Weight location moderates weight-based self-devaluation and perceived social devaluation in women

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Abstract (147/150)

Overweight and obese (“heavyweight”) people devalue themselves because, it has been proposed, they are socially devalued. However, for women, social valuation depends not only on how much weight they carry but where on their bodies they carry it. Here, we investigate whether weight-based self-valuation and perceived social valuation also depend on body shape. Study 1, using a nationally-representative sample from NHANES (N=1,093 reproductively-aged women), showed that, controlling for body fat, weight labeling (by self and others) and wanting to lose weight depended on weight location. Study 2, in a direct test of predictions using an undergraduate sample of women (N=215), showed that with increased body fat, women with an abdominal weight distribution reported more self-devaluation (e.g., lower self-esteem) and perceived social devaluation (e.g., higher perceived weight discrimination); women with a gluteofemoral weight distribution, however, were shielded—partially or fully—from these adverse effects of increased body fat.

Keywords: Weight Stigma; Devaluation; Self-Esteem; Waist-to-Hip Ratio (WHR); Body Shape

In the U.S., how women think and feel about themselves is predicted by their weight. Overweight and obese—henceforth “heavyweight”¹—women devalue themselves: they have lower body image satisfaction, view themselves as less physically attractive, and have lower self-esteem (Grabe & Hyde, 2006; Miller & Downey, 1999; Schwartz & Brownell, 2004). Heavyweight may also adversely correlate with global psychological health and well-being (Major et al., 2018). For example, heavyweight women have a higher prevalence of eating disorders (Brenchley & Quinn, 2016) and segments of this population may also have worse psychological health outcomes, such as anxiety and depression (Friedman & Brownell, 1995; Scott et al., 2008). As over 80% of adult women in the U.S. are heavyweight (Fryar, Carroll, & Afful, 2020), a nuanced understanding of the causes of weight-based self-devaluation would have important theoretical and applied implications.

Although several pathways have been proposed to explain the association between heavyweight and self-devaluation, most focus on social devaluation: it has been proposed that, through reflected appraisal processes (e.g., Cooley, 1902, Mead, 1934), heavyweight people may come to devalue themselves because others devalue them (e.g., Puhl & Brownell, 2001; Major et al., 2018; Rubino et al. 2020). Recent research demonstrates, however, that weight-based social devaluation is predicted not only by weight amount but also by body shape—whether the weight is located in the abdominal (waist) versus gluteofemoral (hips, buttocks, thighs) regions (Krems & Neuberg, 2021).

¹ Weight stigma researchers, medical professionals, and activists debate the most ethical language to use. One view advocates for person-first language when using terms like “heavyweight” (e.g., “people with heavyweight”), arguing that it is less pejorative than alternatives (e.g., Ravussin & Ryan, 2015); another view suggests that person-first language can be “medicalizing” (e.g., Meadows & Daníelsdóttir, 2016). We recognize that each approach seeks both scientific clarity and compassion. We adopt the second convention (“heavyweight people”), but note that it may one day be deemed less than ideal.

Here, integrating evolutionary and biomedical literatures on fat with social psychological literatures on weight stigma and body image, we investigate the thesis that, above and beyond weight amount, weight-based devaluation depends on body shape—specifically, that gluteofemoral weight distributions partially protect heavyweight women against weight-based self-devaluation and perceived social devaluation.

The evolutionary literature has long recognized that how women are socially perceived is predicted not only by how much weight they carry but by whether they carry it in their abdomen or gluteofemoral region. However, because of the interest in romantic partner choice in this literature—given the importance of romantic partner choice to reproductive fitness—it has focused nearly exclusively on how males assess female attractiveness from their weight distribution. In contrast, the weight stigma and body image literatures, which do focus on how women think and feel about themselves, consider “body shape” an important predictor of self-valuation but tend to ambiguously operationalize it and rely on self-reports rather than direct measurement.² Our approach integrates these largely independent literatures by focusing on the targets themselves (rather than social perceivers), bringing conceptual and methodological precision to our operationalization and measurement of weight location, and querying a range of perceived social and self-devaluation outcomes.

