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## The ironic effects of weight stigma

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## HIGHLIGHTS

- We examine effects of exposure to weight stigmatizing (vs. control) new messages.
- Weight stigma led overweight but not nonoverweight women to consume more calories.
- Weight stigma reduced perceived dietary control among overweight women.
- Weight stigma increased perceived dietary control among nonoverweight women.
- Self-perceived overweight was more important predictor than actual body mass index.

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## ABSTRACT

America's war on obesity has intensified stigmatization of overweight and obese individuals. This experiment tested the prediction that exposure to weight-stigmatizing messages threatens the social identity of individuals who perceive themselves as overweight, depleting executive resources necessary for exercising self-control when presented with high calorie food. Women were randomly assigned to read a news article about stigma faced by overweight individuals in the job market or a control article. Exposure to weight-stigmatizing news articles caused self-perceived overweight women, but not women who did not perceive themselves as overweight, to consume *more* calories and feel *less* capable of controlling their eating than exposure to non-stigmatizing articles. Weight-stigmatizing articles also increased concerns about being a target of stigma among both self-perceived overweight and non-overweight women. Findings suggest that social messages targeted at combating obesity may have paradoxical and undesired effects.

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## Introduction

According to the Institute of Medicine, America is in the midst of an obesity "epidemic" (National Research Council, 2012). Media attention to obesity has increased dramatically (Saguy & Almeling, 2008), as has discrimination against overweight and obese individuals (Andreyeva, Puhl, & Brownell, 2008). Overweight individuals are often portrayed in the media as lazy, weak willed, and self-indulgent (Puhl & Heuer, 2009), and as a drain on the nation's resources (Begley, 2012). Because stigma can be a potent source of social control (Phelan, Link, & Dovidio, 2008), some authors have suggested that stigmatizing obesity may encourage people to lose weight (Bayer, 2008; Callahan, 2013; Heinberg, Thompson, & Matzon, 2001), and policies that utilize potentially stigmatizing elements (e.g., BMI report cards) are becoming more prevalent (Vogel, 2011). Little evidence exists, however, that stigmatizing obesity promotes weight loss. In fact, among overweight individuals, experiencing weight-based stigmatization is associated with greater reports

of maladaptive eating behaviors (e.g., Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006; Puhl & Brownell, 2006), increased motivation to avoid exercise (Vartanian & Novak, 2011; Vartanian & Shaprow, 2008), and poorer weight loss outcomes among adults in a weight-loss program (Wott & Carels, 2010; but see Latner, Wilson, Jackson, & Stunkard, 2009). Furthermore, experimentally activating weight stereotypes *decreased* overweight women's self-efficacy for exercise and dietary control (Seacat & Mickelson, 2009). Collectively, these findings suggest that stigmatizing obesity has negative behavioral consequences that may *increase*, rather than decrease the weight of overweight individuals.

Major, Eliezer, and Rieck (2012) proposed that experiencing, anticipating, or fearing being a target of weight-based discrimination leads individuals who believe they are overweight to experience weight-based *social identity threat* (Major & O'Brien, 2005; Shapiro, 2011; Steele, Spencer, & Aronson, 2002). Weight-based social identity threat stems from a person's awareness or belief that others see him or her as a member of the social category "overweight," combined with knowledge of the negative stereotypes and devaluation associated with this category. Unlike stigma consciousness, which is an individual difference variable (Pinel, 1999), weight-based identity threat is a situational threat than can be triggered by cues in the environment such as

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meeting a potential date, interviewing for a job, overhearing “fat jokes,” or reading news articles that implicitly or explicitly devalue people who are overweight.

Experiencing social identity threat produces a variety of negative effects, including increased anxiety and physiological stress reactivity (see Schmader, Johns, & Forbes, 2008 for a review). Stress activates the hypothalamic–pituitary–adrenal (HPA) axis and the cardiovascular, metabolic, and immune systems. Because chronic stress is linked to numerous negative health outcomes (McEwen, 1998), frequently experiencing weight-based identity threat could adversely affect health. People experiencing identity threat also engage in self-regulatory strategies to manage that threat, such as *suppressing* activated stereotypes and negative emotions, *compensating* for negative stereotypes by working harder to make a good impression, or *avoiding* domains in which they might be devalued (Schmader et al., 2008; Seacat & Mickelson, 2009; Vartanian & Shaprow, 2008). According to limited resource models of self-control, engaging in actions that require effortful self-control, such as coping with weight-based identity threat, makes demands on limited executive resources that are necessary for self-control. This can cause people to perform more poorly on immediately subsequent tasks that draw on those same limited resources (e.g., Muraven & Baumeister, 2000). For example, when identity threat associated with gender or race is activated, women and minorities subsequently show decreases in working memory and perform more poorly on tasks that require executive control or are intellectually demanding (Richeson & Shelton, 2007; Steele et al., 2002). These effects often occur in the absence of self-reported threat or anxiety, suggesting that they are outside of conscious awareness (Schmader et al., 2008).

