconomic status, and older adults (Inzlicht & Schmader, 2012; Schmader, Hall, & Croft, 2015).

The current study extends prior research and theory on social identity threat to the relatively unexplored domain of *body weight*.

Body weight is a visible identity characteristic used to categorize self and others, and is often a significant (although not necessarily desired) social identity (Hunger, Major, Blodorn, & Miller, 2015; Miller & Major, 2017). A large body of research indicates that higher body weight individuals are the targets of pervasive negative stereotypes and discrimination (Puhl & Heuer, 2009). Furthermore, experiencing weight-based discrimination has negative implications for mental health (Hatzenbuehler, Keyes et al., 2009), as do chronic concerns about being the target of weight stigma (Hunger et al., 2015). In addition, situational cues that merely activate concerns about being a target of negative stereotypes and social devaluation associated with higher body weight, such as being visible to a potential partner, are sufficient to increase stress and decrease cognitive performance among heavier individuals (Blodorn, Major, Hunger, & Miller, 2016; Major, Eliezer, & Rieck, 2012; Miller, Rothblum, Felicio, & Brand, 1995).

The current research builds on the above research by testing a previously unexamined type of situational cue as an antecedent to weight-based social identity threat – the attitudes endorsed by a same-sex peer, outside of a dating context. Much past research has focused on the potential for experiencing weight-based identity threat in the dating domain, a particularly evaluative domain for higher body weight women (Puhl & Heuer, 2009). The current study extended weight-based social identity threat to examine whether

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and to what extent weight-based social identity threat occurs in non-romantic social interactions and is elicited by the attitudes of same-sex peers, thereby highlighting the potential pervasiveness with which weight-based threat may occur.

We hypothesized that the threat associated with interacting with an anti-fat peer would increase with a person's weight. Past research has shown that the higher people's BMI, the more likely they are to report experiencing weight discrimination (see meta-analysis by Spahlholz, Baer, König, Riedel-Heller, & Luck-Sikorski, 2016), the more concerned they are about being a target of weight stigma (Hunger & Major, 2018), and the more likely they are to anticipate rejection in a dating context if their weight is visible (Blodorn et al., 2016). Furthermore, the effects of weight-based stereotype threat on food choice in a meal-ordering task were more pronounced among individuals with higher body weight (Brochu & Dovidio, 2014), as were the effects of exposure to stigmatizing media on calorie consumption (Schvey, Puhl, & Brownell, 2011). All of these studies lead to the prediction that body weight will moderate the impact of exposure to others' anti-fat attitudes, such that the heavier women are, the more vulnerable they will be to such threats to their identity. Because past research has shown mixed results with regard to whether objective body mass index (BMI) or self-perceived overweight is more predictive of weight-based identity threat (Himmelstein, Incollingo Belsky, & Tomiyama, 2015; Major et al., 2012; Major, Hunger, Bunyan, & Miller, 2014), we tested both objective and self-perceived weight as potential moderators of how people respond to weight bias.

The current study also sought to replicate and extend prior evidence that *anticipated rejection* is the psychological mechanism underlying social identity threat in the weight domain (Blodorn et al., 2016). Prior research on social identity threat typically has inferred threat from differential outcomes across conditions (e.g., Brochu & Dovidio, 2014; Major et al., 2014) or has examined cognitive or affective mediators of threat (e.g., increased vigilance; Schmader et al., 2008). Here, we sought to directly examine anticipated interpersonal rejection as a critical psychological ingredient in the downstream consequences of weight-based social identity threat.