Beyond weight amount to weight location

The literature on weight-based social devaluation has primarily focused on weight *amount*. Heavyweight people—especially women—are negatively stereotyped, stigmatized, and

² For example, one item from the widely used Eating Disorder Examination self-report questionnaire (Fairburn & Beglin, 1994; Fairburn & Cooper, 1993) reads “Over the past four weeks have you been dissatisfied with your overall shape [your figure]?”, thereby leaving what “shape” or “figure” mean unspecified.

discriminated against in a range of life situations: they are more likely to be bullied in school, are viewed as less desirable as romantic partners and friends, receive fewer educational and career opportunities, and may receive worse quality care from medical professionals (e.g., Brewis et al., 2011; Crandall, 1994; Crandall & Schiffhauer, 1998; Crandall, Nierman, & Hebl, 2009; Puhl & Brownell, 2001).

Receiving less attention, however, are findings showing that, above and beyond weight amount, weight *location* (i.e., body shape) also affects at least one form of social valuation—perceptions of physical attractiveness. Specifically, women with lower waist-to-hip ratios (WHRs)—that is, more weight distributed in the hips, thighs, and buttocks, as compared to the waist or abdomen—are viewed across societies as more physically attractive than women with higher WHRs (Andrews et al., 2017; Brown & Konner, 1987; Lassek & Gaulin, 2018a, 2018b, 2019; Marlowe et al., 2005; Singh, 1993; Singh & Luis, 1995; Sugiyama, 2004).

The literature on body shape and social perceptions of physical attractiveness is grounded in findings suggesting that fats located in different regions of the body serve distinct biological functions. Specifically, fat on the hips, thighs, and buttocks—the gluteofemoral region—provides a special functionality for reproductively-aged women: it is a store of reproductively-crucial fatty acids that are differentially mobilized during late pregnancy and lactation for baby brain growth (e.g., Lassek & Gaulin, 2006; Jasienska, 2013). A high ratio of gluteofemoral to abdominal fat (i.e., low WHR) in women is predictive of youth and nulliparity (i.e., never having given birth) and therefore, it has been argued, of future reproductive potential (i.e., expected number of future offspring) (Andrews et al., 2017; Butovskaya et al., 2017; Lassek & Gaulin, 2018a, 2018b, 2019; Symons, 1979, 1995). A high ratio of gluteofemoral to abdominal fat also predicts better post-partum health for the mother and better cognitive development for children

(Gaulin & Lassek, 2008, 2015), and may partially protect women from a range of physical diseases linked to heavyweight (e.g., cardiovascular disease, Type 2 diabetes; Janssen, Katzmarzyk, & Ross, 2004; Manolopoulos, Karpe, & Frayn, 2010).

Recently, Krems and Neuberg (2021) investigated potential independent and interactive effects of weight amount and location on social devaluation. In several studies, and across countries and U.S. subpopulations, participants evaluated figural stimuli of women systematically varying in weight amount (labeled average-weight, overweight, and obese) and location (gluteofemoral versus abdominal). On measures of stigma, observers more strongly devalued reproductively-aged overweight and obese women when those women carried their weight in the abdomen as compared to the gluteofemoral region—even though the figures were created to be of similar overall weights. The effect of weight location was so pronounced that, in some cases, observers more strongly devalued lower-weight women with an abdominal weight distribution than higher-weight women with a gluteofemoral weight distribution.

Thus, to the extent that weight-based social valuation of women depends on weight amount and body shape, and that weight-based self-valuation is at least partially caused by weight-based social valuation, then weight-based self-valuation should depend on weight amount and body shape. Specifically, two hierarchically nested possibilities are compatible with our model: (1) two main effects of weight amount and body shape, such that, controlling for weight amount, body shape will predict self-devaluation, and (2) an interaction of weight amount and body shape, such that women with weight distributed in the abdominal region increasingly devalue themselves with higher weight, whereas women with weight distributed in the gluteofemoral region are protected somewhat against this increase in self-devaluation with higher weight. Although we favor the interaction prediction, we hierarchically test the effects of

weight amount only (the standard model in the weight stigma literature), the additive effects of weight amount and body shape, and the interaction between weight amount and body shape.

Study 1 is designed to establish the importance of this model: it focuses on available indices of weight labeling in a large and nationally-representative archival dataset of reproductively-aged women, leveraging findings that weight labeling can be a precursor to valuation (e.g., Link & Phelan, 2001). Study 2, using an undergraduate sample of young adult women and direct operationalizations of the focal constructs, provides direct tests of whether weight location, additively or interactively with weight amount, predicts self-valuation and perceived social valuation.