Major et al. (2012) activated weight-related identity threat by having overweight and average weight college-aged women give a speech about a topic that is both highly self-relevant and appearance-relevant for young women – why they would make a good date. Half of the women believed their speech was videotaped, and the other half believed it was audiotaped. When women believed that their weight was visible, heavier weight was associated with increased stress, as indicated by greater increases in blood pressure during the speech, and with greater cognitive depletion, indexed by poorer performance on the Stroop color naming test (Engle, 2002). Weight was unrelated to these measures when women believed they were not visible. Thus, this study provided initial evidence that contexts that activate weight-related identity threat can increase stress and decrease executive control resources among overweight individuals.

Ironically, these two consequences of social identity threat – increased stress and decreased executive control – contribute to obesity. Laboratory and naturalistic studies demonstrate that acute and chronic stress increase the drive for sweet and high fat foods, increase food consumption among humans and rats, and lead to weight gain through cortisol-mediated visceral fat deposits (Bjorntor, 2001; Epel, Lapidus, McEwen, & Brownell, 2001; Newman, O'Connor, & Conner, 2007). Furthermore, independent of stress, impairments in self-control can lead to overeating and contribute to weight gain. Avoiding eating tempting but unhealthy food requires executive resources (Baumeister, Vohs, & Tice, 2007), and consumption of calorie-dense food is a widely used measure of self-regulatory depletion. People eat more when they are cognitively depleted (e.g., Vohs & Heatherton, 2000), under cognitive load (Ward & Mann, 2000) or concerned about confirming negative stereotypes (Inzlicht & Kang, 2010). This suggests that experiencing weight stigma may ironically cause overweight individuals to eat *more*, rather than less (Schvey, Puhl, & Brownell, 2011).

#### Current research

We hypothesized that exposure to weight-stigmatizing news messages (vs. non-stigmatizing messages) causes overweight, but not non-overweight, individuals to: (1) consume more calorie-rich snack foods, (2) feel less able to control their diet and (3) be more concerned

about being a target of weight stigma. We also explored whether overweight individuals would display more anxiety than non-overweight individuals when describing a weight-stigmatizing (vs. non-stigmatizing) article, as reflected in their nonverbal behavior.

A secondary goal of this research was to examine objective vs. self-perceived overweight as predictors of weight-based identity threat. This issue is important both theoretically and pragmatically (Seacat & Mickelson, 2009). Unlike social categories such as race and gender where self-classification typically corresponds with others' classification, the social category of “being overweight” has more fluid boundaries. People who are not overweight by objective standards may nonetheless perceive themselves as such; likewise, people who are objectively overweight may not perceive themselves to be overweight (Chang & Christakis, 2003).

Several lines of research suggest that self-perceived overweight, more so than actual overweight, increases vulnerability to experiencing weight-based identity threat. For example, although experiencing weight-based discrimination increases as body mass index (BMI) increases, controlling for BMI does not attenuate the negative relationship of perceived weight stigma with psychological functioning (Hatzenbuehler, Keyes, & Hasin, 2009; Vartanian & Novak, 2011). Furthermore, the difference between actual and desired body weight more strongly predicts reported ill health than does BMI (Muennig, Jia, Lee, & Lubetkin, 2008). Previous experiments examining the effects of exposure to weight stigma on self-regulation have not compared effects of objective vs. self-perceived weight (Major et al., 2012; Schvey et al., 2011). We theorize that even if people are objectively overweight, if they do not believe they are overweight they will not experience weight-stigmatizing messages as identity-threatening, and will thus be unlikely to show self-regulatory depletion in response.

## Method

### Participants

Ninety-three female students at a Western public university participated in return for course credit or \$10.00 ( $M_{\text{age}} = 19.15$  years; Range = 18–32 years). We focused on females because they are stigmatized at lower weights than males (Azarbad & Gonder-Frederick, 2010) and experience more weight-based discrimination in the workplace than men (Roehling, Roehling, & Pichler, 2007). Participants self-identified as White (45.2%), Latina (23.7%), Asian/Pacific Islander (18.3%), African-American (3.2%) and other (9.7%). All had previously rated their weight in an online survey completed at least two days prior to the study on a scale from 1 to 7 (1 = *very thin*, 4 = *average weight*, 7 = *very heavy*;  $M = 4.43$ ,  $SD = .95$ ). Overall, 49 women rated themselves as overweight (rated themselves a 5, 6, or 7) and 44 rated themselves as average weight or less (rated themselves a 1, 2, 3 or 4). Participants also completed online measures of self-esteem (Rosenberg, 1965), and dietary restraint (Herman & Polivy, 1980) and indicated whether they were currently dieting for examination as potential covariates. These questions were embedded in a larger questionnaire to disguise the purpose of the study. Participants were not informed that food was involved or that weight was a variable of interest.