Finally, this study extended our understanding of the downstream effects of weight-based social identity threat by examining two coping responses to weight stigma: rumination and compensation. Despite evidence of the negative effects of weight stigma, relatively few studies have focused on how people cope with weight-based identity threat (see Miller et al., 1995; Puhl & Brownell, 2003 for exceptions). Recent studies identified several different coping responses to weight stigma including active coping, reappraisal coping, and disengagement coping (Hayward, Vartanian, & Pinkus, 2017) and coping via engaging in healthy lifestyle behaviors, maladaptive eating, exercise avoidance, and negative affect (Himmelstein, Puhl, & Quinn, 2018). These studies found that coping with weight stigma via healthy lifestyle behaviors or reappraisal was positively associated with well-being whereas responding to weight stigma with negative affect, maladaptive eating, and/or disengagement forms of coping were negatively associated with well-being. The current study examined the extent to which women engaged in rumination and compensation in response to weight-based identity threat. Rumination is a passive coping response in which individuals repetitively dwell on a distressing experience (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Rumination in response to stigmatizing experiences is associated with increases in psychological distress (Hatzenbuehler, Nolen-Hoeksema et al., 2009). Compensation, in contrast is an active coping response in which an individual exerts extra effort to make a good impression or disconfirm negative stereotypes (Miller et al., 1995; Neel, Neufeld, & Neuberg, 2013). Although a potentially effective way to make favorable impressions, com-

pensation can be exhausting and impede subsequent attempts at self-regulation (Vohs, Baumeister, & Ciarocco, 2005). This may explain why Hayward, Vartanian, and Pinkus (2017) found that active coping with weight stigma was unrelated to psychological outcomes. We expected both rumination and compensation to increase in response to weight-based identity threat.

In the current study, women who would be categorized as "overweight" or "obese" based on their BMI interacted with a same-sex peer who they believed held either very negative or unbiased attitudes toward "fat people." We predicted that for higher body weight women, interacting with a same-sex peer who endorsed anti-fat attitudes would be identity threatening, leading to greater anticipation that the partner would dislike and reject them. We further predicted that anticipated rejection would be more pronounced the higher women's weight. Following up previous research (Blodorn et al., 2016), we expected anticipated rejection to be associated with decreased self-esteem, poorer cognitive performance, increased cardiovascular stress responses, and more negative emotions. We also expected that anticipated rejection would be associated with attempts to cope via rumination and compensation.

2. Method

2.1. Participants

One hundred and forty six women (18–29 years old, $M = 19.95$, $SD = 2.18$), recruited from University of California, Santa Barbara, Santa Barbara Community College, and the surrounding community, participated in exchange for either partial course credit or monetary compensation. They were selected on the basis of their responses to an eligibility survey in which they rated their self-perceived weight on a 7-point scale (1 = *very underweight*, 4 = *average weight*, 7 = *very overweight*) and also reported their height and weight. The latter information was used to calculate self-reported BMI (weight in pounds*703/height in inches²). We restricted recruitment to women who *both* perceived themselves as overweight *and* who self-reported a BMI that was greater than 25. We also restricted recruitment to White ($n = 70$) or Latina/Hispanic ($n = 76$) women in order to have an ethnic-matched confederate and thus eliminate anticipated ethnic-based stigmatization as an alternative explanation for our findings.

At the end of the study, participants' height and weight were measured to get an objective measure of BMI. Two individuals had an objective BMI below 25, but were retained for analyses because they perceived themselves as overweight.¹ One participant did not consent to being weighed and was excluded from analyses. Participants' BMI ranged from 24.21 to 44.87 ($M = 30.61$, $SD = 4.34$), with 57.5% falling in the overweight category ($BMI \geq 25$ and < 30) and 42.5% falling in the obese category ($BMI \geq 30$) according to World Health Organization guidelines. Self-perceived weight and objective BMI were significantly correlated, $r = .52$, $p < .001$.

2.2. Procedure

Upon arrival to the lab and after providing consent, participants were connected to physiological recording equipment (see below) and sat quietly for a 5-minute baseline recording period. Partici-

¹ Given that perceiving oneself as overweight is theorized to be necessary to experience weight-based social identity threat (Hunger et al., 2015), we had an a priori interest in women who saw themselves as at least slightly overweight. Four participants perceived themselves as overweight when initially recruited but subsequently indicated that they were "average weight" in a pre-study survey, and were therefore excluded from analyses.

pants were then told that we were examining social interactions and impression formation processes and that they would interact with another participant (actually a trained confederate), after which they would evaluate each other. Participants completed a 'Getting to Know You Questionnaire' to exchange with their partner before meeting in person. This measured demographic information (age, gender, and ethnicity) and attitudes toward several groups, including fat people. The experimenter then supposedly delivered the participant's completed questionnaire to the partner and returned with the supposed partner's completed questionnaire. Participants were given 2 min to review the partner's responses.