We also explore whether this model predicts mental health (Studies 1-2) and well-being (Study 2). We find only very weak evidence of this. See Supplements for details.

Study 1

Method

Data set. The National Health and Nutrition Examination Survey (NHANES), a program of the National Center for Health Statistics, interviews nationally representative cross-sections of the U.S. population in two-year cycles. NHANES data include surveys (e.g., demographic, physical and mental health, medical history), a medical examination, body measurements (including anthropometrics and body composition analyses), and laboratory tests. We used the 2017-18 wave because it included a needed measurement of hip circumference (waist circumference data were included in all waves).

Participants. The sample was $N = 1,093$ reproductive-aged women (operationalized as 15- to 49-year-olds, following Lassek & Gaulin, 2019); mean age = 30.81, $SD = 10.67$; 33% White, 18% Black, 17% Mexican American, 8% Other Hispanic, and 23% Other non-Hispanic race/ethnicity including “mixed.” Women who could not safely be administered the whole-body dual-energy x-ray absorptiometry (DXA) scan (e.g., women pregnant at the time of the examination) were excluded. See NHANES 2017-18 documentation for full details of DXA exclusions (CDC, 2018a).

A sensitivity analysis using G*Power version 3.1.9.3 (Faul et al., 2009) showed that this sample is large enough to detect with power = 95% and alpha = 5% a 2-way interaction in a linear multiple regression with a small effect of $f^2 = 0.02$ (corresponding to $R^2 = 0.02$) (see Cohen, 1988, p. 412).

Fat amount. Fat amount was operationalized by fat percentage, calculated from whole body DXA scans (e.g., Heymsfield et al., 1989). Hologic Discovery model A densitometers (Hologic, Inc., Bedford, Massachusetts) were used, using software version Apex 3.2. DXA scans were administered by trained and certified radiology technologists and analyzed with Hologic APEX version 4.0 software with NHANES BCA option. See NHANES 2017-18 documentation for full details of the DXA examination protocol (CDC, 2018a).

Fat location. Fat location was indexed by the ratio of waist-to-hip circumferences (WHR). Waist circumference, used to approximate abdominal fat, was measured right above the iliac crest. Note that most studies in the literature on WHR and judgments of female attractiveness instead measure waist circumference at the narrowest region between the ribs and the iliac crest. Lassek and Gaulin (2019, pp. 411-412) present a conversion between these two measurement standards. Hip circumference, used to approximate gluteofemoral fat, was

measured at the region of the greatest protrusion of the buttocks. Full details of the anthropometric examination protocol are available in the NHANES 2017-2018 documentation (CDC, 2018b).

Fat percentage and WHR were correlated at $r = .49$ ($p < .001$). Fat percentage and WHR distributions for this sample are shown in Figure 1.

Figure 1. Density plots of (A) fat percentage calculated using whole body dual-energy x-ray absorptiometry (DXA) scans, and (B) ratios of waist-to-hip circumferences (WHRs). Vertical dotted lines mark the density distribution at the mean and at $\pm 1SD$. NHANES data. $N = 1,052$. Women, reproductive-aged (mean age = 30.81, $SD = 10.67$, range 15-49).

Weight labeling. Participants reported on whether healthcare professionals label them as overweight and on whether they label themselves as overweight with two interview questions: “Has a doctor or other health professional ever told you that you are overweight?” (1 = Yes, 0 = No) and “Do you consider yourself now to be overweight, underweight, or about the right weight?” (coded as 1 = “overweight” and 0 = “about the right weight”; “underweight” responses were excluded from this analysis).

Wanting to weigh less. Participants reported whether they wanted to weigh less with the interview question: “Would you like to weigh more, less, or stay about the same?” (coded as 1 = “less” and 0 = “stay about the same”; “more” responses were excluded from this analysis).

Results and Discussion

The fit of four hierarchical statistical models were sequentially compared for each dependent variable using log-likelihood tests: (1) the null model ($DV \sim 1$), (2) the main effect of fat percentage ($DV \sim \text{Fat } \%$), (3) the main effects of fat percentage and WHR ($DV \sim \text{Fat } \% + \text{WHR}$), and (4) the main effects and two-way interaction of fat percentage and WHR ($DV \sim \text{Fat } \% * \text{WHR}$). The binary dependent variables were analyzed using generalized linear models with binomial (logit) distributions (Figures 2A-2C). See Tables S1-S6 for full model summaries and model comparisons.