At the end of the experiment, participants who consented were weighed and measured and BMI was calculated ( $M = 24.28$ ,  $SD = 4.71$ , Range = 17.36 to 40.18). Two participants in the control condition refused to be weighed and were omitted from analyses involving BMI. According to weight categories established by the National Institutes of Health, 4.3% ( $n = 4$ ) were underweight (BMI < 18.5); 59.1% ( $n = 55$ ) were average weight (BMI  $\geq 18.5$  and < 25), 23.7% ( $n = 22$ ) were overweight (BMI  $\geq 25$  and < 30) and 10.8% ( $n = 10$ ) were obese (BMI  $\geq 30$ ). Perceived weight and BMI were significantly correlated,  $r(91) = .59$ ,  $p < .001$ .

## Procedure

Participants were scheduled individually and asked not to eat for 2 h prior to the experiment because we would be measuring physiological responses. Upon arrival, they were told that the goal of the study was to examine the correspondence among verbal, nonverbal, and physiological signals. After a five-minute period, during which time we assessed their resting blood pressure,<sup>1</sup> we randomly assigned participants to read and describe an ostensible *New York Times* article titled either, “Lose Weight or Lose Your Job,” ( $n = 46$ ) or “Quit Smoking or Lose Your Job” ( $n = 47$ ). Article content was taken from actual news reports. The articles were crafted so as to be highly similar to each other and described reasons that employers are reluctant to hire individuals who are overweight (or who smoke); see Appendix A. Participants were instructed to “talk about the facts conveyed in the article and the rationale driving this social policy” and were told to “try to clearly convey to someone else who has not read the article what the policy is and why it is being instituted or considered.” They were also told they could discuss what they saw as the implications of the policy. Participants were given 2 min to prepare and then spoke for 5 min while facing a video camera. Participants were then informed that a break was needed. They were escorted to a nearby room and told they could watch a video (about deep sea life) while waiting. There was no camera in the room, and participants (correctly) believed that they were unobserved during this period. Three full, equally sized, pre-weighed bowls of snacks (Skittles (111 g), M&M’s (102 g) and Goldfish Crackers (46 g)) were placed near the computer monitor and participants were invited to help themselves. After 10 min, they returned to the experimental room, completed a post-questionnaire (see below), and if they consented were weighed and measured for height. They were then carefully debriefed, and informed that the articles were not genuine but rather constructed for the experiment. They were not informed that the study was about weight or eating behavior.

## Dependent measures

### Calories consumed

We subtracted total grams of food present after the waiting period from total grams present initially to derive a measure of total grams consumed. We converted this to calories consumed using nutritional information provided by the manufacturers.

### Self-efficacy for dietary control

We adapted five items from an existing self-efficacy scale to assess self-efficacy for dietary control (Clark, Abrams, Niaura, Eaton, & Rossi, 1991). Participants indicated how confident they were (from 0 = not confident at all to 100 = very confident) that they could: control what you eat; avoid eating unhealthy food that you like; avoid unhealthy foods every day; stick to your diet even when you are hungry; and avoid giving in to the temptation to break a diet if offered tempting foods. Responses were averaged and combined into a single measure of self-efficacy ( $\alpha = .90$ ).

### Weight stigma concerns

Participants were asked on a scale from 1 (strongly disagree) to 7 (strongly agree) how much they agreed with three statements: “I am concerned that I will not be treated fairly because of my weight,” “I am concerned that others will reject me because of my weight,” and “When interacting with people, I am concerned that their opinion of me will be based on my weight.” Responses were averaged into a single index ( $\alpha = .86$ ).

<sup>1</sup> Blood pressure (BP) was measured using a Vasotrac (Model APM205A) BP monitor. We found no significant differences by condition, weight status, or interactions in either baseline BP or BP reactivity during the speech. Due to space restrictions, these data are not discussed further.

## Speech coding

All speeches were transcribed, and transcriptions were analyzed in two different ways. First, three coders blind to the study hypotheses rated each speech on: 1) overall speech quality, ( $ICC = .48$ ) and 2) the extent to which the participant appeared to find the policy justified ( $ICC = .83$ ) and 3) agreed with the rationales offered for the policy ( $ICC = .64$ ). These latter two ratings were combined as a single rating of policy support ( $\alpha = .88$ ). Second, we used the Linguistic Inquiry and Word Count (LIWC) program (Pennebaker, Booth, & Francis, 2007) to analyze the speech transcripts for length and frequency of word use from the following categories: personal pronouns (e.g., I, we), which are thought to reflect greater self-focused attention (Tausczik & Pennebaker, 2010) and words reflecting the expression of negative affect (i.e., anxiety, anger, and sadness).