2.2.1. Weight bias manipulation

The partner's responses to the weight bias questionnaire served as the manipulation of weight bias. In the biased condition, the partner agreed or strongly agreed (i.e., gave a response of 5 or 6 on a 6-point scale) with five items from Crandall's (1994) Anti-Fat Attitudes Scale (e.g., "Some people are fat because they have no willpower," "Fat people make me somewhat uncomfortable"), averaging a response of 5.6. In the unbiased condition, the partner disagreed or strongly disagreed (i.e., gave a response of 1 or 2) with the same five items, averaging a response of 1.4. This approach ensured that attitudes toward "fat people" were made salient for everyone and thus that any condition effects observed on our dependent measures were due to the partner's level of bias and not the activation of weight. In both conditions the partner reported low levels of age and anti-smoker bias. Immediately after reviewing their partner's questionnaire, participants completed the measure of anticipated rejection.

2.2.2. Cognitive performance and physiological stress measurement

The experimenter then brought the partner into the room. The partner was an ethnicity-matched, lean same-sex confederate who was blind to condition and trained to behave in a neutral manner. The experimenter "connected" the confederate to her own set of physiological recording equipment and then instructed the participant and confederate that they would play a cooperative word-finding game, similar to the game Boggle, in which the goal was to collectively find as many words as possible in 3 min. In order to increase motivation to perform well, they were told that teams able to generate 20 words or more would be entered into a lottery for \$50. In actuality, all participants were entered into the lottery. They were instructed to take turns finding words and to spell the word aloud when it was their turn to find a word. They were shown an 8 × 8 letter grid, and given 3 min to play the game. Following procedures used by Mendes, Major, McCoy, and Blascovich (2008), we standardized confederate responses during the word-finding game. Confederates were unobtrusively provided with a list of words, and matched the length of their word to the participant's word for each turn. In addition, the length of time confederates took to find words was standardized (i.e., two seconds for words one and two, three seconds for words three and four, four seconds for words five and six, and seven seconds for all remaining words). Participants' physiological responses were recorded while they played the game to assess physiological stress responses.

2.2.3. Thought listing task

After being disconnected from the physiological equipment and before completing the remaining dependent measures, the participant completed a 3-min thought-listing task in which she was instructed to list the thoughts that went through her mind during the interaction. This allowed for an ancillary non-self-report measure of concerns about rejection as well as expressed anxiety. After completing the thought listing task, the participant completed a variety of questionnaires and a manipulation check, was weighed

and measured, probed for suspicion, thoroughly debriefed using a funnel-debriefing procedure, compensated, and thanked for her time.

2.3. Measures

2.3.1. Anticipated rejection

Seven items (adapted from Blodorn et al., 2016) assessed anticipated social rejection prior to the interaction (e.g., "I think my interaction partner will like me" [reverse-scored] and "I am afraid I'll be rejected"; $\alpha = .88$) on a 7-point scale (1 *not at all* to 7 *very much*).

2.3.2. Interaction stressfulness

The stressfulness of the interaction was assessed with one face-valid item (i.e., "I found the interaction stressful") on a 7-point scale (1 *strongly disagree* to 7 *strongly agree*).

2.3.3. Cognitive performance

Participants' responses on the word-finding game were recorded and checked for accuracy. The total number of words found was used to index cognitive performance.

2.3.4. State self-esteem

Participants completed the appearance self-esteem (6 items; e.g., "I am pleased with my appearance right now"; $\alpha = .89$) and social self-esteem (7 items; e.g., "I am worried about what other people think of me" [reverse-coded]; $\alpha = .88$) subscales of the State Self-esteem Scale (Heatherton & Polivy, 1991). Participants indicated the extent to which each statement was true of them *at the moment* on a 5-point scale (1 *not at all* to 5 *extremely*). Consistent with past research, these two subscales were highly correlated ($r = .70, p < .001$) and were combined to form a single index of state self-esteem; $\alpha = .92$.