Figure 2. Study 1 logistic regressions displaying, as a function of fat percentage and WHR, (A) reported weight labeling by healthcare professionals, (B) self-weight labeling, and (C) wanting to

weigh less. Vertical dotted lines mark fat percentage at the mean and at $\pm 1SD$. The shaded areas around each regression line mark the 95% CIs.

The model including the main effects of fat percentage and WHR (model 3) showed the best fit for each dependent variable. Compared to the model including the main effect of fat percentage only (model 2), adding the main effect of WHR significantly improved model fit for all dependent variables; adding the interaction term (model 4) did not significantly improve model fit for any dependent variable. Fat percentage and WHR both significantly predicted whether participants reported that healthcare professionals view them as overweight ($b_{\text{fat}} = 0.20$, 95% CI [0.17, 0.23], $b_{\text{WHR}} = 5.41$, 95% CI [3.09, 7.76], $p < 0.001$), whether they view themselves as overweight ($b_{\text{fat}} = 0.25$, 95% CI [0.22, 0.29], $b_{\text{WHR}} = 6.91$, 95% CI [4.33, 9.54], $p < 0.001$), and whether they would like to weigh less ($b_{\text{fat}} = 0.21$, 95% CI [0.17, 0.24], $p < 0.001$; $b_{\text{WHR}} = 3.99$, 95% CI [1.23, 6.80], $p = 0.005$).

The three dependent variables are displayed in Table 1 at mean fat percentage (38%) and at three levels of WHR: high ($+1SD$; 0.94), average (0.87), and low ($-1SD$; 0.80). The percent of women reporting that healthcare professionals viewed them as overweight increased by 73% from one standard deviation below to one standard deviation above mean WHR, and the percent of women who viewed themselves as overweight increased by 62% in this WHR range. The percent of women who said they would like to weigh less increased by 14% in this WHR range.

Table 1. Study 1 dependent variables at mean fat % and at low (-1SD), mean, and high (+1SD) waist-to-hip ratio (WHR).

Dependent Variable	Low WHR	Mean WHR	High WHR
1. Has a doctor ever told you that you are overweight? (Y/N)	22%	29%	38%
2. Do you consider yourself now to be overweight? (Y/N)	39%	51%	63%
3. Would you like to weigh less? (Y/N)	71%	77%	81%

Note. N = 1,093. Mean fat % = 38%. Mean WHR = 0.87 (SD = 0.07). All models are the main effects of fat % and WHR.

Thus, as expected, *controlling for fat amount*, women with relatively more weight in the abdominal as compared to the gluteofemoral region (i.e., high WHR) were more likely to report that healthcare professionals label them as overweight and to label themselves as overweight, and reported wanting to weigh less.

Study 1 demonstrates, within a large nationally representative sample, that women view themselves differently depending on whether their weight is distributed in the abdominal versus gluteofemoral regions. Study 2 directly tests our integrative weight amount and location model, moving from weight labeling to self-devaluation and perceived social valuation.

Study 2

Method

Participants. Two hundred and thirty-nine participants—all the female participants available for this study during the 2018-19 academic year—were recruited from the undergraduate psychology subject pool at a large southwestern university. Twenty-three participants were removed for having incomplete fat percentage and/or WHR data; one

participant was removed for identifying as “transgender or transsexual,” as our predictions depend on sexually dimorphic differences in fat percentage and fat distribution; no participants reported being pregnant at the time of the study. All women were of reproductive age (mean age = 18.87, $SD = 1.06$, range 18 to 24). Krems and Neuberg (2021) find that weight location has the largest effect on stigma for women in this age group (compared to older reproductive-aged women or to pre- or post-reproductive women); given that current theory focuses on weight-based social devaluation as a cause of weight-based self-devaluation, this college-aged sample is ideal for testing our predictions. In the final sample of $N = 215$, 46% of participants identified as White, 19% as Hispanic, 8% as Black or African American, 10% as East Asian, 5% as South Asian, 4% as Southeast Asian, 2% as Middle Eastern, and 7% as "Other." As part of a multi-study session, participants completed a battery of surveys and subsequently had their body composition and anthropometrics measured.