## Nonverbal behavior coding

All speeches were also assessed for nonverbal characteristics independent of the actual speech content. Following the work of Ambady and colleagues, we selected the second 30-second segment from each participant's speech for analysis. Naïve perceivers are remarkably accurate in making social judgments made from brief nonverbal exposure; indeed, this “thin slices” approach has been used to examine both personality traits and current affective states (for a review, see Ambady & Weisbuch, 2010). First, we had six coders naïve to condition independently rate each 30 second segment of video with the sound removed for how confident ( $ICC = .86$ ), jittery ( $ICC = .80$ ), composed ( $ICC = .66$ ), and uncomfortable ( $ICC = .75$ ) the participants appeared. We reverse-coded composed and confident and averaged all items to form an index of nervousness ( $\alpha = .71$ ). Coders also rated the extent to which the participant had a closed or slumped posture ( $ICC = .87$ ) and averted their gaze away from the camera during their speech ( $ICC = .94$ ), two behavioral manifestations of shame (Keltner, 1995). These were combined to form a single index of shame ( $\alpha = .92$ ). Second, using Adobe Premier software (Adobe Systems, Inc., San Jose, CA) we “content-filtered” the audio from the same 30-second segment of the speech by removing high-frequency sounds, a process that retains vocal qualities such as prosody but removes the ability to comprehend individual words. This approach allows for vocal affect to be reliably coded independent of the speech content (e.g., Ambady, Krabbenhoft, & Hogan, 2006). Seven raters independently coded these audio clips for how anxious ( $ICC = .56$ ), excited ( $ICC = .80$ ), uncomfortable ( $ICC = .79$ ), nervous ( $ICC = .75$ ), engaged ( $ICC = .85$ ), confident ( $ICC = .79$ ), and enthusiastic ( $ICC = .85$ ) the participant seemed. A composite score was created for each rating, positively-keyed items were reversed, and then all items were averaged to form a highly reliable index of nervousness ( $\alpha = .97$ ).

## Results

### Preliminary analyses

All participants correctly recalled the topic of their speech. Only two participants smoked; a priori, their data were excluded from analysis.<sup>2</sup> Women in the weight and control conditions did not differ significantly in perceived weight ( $M_s = 4.26$  and  $4.60$ , respectively,  $t(91) = 1.72$ ,  $p = .09$ ) or BMI ( $M_s = 23.63$  and  $24.94$ , respectively,  $t(89) = 1.233$ ,  $p = .19$ ). White and non-White participants did not differ significantly in their self-perceived weight ( $M_s = 4.55$  and  $4.29$ , respectively,  $t(91) = 1.338$ ,  $p = .18$ ). However, non-White participants did have higher BMIs than White participants ( $M_s = 25.42$  and  $23.01$ , respectively,  $t(89) = 2.505$ ,  $p = .014$ ). However, the relationship between self-perceived weight and BMI was not significantly different between

<sup>2</sup> The results do not change in a meaningful way when the data are analyzed including these two participants.

White ( $r = .61$ ) and non-White participants ( $r = .55$ ),  $z = .43$ ,  $p = .67$ .

*Analytic approach and initial analyses*

We conducted a series of hierarchical regression analyses to assess the influence of weight (both objective and perceived) and condition on the dependent measures. In our first analyses (reported here) we entered perceived weight (centered) and article condition (dummy coded: 0 = smoking control, 1 = weight stigma) on Step 1, and the perceived weight  $\times$  condition interaction on Step 2. A second set of analyses used BMI, rather than perceived weight, to operationalize weight; these analyses revealed that BMI did not interact with condition to affect any dependent variable. A third set of analyses examined effects of perceived weight and condition controlling for BMI. These analyses revealed that all effects for perceived weight reported here remained significant when BMI was controlled. We also performed all regression analyses including covariates that might act as potential confounds: dietary restraint, current dieting status, self-esteem (all assessed in pre-testing), hunger (assessed at the start of the experiment), and participant ethnicity (White/non-White).<sup>3</sup> The only significant covariate was hunger, which predicted calories consumed ( $\beta = .250$ ,  $p = .015$ ). All effects reported remain significant when the above variables were included as covariates. Consequently, we report results from only the first series of analyses here, based on perceived weight. Table 1 reports correlations among outcome variables within the threat and no threat conditions.