2.3.5. Self-conscious emotions

Five items (adapted from Blodorn et al., 2016) assessed the extent to which participants were currently feeling negative self-conscious emotions (i.e., guilty, disgusted with myself, pleased with myself [reverse-scored], ashamed, embarrassed; $\alpha = .77$), each answered on a 7-point scale (1 *not at all* to 7 *very much*).

2.3.6. Anger

Participants indicated the extent to which they were currently feeling "angry" on a 7-point scale (1 *not at all* to 7 *very much*). In contrast to self-conscious emotions, anger is another-directed emotion. Anger has been shown to increase in response to perceived discrimination, and to mediate some of the negative effects of perceived discrimination on health-related behaviors (Gibbons et al., 2012).

2.3.7. Compensation

Two items assessed the extent to which participants reported compensating by trying to make a good impression on their partner (i.e., "I tried hard to make a good impression on my partner" and "I wanted to make a good impression on my partner"; $r = .77, p < .001$), rated on a 7-point scale (1 *strongly disagree* to 7 *strongly agree*).

2.3.8. Post-interaction rumination

Thirteen items (adapted from Edwards, Rapee, & Franklin, 2003) assessed rumination. Participants rated how often since the interaction they had negative thoughts (e.g., "How anxious I felt," "How bad my performance was," "How awkward I felt"; $\alpha = .92$) on 5-point scales (0 *never* to 4 *very often*).

Analyses of physiological outcomes included baseline levels as a covariate (Mendes et al., 2008). All effects reported are unchanged when these baseline levels are omitted as a covariate. Consistent with other research (Blodorn et al., 2016; Major et al., 2012, 2014), the effects of exposure to weight stigma were unaffected by participant race/ethnicity.

3.2. Manipulation check

We first tested whether the weight bias manipulation was effective. As expected, participants rated their partner as significantly more biased against overweight individuals in the explicit anti-fat condition ($M = 6.25$, $SD = 1.27$) than in the unbiased condition ($M = 1.86$, $SD = 0.96$; $t(144) = -23.43$, $p < .001$).² Our participants own anti-fat attitudes were low ($M = 1.52$, $SD = 0.59$) and comparable to the attitudes expressed in the unbiased attitude condition. Their responses did not differ by condition, $t(144) = 0.50$, $p = .617$.

3.3. Dependent variables

3.3.1. Anticipated rejection

Regression analyses testing the effects of condition, participant BMI and their interaction on anticipated rejection revealed the predicted main effect of condition ($\beta = .24$, $p = .003$). As expected, women in the anti-fat condition anticipated rejection more than did those in the control condition. We also observed a significant effect of BMI ($\beta = .17$, $p = .038$) such that the more women weighed the more they anticipated rejection. We also observed a significant condition \times BMI interaction ($\beta = .19$, $p = .017$). Higher BMI predicted greater anticipated rejection in the explicit anti-fat bias condition ($\beta = .34$, $p = .002$), but BMI was unrelated to anticipated rejection in the unbiased condition ($\beta = -0.05$, $p = .676$). We tested for differences in the regression lines at three levels of BMI: one SD below the mean (26.27), the mean (30.51), and one SD above the mean (34.84). As expected, women at the BMI mean (30.61) and one SD above the BMI mean (34.95) in our sample anticipated greater rejection in the explicit anti-fat bias condition than the unbiased condition ($\beta = .26$, $p = .002$ and $\beta = .44$, $p < .001$, respectively). In contrast, women at one SD below the BMI mean in our sample (26.27) did not differ in anticipated rejection by condition ($\beta = .15$, $p = .071$).