A sensitivity analysis using G*Power version 3.1.9.3 showed that this sample is large enough to detect with power = 95% and alpha = 5% a 2-way interaction in a linear multiple regression with a small-to-medium effect of $f^2 = 0.08$ (corresponding to $R^2 = 0.08$).

Fat amount. Fat amount was again operationalized by fat percentage, collected using a SECA medical Body Composition Analyzer (mBCA) 514, an 8-point bioelectrical impedance device. Body composition data were analyzed using SECA analytics 115 software (Bosy-Westphal et al., 2013, 2017).

Fat location. Fat location was again indexed by the ratio of waist-to-hip circumferences (WHR), measured by a trained same-sex research assistant. The anthropometric data collection protocol was closely modeled after the 2017-18 wave of NHANES (see Study 1 for details).

Fat percentage and WHR were correlated at $r = .34$ ($p < .001$). Fat percentage and WHR distributions for this sample are shown in Figure 3.

Figure 3. Density plots of (A) fat percentage calculated using an 8-point bioelectrical impedance device, and (B) ratios of waist-to-hip circumferences (WHRs). Vertical dotted lines mark the density distribution at the mean and at $\pm 1SD$. $N = 215$, young adult women (mean age = 18.87, $SD = 1.06$, range 18 to 24).

Self-devaluation. Self-devaluation was assessed in three ways: First, self-reported physical attractiveness was assessed using the single question, “How physically attractive are you, compared to the average same-sex individual of your approximate age?” (0 = Much less attractive than average, 50 = About average, 100 = Much more attractive than average). Second, body image satisfaction was assessed using the 6-item Body Image States Scale (BISS) (Cash et al., 2002). BISS includes items such as “Right now I feel _____ with my body size and shape” (1 = Extremely Dissatisfied to 9 = Extremely Satisfied); items were mean averaged (Cronbach’s $\alpha = .91$). Third, self-esteem was assessed using the Single-Item Self-Esteem Scale (Robins,

Hendin, & Trzesniewski, 2001): "I have high self-esteem" (1 = Not very true of me, 5 = Very true of me).

Perceived social devaluation. Perceived social devaluation was assessed with both the 5-item Perceived Weight Discrimination (PWD) scale and the 5-item Weight Stigma Concerns (WSC) scale (both from Hunger & Major, 2016). The PWD scale opens with: "In the past 12 months, how often have..." and it includes items such as "...you been teased or harassed because of your weight?" (1 = Never, to 5 = All the time); items were mean averaged (Cronbach's alpha = .91). The WSC scale includes items such as "I am afraid that other people will reject me because of my weight" (1 = Strongly disagree, to 7 = Strongly agree); items were mean averaged (Cronbach's alpha = .94).

Results and Discussion

The fit of four hierarchical statistical models was sequentially compared for each dependent measure using log-likelihood tests. All dependent measures were analyzed using linear models. The model including the two main effects of fat percentage and WHR and their interaction (Model 4) showed the best fit for the self-devaluation and social devaluation outcomes, compared to both the model including the main effect of fat percentage only (Model 2) and the model including the main effects of fat percentage and WHR but not their interaction (Model 3). See Table 2 for comparisons of the variance explained (R^2) by these three models. See Tables S9-S18 for full model summaries and model comparisons.

Table 2. Study 2 variance explained (R^2) by fat % (Model 2), fat % + WHR (Model 3), and fat % * WHR (Model 4)

Outcome	R^2			Model Comparisons (Chi-Square Tests)	
	Model 2	Model 3	Model 4	Model 4 vs. Model 2	Model 4 vs. Model 3
Self-Valuation					
Attractiveness (Self-Reported)	4%	9%	14%	$p < .001$	$p < .001$
Body Image States Scale (BISS)	8%	9%	10%	$p = 0.035$	$p = 0.063$
Self-Esteem (Single-Item)	0%	1%	4%	$p = 0.013$	$p = 0.011$
Perceived Social Valuation					
Perceived Weight Discrimination (PWD)	7%	7%	11%	$p = 0.011$	$p = 0.003$
Weight Stigma Concerns (WSC)	15%	16%	17%	$p = 0.056$	$p = 0.088$