*Calories consumed*

Eighty-seven percent of participants ( $n = 81$ ) consumed some food. Analysis of total calories consumed revealed the predicted perceived weight  $\times$  condition interaction,  $\beta = .33$ ,  $p = .02$ . Neither the main effect of perceived weight ( $\beta = .03$ ,  $p = .80$ ) nor the main effect of condition ( $\beta = .12$ ,  $p = .27$ ) was significant. As shown in Fig. 1, among women in the weight stigma (threat) condition, perceived weight was positively related to calories consumed ( $\beta = .29$ ,  $p = .058$ ). However, among women in the smoking (control) condition, perceived weight was unrelated to calories consumed, ( $\beta = -.20$ ,  $p = .16$ ). We further probed the interaction by computing the difference between the two simple regression lines at one SD above (5.38) and below (3.48) the mean of perceived weight. As predicted, women who perceived themselves as above average in weight consumed significantly more calories in the threat condition than in the control condition ( $b = 81.26$ ,  $\beta = .37$ ,  $p = .02$ ). In contrast, calorie consumption of women who did not think they were overweight did not differ significantly between the threat and control conditions ( $b = -27.00$ ,  $\beta = -.12$ ,  $p = .40$ ). Effects were the same when we examined grams rather than calories consumed.

*Self-efficacy for dietary control*

Analysis of self-efficacy for dietary control also revealed a significant perceived weight  $\times$  condition interaction,  $\beta = -.437$ ,  $p = .002$ . Neither the main effect of perceived weight ( $\beta = -.15$ ,  $p = .17$ ) nor the main effect of condition ( $\beta = .001$ ,  $p = .99$ ) was significant. As shown in Fig. 2, among women in the threat condition, perceived weight was significantly and negatively related to self-efficacy for dietary control,  $\beta = -.50$ ,  $p = .001$ . In contrast, among women in the control condition, perceived weight was unrelated to self-efficacy,  $\beta = .15$ ,  $p = .28$ . Looked at another way, self-perceived overweight women (+1 SD on

<sup>3</sup> We also conducted our analyses including ethnicity of participant as an additional factor. Because of small sample sizes among ethnic minorities, we coded ethnicity as White vs non-White. These analyses revealed no interactions between ethnicity, perceived weight, and condition on any outcome variable, all  $ps > .31$ . Hence results are reported collapsed over ethnicity.

**Table 1**  
Correlations among outcome variables within condition.

	1	2	3	4	5	6
1. Total calories		-.22	.19	-.05	.01	.06
2. Self-efficacy for dietary control	-.05		-.41**	-.15	.09	-.02
3. Weight stigma concerns	.09	-.01		.03	.02	.10
4. Video nervousness	-.16	.00	-.13		.44**	.65**
5. Audio nervousness	-.12	.09	-.04	.28†		.23
6. Shame	-.16	-.08	-.13	.66*	.38*	

Note. Correlations within the weight stigma condition are shown above the diagonal and those for the control condition are shown below the diagonal.

\*\*  $p < .01$ .

\*  $p < .05$ .

†  $p < .06$ .

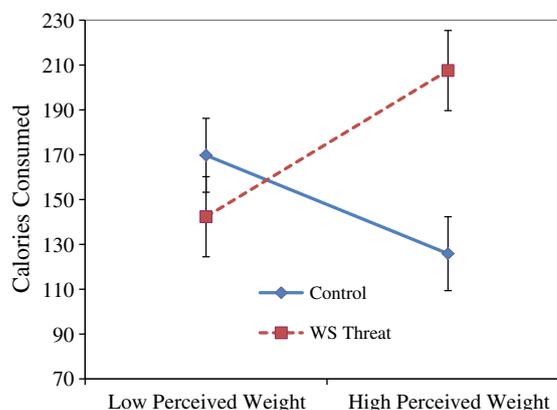
perceived weight) had significantly lower self-efficacy for controlling their diet if exposed to the threat message than the control message, ( $\beta = -.32$ ,  $p = .027$ ). In contrast, women who did not think they were overweight (-1 SD on perceived weight) had significantly higher self-efficacy for controlling their diet in the threat condition than in the control condition ( $\beta = .32$ ,  $p = .028$ ). Because self-efficacy was assessed after consumption, we conducted moderated-mediation analyses (Muller, Judd, & Yzerbyt, 2005) to examine whether calories consumed mediated the Condition  $\times$  Perceived weight interaction for self-efficacy. They did not.