We also examined whether self-perceived weight moderated the effects of condition on anticipated rejection. Recall that we recruited only women who perceived themselves as overweight (i.e., reported a response of 5 *slightly overweight* to 7 *very overweight*) to participate. As a result, variability on the self-perceived weight measure was limited. Because of the relatively few women who rated themselves a 6 ($n = 66$, 45.2%) or 7 ($n = 12$, 8.2%), we combined them into one group and compared them with women who rated themselves a 5 (slightly overweight; $n = 68$, 46.6%). These regression analyses revealed a main effect of condition on anticipated rejection ($\beta = .25$, $p = .002$) and a significant effect of self-perceived weight ($\beta = .26$, $p < .001$). This effect was subsumed by a significant condition \times self-perceived weight interaction ($\beta = .28$, $p = .046$). Higher self-perceived weight (i.e., 6+) predicted greater anticipated rejection in the explicit anti-fat bias condition ($\beta = .41$, $p < .001$), but was unrelated to anticipated rejection in the unbiased condition ($\beta = .10$, $p = .353$). We tested for differences in the regression lines at two levels of self-perceived weight: slightly overweight (5) or very overweight (6+). Women who perceived

themselves to be very overweight (6+) reported greater anticipated rejection in the explicit anti-fat bias condition than the unbiased condition ($\beta = .40$, $p < .001$). In contrast, women who perceived themselves as only slightly overweight (5) did not differ in anticipated rejection by condition ($\beta = .09$, $p = .439$).

3.3.2. Other dependent measures

Results of regression analyses examining the effects of condition, BMI, and their interaction on all other dependent measures are shown in the Supplementary Materials. We observed significant main effects of condition on only three variables: anger ($\beta = .22$, $p = .008$), compensation ($\beta = -0.21$, $p = 0.012$), and heart rate reactivity ($\beta = .22$, $p = .013$). Women who anticipated interacting with a peer who held anti-fat attitudes reported greater anger, less compensation, and showed higher heart rate reactivity than those in the unbiased peer condition. We also observed a main effect of BMI on cognitive performance; higher BMI was related to poorer performance, $\beta = -0.22$, $p = 0.006$. No significant interactions between BMI and condition emerged for these dependent measures (all interaction $ps > .068$).

Similar analyses with self-perceived weight as the moderator are also shown in the Supplementary Materials. These analyses revealed the same main effects of condition on anger ($\beta = .23$, $p = .006$), compensation ($\beta = -0.21$, $p = .012$), and heart rate reactivity ($\beta = .22$, $p = .012$). These analyses also yielded a main effect of self-perceived weight on stressfulness of the interaction ($\beta = .18$, $p = .032$), state self-esteem ($\beta = -0.20$, $p = .004$), self-conscious emotions ($\beta = .22$, $p = .009$), and state rumination ($\beta = .21$, $p = .010$). Women who perceived themselves as very overweight (i.e., 6+) reported a more stressful interaction, had lower state self-esteem, more negative self-conscious emotions, and engaged in more post-interaction rumination compared to women who perceived themselves as only slightly overweight. Similar to the BMI analyses, no significant interaction between self-perceived weight and condition emerged for these dependent measures (all interaction $ps > .062$).

3.3.3. Tests of indirect effects

We used Hayes' (2013) PROCESS model 7 (moderated mediation) to test the indirect effect of exposure to anti-fat bias (0 = unbiased, 1 = explicit bias) on the dependent measures via anticipated rejection (the mediator) at three levels of BMI (the moderator): one standard deviation (SD) below the mean (26.27), the mean (30.61), and one SD above the mean (34.95). See Table 1 for all effects and 95% confidence intervals. We also conducted analyses testing indirect effects at two levels of self-perceived weight (5 versus 6+).

Among higher BMI women (those at the BMI mean [30.61] and one SD above the BMI mean [34.95] in our sample), as well as among women who perceived themselves more than slightly overweight (i.e., 6+), exposure to anti-fat bias (versus unbiased attitudes) led to a host of negative affective and cognitive outcomes indirectly by increasing their anticipation of rejection. Specifically, for these young women, exposure to a peer with anti-fat (versus unbiased) attitudes predicted a more stressful interaction, worse cognitive performance, greater post-interaction rumination, greater compensation, greater anger, lower state self-esteem, more negative self-conscious emotions, and more thoughts related to anxiety and evaluative concern, all via increased anticipation of rejection. In contrast, these indirect effects were not significant among women who were only slightly overweight (BMI at 1 SD below the BMI mean in our sample [26.27]) or who perceived themselves as only slightly overweight. Contrary to predictions, we did not see any indirect effects on our indices of cardiovascular reactivity.