Specifically, the interaction between fat percentage and WHR was statistically significant for two of the three self-devaluation measures: self-reported physical attractiveness ($b_{\text{fat}} = 6.14$, 95% CI [2.17, 10.11], $p = .003$; $b_{\text{WHR}} = 156.89$, 95% CI [5.77, 308.01], $p = .042$; $b_{\text{int.}} = -7.48$, 95% CI [-12.06, -2.90], $p = .001$) and self-esteem ($b_{\text{fat}} = 0.27$, 95% CI [0.06, 0.47], $p = .013$; $b_{\text{WHR}} = 7.92$, 95% CI [0.00, 15.84], $p = .050$; $b_{\text{int.}} = -0.31$, 95% CI [-0.55, -0.07], $p = .012$); it did not reach statistical significance for body image satisfaction ($b_{\text{fat}} = -0.12$, 95% CI [-0.07, 0.57], $p = .118$; $b_{\text{WHR}} = 7.71$, 95% CI [-4.39, 19.82], $p = .211$; $b_{\text{int.}} = -0.35$, 95% CI [-0.71, 0.02], $p = .064$). See Figures 4A-C for model plots.

Figure 4. Study 2 linear regressions displaying, as a function of fat percentage, WHR, and their interaction, (A-C) estimates of women’s self-devaluation (self-reported physical attractiveness, body image satisfaction, and self-esteem) and (D-E) perceived social devaluation (perceived discrimination and concerns about weight stigma). Vertical dotted lines mark fat percentage at the mean and at $\pm 1SD$. The shaded areas around each regression line mark the 95% CIs.

Unpacking these interactions with simple slope analyses (reported here at $\pm 1SD$), we find that with increased fat percentage, women with high WHRs (an abdominal fat distribution) felt less physically attractive (estimate = -0.67, $p = .001$) and were less satisfied with their bodies (estimate = -0.06, $p < .001$), whereas women with low WHRs (a gluteofemoral fat distribution) were shielded from such self-devaluation (self-reported physical attractiveness: estimate = 0.21, $p > .250$; body image satisfaction: estimate = -0.02, $p > .250$). Although neither of the simple

slopes for self-esteem reached statistical significance, women with high WHR tended to have lower self-esteem (estimate = -0.02, $p = .155$), whereas women with low WHRs tended to have higher self-esteem (estimate = 0.02, $p = .092$). See Supplementary Materials for full details of the simple slope analyses. Thus, women with a gluteofemoral weight distribution seem to be protected from the self-devaluation associated with heavyweight. Self-reported physical attractiveness showed the clearest effect, with the interaction and simple slopes all reaching statistical significance; somewhat more mixed, analyses of body image satisfaction revealed a statistically nonsignificant interaction but statistically significant simple slopes, and analyses of self-esteem revealed a statistically significant interaction but statistically nonsignificant simple slopes.

Further, regarding perceived social devaluation, the interaction between fat percentage and WHR was statistically significant for perceived weight discrimination ($b_{\text{fat}} = -0.18$, 95% CI [-0.31, -0.04], $p = .009$; $b_{\text{WHR}} = -6.91$, 95% CI [-12.03, -1.79], $p = .008$; $b_{\text{int.}} = 0.23$, 95% CI [0.08, 0.39], $p = .004$); it did not reach statistical significance for concerns about weight stigma ($b_{\text{fat}} = -.21$, 95% CI [-0.55, 0.12], $p = .205$; $b_{\text{WHR}} = -7.28$, 95% CI [-19.93, 5.38], $p = .258$; $b_{\text{int.}} = 0.33$, 95% CI [-0.05, 0.71], $p = .090$). See Figures 4D-E for model plots.

Unpacking these interactions with simple slope analyses (reported here at $\pm 1SD$), we find that with increased fat percentage, women with high WHRs (an abdominal fat distribution) perceived more weight discrimination (estimate = 0.03, $p < .001$), whereas women with low WHRs (a gluteofemoral fat distribution) were shielded from such perceived social devaluation (estimate = 0.00, $p > .25$). Similar trends were found for concerns about weight stigma (higher WHR estimate = 0.09, $p < .001$; low WHR estimate = 0.05, $p = .016$). See Supplementary Materials for full details of the simple slope analyses. Thus, as predicted, we find evidence on

one measure and suggestive evidence on another that women with a gluteofemoral weight distribution may be somewhat protected from the perceived social devaluation associated with increased fat amount.³

Overall, then, weight location interacted with fat amount to predict self-devaluation and perceived social devaluation. Whereas for women whose weight is distributed toward the abdominal region, increased fat amount predicted increased self-devaluation and perceived social devaluation, women whose weight is distributed toward the gluteofemoral region were shielded—partially or fully, depending on the outcome—from such adverse effects.