*Weight stigma concerns*

Analysis of weight stigma concerns revealed that the more women perceived themselves to be overweight, the more concerned they were about being a target of weight stigma,  $\beta = .50$ ,  $p < .001$ . In addition, women who read the weight-stigmatizing article were significantly more concerned about being a target of weight stigma ( $M = 3.43$ ) than women who read the control article ( $M = 3.03$ ),  $\beta = .24$ ,  $p < .05$ . Contrary to predictions, the perceived weight  $\times$  condition interaction was not significant,  $\beta = .12$ ,  $p = .35$ . However, planned contrasts indicated that women in the threat condition who thought they were overweight (rated themselves 5 or above) reported significantly higher weight stigma concerns than all other groups, ( $t(89) = 3.27$ ,  $p < .002$ ). Moderated-mediation analyses revealed that self-reported weight stigma concerns did not mediate the Condition  $\times$  Perceived weight interaction for either calories consumed or self-efficacy for dietary control.

*Speech coding*

Analyses of speech quality and support for the policy described in the article revealed only one significant effect. Women in the smoking condition expressed greater support for the policy expressed in the



**Fig. 1.** Perceived weight and article content interact to predict calories consumed.

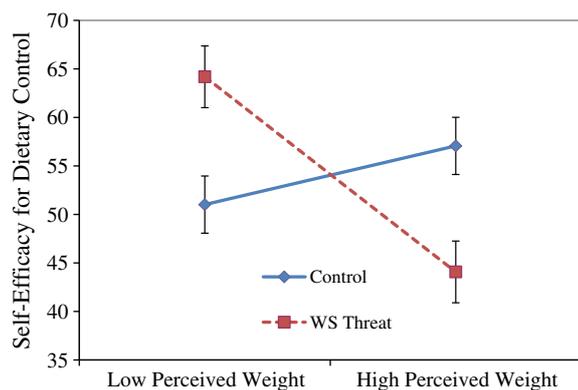


Fig. 2. Perceived weight and article content interact to predict self-efficacy for dietary control.

article than did women in the weight condition ( $\beta = -.45, p < .001$ ). There were no main effects of perceived weight ( $ps > .27$ ) and condition did not interact with perceived weight to predict any speech ratings ( $ps > .18$ ). Separate LIWC analyses of word count, personal pronoun use, and the use of negative affect words also failed to reveal significant effects of condition ( $ps > .08$ ), perceived weight ( $ps > .11$ ), or their interaction ( $ps > .41$ ).

#### Nonverbal behavior coding

Analyses of the silent video clip coding revealed no main effects of either perceived weight ( $ps > .34$ ), or condition ( $ps > .38$ ), and no significant interactions between condition and perceived weight ( $ps > .60$ ). Analysis of the content-filtered speeches for nervousness also revealed no significant main effect of perceived weight ( $p > .45$ ), condition ( $p > .66$ ), or their interaction ( $p > .90$ ).

#### Discussion

This research illustrates that for individuals who perceive themselves to be overweight, media messages that stigmatize obesity not only increase their concerns about being stigmatized because of their weight, but also can have the paradoxical effects of increasing their consumption of calorie-rich food and reducing their feelings of self-efficacy for being able to control their diet. Combined with other recent experiments (e.g., Major et al., 2012; Schvey et al., 2011; Seacat & Mickelson, 2009), this study provides further evidence that environmental cues that signal to individuals who think they are overweight that they are at risk of being negatively stereotyped, devalued, or rejected because of their weight can lead them to experience *social identity threat*. This threat, in turn, can lead them to engage in behaviors that ironically may contribute to obesity.

As predicted, women who perceived themselves as overweight consumed significantly *more* high-calorie snack food (about 80 cal more on average), after reading a news article about the social and economic costs associated with being overweight than they consumed after reading a similar news article discussing the costs associated with a stigma that was not self-relevant. This increased calorie intake in response to social identity threat represents approximately 4% of the 2000 calorie daily intake recommended for the average adult (U.S. Department of Agriculture and U.S. Department of Health & Human Services, 2010). Calorie consumption of women who did not think they were overweight did not differ between article conditions. Also as predicted, self-perceived overweight women felt significantly *less* capable of controlling their food intake after reading the weight-stigmatizing article than the control article. This latter finding is consistent with prior evidence that activating weight-related stereotypes can decrease self-efficacy for diet and exercise among overweight women (Seacat &

Mickelson, 2009). Notably, effects in the current study were observed both with and without controlling for potentially confounding variables such as hunger, dietary restraint, and self-esteem.