² Two people in the weight bias condition strongly disagreed that their partner was biased; three people in the unbiased condition somewhat agreed that their partner was biased. Ten individuals reported suspicion of the confederate during debriefing. We analyzed the data with and without including these 15 individuals. Since the effects were the same, the analyses reported here retained all participants.

3.4. Exploratory analyses

Recall that condition had a direct effect on anger irrespective of weight, such that those exposed to the anti-fat peer reported feeling angrier than those exposed to the unbiased peer. Although not a primary focus of our study, we conducted exploratory analyses using Hayes' (2013) PROCESS model 4 (mediation) to test the indirect effect of condition on our outcomes via anger.³ Threat condition was indirectly related to greater interaction stressfulness ($b = 0.151$, $SE = 0.068$, 95% CI: 0.040, 0.308), lower social self-esteem ($b = -0.059$, $SE = 0.035$, 95% CI: -0.141 , -0.005), higher self-conscious emotions ($b = 0.136$, $SE = 0.071$, 95% CI: 0.027, 0.310), and more post-interaction rumination ($b = 0.101$, $SE = 0.053$, 95% CI: 0.020, 0.237) via increased anger. Through its effect on increased anger, condition was also associated with higher heart rate ($b = 0.889$, $SE = 0.430$, 95% CI: 0.239, 2.006), higher CO ($b = .098$, $SE = 0.048$, 95% CI: 0.022, 0.211), lower TPR ($b = -0.019$, $SE = 0.009$, 95% CI: -0.040 , -0.005), and a lower score on the Threat/Challenge Index ($b = -0.169$, $SE = 0.078$, 95% CI: -0.358 , -0.045). These cardiovascular responses indicate that the women who felt angrier in response to the biased peer were more *challenged* than threatened (Blascovich & Mendes, 2010; Blascovich et al., 2004). No indirect effects emerged for cognitive performance ($b = 0.041$, $SE = 0.189$, 95% CI: -0.309 , 0.452), behavioral compensation ($b = -0.038$, $SE = 0.056$, 95% CI: -0.175 , -0.054), anxious thoughts ($b = 0.028$, $SE = 0.097$, 95% CI: -0.130 , 0.252), thoughts reflecting evaluative concern ($b = 0.054$, $SE = 0.112$, 95% CI: -0.118 , 0.274), or MAP ($b = -0.071$, $SE = 0.328$, 95% CI: -0.664 , 0.682).

4. Discussion

The present study adds to an emerging body of research demonstrating that exposure to situational cues that activate anticipated rejection, such as the overt weight bias of a peer, can lead to a host of negative consequences for higher body weight individuals. Specifically, among higher BMI women, or among women who perceived themselves as more than slightly overweight, those led to believe their same-sex interaction partner was biased against fat people anticipated rejection more than those who thought their partner was not biased. In turn, greater anticipated rejection predicted poorer cognitive performance, lower appearance and social self-esteem, more negative emotions, a more stressful interaction, more rumination, more reported efforts to compensate, and more spontaneous thoughts related to anxiety and evaluative concern. These findings add to a growing literature indicating that not only *experiencing* weight-based mistreatment, but also merely *anticipating* social rejection based on stigma can be harmful to health and well-being (e.g., Earnshaw, Quinn, & Park, 2012; Lillis, Thomas, Levin, & Wing, 2017; Quinn & Chaudoir, 2009).

Furthermore, by identifying anticipated rejection as a key psychological mechanism explaining the consequences of weight bias, this study may inform our understanding of weight-based disparities in domains beyond health, such as disparities in employment and social relationships (Pearl, 2018). Individuals who anticipate being stigmatized may avoid putting themselves in situations where they fear they may experience stigma, thus constraining them from applying for certain jobs, participating in social events, or seeking healthcare (Hunger et al., 2015; Major, Quinton, & Schmader, 2003). This in turn may undermine social relationships, limit employment opportunities, and impose an additional barrier to receiving quality health care among higher body weight individuals. Future research would benefit from examining how

anticipated rejection is related not only to poorer mental and physical health outcomes, but also factors such as social relationships and full participation in society (e.g., employment, adequate health care), which themselves carry considerable implications for overall well-being.

As found in prior research (e.g., Blodorn et al., 2016; Brochu & Dovidio, 2014; Schvey, Puhl, & Brownell, 2014), objective and self-perceived body weight moderated the effects of exposure to weight bias, even though all women in this sample qualified as at least somewhat overweight. Interacting with a same-sex peer who endorsed explicitly anti-fat (versus unbiased) attitudes led to greater anticipated rejection and concomitant downstream negative effects *only* among women in our sample with higher BMIs or higher self-perceived weight. Women who were only slightly overweight according to their BMI or women who perceived themselves as only slightly overweight did not show these effects. One potential explanation for this pattern of results has to do with the phrasing of our weight bias manipulation, which focused on attitudes toward “fat people” (rather than “overweight people”). The use of “fat” in our manipulation may have led the women in our study who had lower BMIs or who perceived themselves as only slightly overweight to feel that the anti-fat attitudes endorsed by their partner did not apply to them personally. That is, they may not have regarded their partner's attitudes about “fat people” as highly relevant to their own social identity. Several studies have shown that different ways of describing higher body weight people (e.g., fat vs. overweight vs. obese vs. full-figured) elicit different responses from perceivers (Brochu & Esses, 2011; Smith, Schmoll, Konik, & Oberlander, 2007; Vartanian, 2010).

Preliminary evidence is consistent with this explanation for our findings. Hunger and Major (2018) conducted an online survey of self-labeling among women who had a self-reported BMI over 25. Women whose BMI put them in the “overweight” category were far less likely than women whose BMI put them in the “obese” category to indicate that others would consider them to be fat, and also far less likely to say that the term “fat” applied to them. The same pattern of results emerged when comparing women who perceived themselves as slightly overweight to those who perceived themselves as overweight or very overweight. These findings suggest that people who are (or who think they are) only “slightly overweight” may not experience negative attitudes toward “fat people” as personally threatening.

Another possible explanation for our findings has to do with the context. Whereas previous studies have examined weight-based identity threat in dating contexts, the present study examined antecedents to social identity threat in same-sex interactions unrelated to dating. It is possible that the weight threshold for anticipating rejection on the basis of body weight is higher in non-dating than dating contexts. Indeed, a recent study that manipulated weight visibility in an employment interview, rather than a dating context, did not show evidence of greater identity threat among higher body weight women as a function of visibility (Miller & Major, 2017). These findings suggest that future research seeking to thoroughly examine the effects of weight stigma should make a concerted effort to examine the effects of weight bias across diverse contexts.

As noted above, heavier women exposed to anti-fat bias who anticipated rejection coped via more rumination and attempts to compensate, two coping responses associated with poorer health. Rumination contributes to the development of depression, anxiety, and psychological distress (Hatzenbuehler, Nolen-Hoeksema et al., 2009; Nolen-Hoeksema et al., 2008). Although compensation may be a potentially effective strategy to mitigate the risk of negative treatment (Miller et al., 1995), it nonetheless can limit self-regulatory capacity (Vohs et al., 2005), which may undermine the ability to enact effortful health behaviors. Interestingly, irre-

³ We thank an anonymous reviewer for suggesting these analyses.

spective of weight, women in the anti-fat bias condition overall reported compensating less than those in the unbiased condition. It is perhaps unsurprising that women would be less willing to try to make a positive impression on a person they believe to be biased. Yet individuals for whom the situation elicited social identity threat – that is, women who anticipated rejection – did try to compensate. For them, behavioral compensation may have been a coping strategy to minimize perceived risk.