Surprisingly, we observed basically no effects of perceived weight or condition or their interaction in our analyses of speech content and quality, or our analyses of nonverbal displays of anxiety or nervousness expressed either in body or voice. One possible reason for this could be that self-perceived overweight participants engaged in compensatory behavior to make a better impression, resulting in them appearing just as composed in talking about a weight-stigmatizing article as other participants (Miller & Kaiser, 2001). However, the design of the present study makes it difficult to disentangle successful compensation in response to identity threat from merely a lack of threat. Another potential reason for the lack of observed effects on verbal or nonverbal behavior could be that participants were simply asked to describe an article, a task that may have overly constrained what participants said and how they said it. Paradigms that afford participants greater freedom to alter the content of their speech (and thus greater ability to alter impressions made of them) would be better suited to address the extent to which weight-based identity threat results in behavioral compensation. A third possibility could be that our manipulation of identity threat taxed the executive resources of self-perceived overweight individuals without being sufficiently stressful to produce noticeable differences in nervousness. Although social identity threat has been shown to both increase stress and decrease executive resources, both are not necessary to produce adverse effects. Indeed, many studies have shown that subtle cues in the environment that do not produce measurable increases in stress response (e.g., indicating one's race or gender prior to taking an exam) can nonetheless impair performance in domains where one's race or gender is negatively stereotyped (e.g., Steele & Aronson, 1995), and deplete executive control resources among negatively stereotyped groups (e.g., Inzlicht & Kang, 2010; Schmader & Johns, 2003). Similarly, the current study suggests that weight stigmatizing messages can lead self-perceived overweight individuals to engage in unhealthy behaviors even in the absence of clear evidence of increased anxiety or stress. This could have occurred due to the depleting effects of these messages on executive control resources. Further research is needed to explore these speculations.

Importantly, significant effects in the current study were associated with *self-perceived* overweight but *not* with objective weight (BMI), despite the fact that these weight indices were significantly correlated. Findings of the current study are thus consistent with evidence that perceived weight, more so than actual weight, increases a person's vulnerability to experiencing weight-based identity threat and the negative health consequences associated with weight discrimination (Hatzenbuehler et al., 2009; Muennig et al., 2008; Schafer & Ferraro, 2011). These findings can be contrasted with those obtained by Schvey et al. (2011) and Major et al. (2012), who found detrimental effects of exposure to weight-stigmatizing situations on self-regulation as a function of women's objective BMI. The overweight women in these latter studies, however, were objectively heavier, on average, than the overweight women in the current study. Because self-classification as overweight increases with actual BMI (Chang & Christakis, 2003), it is likely that the overweight women in the Schvey et al. (2011) and Major et al. (2012) studies also perceived themselves as overweight. Neither study, however, examined the effects of self-perceived overweight on self-regulation. Although further research is needed, we believe that the current study makes an important contribution to social identity threat theory more broadly by indicating that self-classification as a member of a (devalued) social category may be essential to experiencing identity threat based on that category. Individuals who believe they are *not* members of a devalued social category (irrespective of whether they objectively are in the eyes of others or according to government standards) may not experience identity threat associated with that category, even though they may still be targets of discrimination.

We also found that regardless of self-perceived or actual weight, reading a news article about weight stigma heightened women's concerns about being treated poorly because of their weight. Many young women are concerned about becoming overweight even if they do not currently consider themselves to be overweight (LaRose, Gorin, Clarke, & Wing, 2011). Hence, even those who do not think they are overweight may experience increased weight stigma concerns when exposed to messages about the negative consequences associated with being overweight. The effects of perceived weight and message exposure on stigma concerns were additive, such that concerns about weight stigma were highest among women who both perceived themselves as overweight *and* read a message about weight stigma. Although we speculated that self-reported stigma concerns would mediate the effects of identity threat on consumption and self-efficacy, tests of mediation did not confirm this. This is consistent with a large body of research indicating that the negative effects of social identity threat often occur outside of conscious awareness and thus cannot be reported (Schmader et al., 2008).

Unexpectedly, we found that women who did not perceive themselves as overweight reported significantly *greater* self-efficacy for controlling their diet after reading the weight-stigmatizing article than the control article. That is, exposure to a weight-stigmatizing message appeared to *boost* their self-efficacy for controlling their diet. One possible explanation for this finding could be that increased feelings of self-efficacy for dietary control were post hoc rationalizations of decreased food consumption, since self-efficacy was measured after eating. However, women who did not consider themselves to be overweight did not eat less in the weight stigma condition than the control condition, and self-efficacy was unrelated to food consumption. Another possibility could be that weight-stigmatizing messages functioned like a fear appeal for women who did not consider themselves to be overweight. Increasing fear of weight stigma may have increased their motivation to avoid becoming overweight and strengthened their perceived ability to do so. Yet another possibility could be that weight-stigmatizing messages evoked downward-comparisons among those who did not perceive themselves as overweight (e.g. unlike them, I am not overweight), thereby reinforcing their self-efficacy (so I must be good at controlling my eating). These speculations merit further research.