Irrespective of body weight, women in the anti-fat bias condition were angrier than those in the unbiased condition. Exploratory analyses examining the downstream effects of anger showed that greater anger in response to weight bias was associated with cardiovascular indicators of challenge rather than threat, including higher heart rate reactivity, higher cardiac output, and lower total peripheral resistance. Our finding that anger in response to bias was associated with cardiovascular indices of challenge rather than threat is consistent with prior research (e.g., Dover et al., 2015; Mendes et al., 2008), and suggests that getting angry in response to encountering weight bias may be a cardiovascularly adaptive response. Greater anger, however, also was associated with greater psychological distress, including more negative self-conscious emotions, lower social self-esteem, perceiving a more stressful interaction, and greater post-interaction rumination. Thus, greater anger also carries with it negative psychological consequences (Gibbons et al., 2010; Miller, Smith, Turner, Guijarro, & Hallet, 1996). Given the exploratory nature of these analyses, these results should be interpreted with appropriate caution until they are replicated in future research.

In the present study, BMI and self-perceived weight exerted similar effects on anticipated rejection and downstream outcomes. This can be contrasted with prior studies, where BMI emerged as the critical predictor of threat-related effects among women in a dating domain (Blodorn et al., 2016; Major et al., 2012) and self-perceived weight emerged as a more important predictor than BMI in a study of the effects of exposure to weight-stigmatizing messages on eating (Major et al., 2014). We speculate that these differences may be due to the context in which identity threat is experienced. Unfortunately, the recruitment approach used in the current study does not allow us to truly disentangle the effects of objective and subjective dimensions of weight as we selected only women who were overweight both in terms of self-appraisal and BMI. Future research is needed to systematically test when objective weight versus self-perceived weight carries more “weight” in predicting social identity threat effects. This could be accomplished, for example, by comparing how individuals with concordant and discordant objective and self-perceived weights respond to identity-threatening situations (e.g., interacting with an anti-fat peer, engaging with stigmatizing media).

One limitation of this study is its absence of a control condition in which the attitudes of the partner were unknown. As a result, we do not know whether the differential responses by condition were due to increased threat in the anti-fat condition or decreased threat in the unbiased condition. That is, interacting with an unbiased peer may have felt “identity safe” and alleviated concerns of some participants. Because the attitudes of the partner in the unbiased condition were comparable to those of our participants, however, we think it likely that the former more accurately describes our findings. A second limitation is that the current study focused on the implications of weight-based social identity threat for higher body weight women and not men, based on prior evidence that weight-based identity threat is experienced more keenly by women than men (Blodorn et al., 2016). Additional research is needed to identify when, and to what extent, exposure to weight stigma heightens anticipated rejection and concomitant downstream effects among heavier men. A third limitation is that our manipulation of anti-fat bias may have led participants to view the biased peer as less

politically correct or socially appropriate in general. Future research should examine the consequences of interacting with different types of biased peers (e.g., weight versus race or religion) to see if threat transfers from one type of stigma to another (Sanchez, Chaney, Manuel, Wilton, & Remedios, 2017).⁴

5. Conclusions and implications

The present research provides further evidence that weight stigma undermines the psychological well-being of higher body weight women, and does so by heightening anticipated rejection. This adds to a literature documenting the negative relationship between anticipating or fearing stigma and variety of mental and physical health outcomes (e.g., Blodorn et al., 2016; Earnshaw et al., 2012; Lillis, Levin, & Hayes, 2011; Lillis, Luoma, Levin, & Hayes, 2010; Lillis et al., 2017; Quinn & Chaudoir, 2009). Given the pervasiveness of weight bias and discrimination in our culture, heavier individuals are likely to encounter many situations in which they anticipate weight-based rejection. They are thus susceptible to experiencing social identity threat and its associated cognitive, affective and physiological effects chronically in their day-to-day lives. This may explain why those who chronically expect weight-based rejection in their daily lives see declines in health over time (Brenchley & Quinn, 2016). Reducing weight-based stigma and the anticipated rejection that accompanies it is critical to improving the health and well-being of higher body weight individuals.

Funding

This research was supported by NIH Grant 5R01HL112818 to Brenda Major and Carol Miller.

Conflicts of interest

The authors have no conflicts of interest to report.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.bodyim.2018.09.002>.

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⁴ We thank an anonymous reviewer for this suggestion.

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