Prior research has shown that strategies that are effective for achieving primary prevention (preventing new cases of a disorder from arising) may work in opposition to those that are effective for achieving secondary prevention (reduction of a disorder; Mann et al., 1997). Drawing on this work, a provocative implication of our study is that whereas weight stigma may contribute to weight gain among those who already perceive themselves to be overweight, it may deter weight gain among those who do not. This may explain the intuitive appeal of stigma as a motivational tool: among those who are not overweight and who have a hard time understanding what it is like to be overweight, stigma feels like it would help strengthen other people's resolve to eat less since it strengthens their own. Future research is needed on this important issue.

### Limitations

Generalization of our findings is limited in part by our sample restriction to young women. We focused on young women because women and younger individuals are more vulnerable to weight stigma than men and older individuals (Azarbad & Gonder-Frederick, 2010). Because most past research on the consequences of experiencing weight stigma has focused on women, however, it is important for future research to examine whether men show similar effects. Another limitation is our request that participants not eat for 2 h prior to the study. Although this is a common feature of laboratory studies where eating is used as a measure of self-regulatory depletion, this may have increased participants' hunger and the appeal of snack foods. Future research should examine whether similar effects occur when participants

have not refrained from eating. Finally, this study examined only short term effects of brief exposure to weight stigmatizing messages. Future research should examine the effects of long-term exposure to weight stigma on eating and self-control.

### Implications

This research has important implications for public health campaigns that aim to reduce obesity. As noted at the beginning of this article, some scholars assert that stigmatizing individuals who are obese may be necessary to reduce obesity (e.g., Callahan, 2013). Some policies and campaigns designed to combat obesity portray overweight and obese individuals negatively. For example, Georgia's "Strong4Life" campaign to combat childhood obesity prominently features advertisements portraying fat children as unhappy; other states send heavy children home with "BMI report cards" (Vogel, 2011); and the Boy Scouts of America recently placed BMI restrictions for boys participating in the Boy Scout Jamboree (Leitsinger, 2013). Although it may not be their primary intent, such programs increase stigmatization of overweight individuals (Puhl, Peterson, & Luedicke, 2012). Furthermore, we would argue that such programs are likely to increase the extent to which self-perceived overweight individuals experience weight-based identity threat. Consequently, public health campaigns aimed at reducing obesity but that stigmatize overweight and obese individuals may have negative psychological and behavioral consequences that ultimately can impair their efforts at weight control.

### Appendix A

#### [Lose Weight/Quit Smoking] or Lose Your Job

Doctors have established that being [**overweight/a smoker**] is bad for your health. People who [**are overweight/smoke**] are at an increased risk of contracting [**diabetes/lung cancer**] and heart disease. [**Being overweight/smoking**] also affects a person's joints, breathing, sleep, mood and energy levels.

But there now is another risk to being [**fat/a smoker**]: it could cost you a job.

An increasing number of U.S. companies are considering [**weight/smoking**] as a factor in employment. People who [**are overweight/smoke**] are being denied jobs, or in some cases, fired.

The reason? Employees who [**are overweight/smoke**] are bad for the bottom line.

Mark V. Roehling, an Associated Professor at the School of Labor and Industrial Relations at Michigan State University, concluded that decades of studies show "consistent evidence" that [**being overweight/smoking**] can affect a person's job options.

One reason is that in these days of tightened budgets, some employers do not want to be burdened with higher health insurance costs. [**Heavy weight employees/Employees who smoke**] cost two to four times more in insurance premiums than [**average-size/non-smoking**] employees.

[**Excess weight/smoking**] can also interfere with job performance. Physical fitness is important for any job that requires strenuous physical activity. Policemen, fireman, and military personnel must be physically fit in order to perform their jobs effectively. Even working in a grocery store requires stocking shelves and hauling heavy boxes. Working a retail store requires being able to stand on one's feet for a long period of time. Thus, *the Labor Law Journal* concludes that physical limitations are a legitimate reason not to hire people who [**are overweight/smoke**].

[**Overweight employees/Employees who smoke**] may also decrease profit in another way: They may be bad for the company's image.

Employers think that [**"people of size," as Mr. Roehling terms the obese,smokers**] are weak-willed and too unattractive to interact with customers. A study done by Dennis Clayson, a Professor at the University of Northern Iowa, confirms this. He showed that people believe stores that have [**overweight sales associates/sales associates who**

smoke] are less well managed and less successful than are stores with [average size/non-smoking] sales associates. Another study found that employers believe that customers do not want to do business with [over-weight people/people who smoke].

Thus, as health insurance costs have skyrocketed and the economy has tightened, companies are fighting back by refusing to hire people who cannot [get their weight in the normal range/quit smoking].

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