General Discussion

It has been proposed that heavyweight people devalue themselves because they are socially devalued (Puhl & Brownell, 2001; Major et al., 2018). Because social valuation of women depends not only on their overall weight but also on where on their bodies this weight is located (Krems & Neuberg, 2021), how women value themselves should similarly depend on weight location.

Study 1, using a large and nationally-representative U.S. sample of reproductive-aged women, demonstrated that women indeed view themselves differently depending on whether their weight is distributed toward the abdominal versus gluteofemoral region. Specifically, controlling for fat amount, women with weight distributed in the gluteofemoral region as compared to the abdominal region were more likely to report that healthcare providers label them as overweight, label themselves as overweight, and report wanting to weigh less. Because weight

³ We explored the possibility that the observed interactions between body fat and WHR could be due to a curvilinear relationship between body fat and devaluation. As revealed in the Supplement, this is not the case.

labeling can be a precursor to valuation (Link & Phelan, 2001), these archival findings suggested the value of directly testing our integrative model.

Study 2 did this. As predicted, with increasing fat amount, young adult women whose weight was distributed in the abdomen were more likely to devalue themselves (they reported lower attractiveness, and tended to report lower body image satisfaction and self-esteem) and to perceive others as devaluing them (they reported higher perceived weight discrimination and tended to have higher concerns about weight stigma); in contrast, women whose weight was distributed in the gluteofemoral region were somewhat protected from such adverse effects.

Although Study 1 found additive effects of fat amount and body shape whereas Study 2 found an interaction, these are two nested possibilities compatible with the broader conceptual model we have proposed here. Toward explaining the difference between studies, note that responses to the Study 1 measures (e.g., “Do you consider yourself overweight?”) are likely to be constrained by the amount of one’s actual or objective weight, whereas the Study 2 focal measures of self-devaluation and perceptions of social devaluation are highly subjective, thereby better revealing the nuance of the effects of body shape. Future research can explore this explanation further.

Finally, although the literature on weight stigma and discrimination conceptually focuses on fat amount, most studies employ indirect proxies such as Body-Mass Index (BMI). The studies reported here, in contrast, measured fat amount directly. Although fat amount is highly correlated with BMI, the two are not interchangeable. As many have noted, there are problems in using BMI as an index of fat because it does not differentiate fat from fat-free mass such as muscle and bone (Burkhauser & Cawley, 2008; Rothman, 2008). That said, to facilitate comparisons between our studies and others in the weight stigma and discrimination literature,

we present in the Supplementary Materials an analysis of the studies reported here using BMI instead of fat amount (see Tables S35-S58 and Figures S2-S4). Although not all effects reported with fat amount replicate with BMI, the general conclusions about the usefulness of our integrative weight amount and location model remain the same. We take this to be an advantage of using direct measures of fat rather than proxies like BMI.

Conclusion

Heavyweight people devalue themselves, and it has been proposed that this is because they are socially devalued. The current findings show that, although heavyweight predicted increased self-devaluation and perceived social devaluation for women with weight distributed in the abdomen, it generally did not have these adverse effects for women with weight distributed in the gluteofemoral region. As such, these findings highlight who may be uniquely vulnerable to or protected from the social and self-devaluation of heavyweight. The nuanced understanding of the predictors of weight-based self- and social devaluation (real and perceived) afforded by our integrative weight amount and location model is likely to contribute not only to advancing theory but also to more effective practical applications.

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Supplementary Materials for “Weight location moderates weight-based self-devaluation and perceived social devaluation in women”

1. Do weight amount and location predict mental health and well-being?

1.1. Study 1

We explored the possibility that fat amount and weight location can have broader mental health effects using the 9-item Depression Screener Questionnaire (DPQ-9) (Kroenke & Spitzer, 2002; Kroenke et al., 2001). The DPQ-9, which incorporates DSM-IV depression diagnostic criteria (Spitzer et al., 1999), is used to determine the frequency of depression symptoms over the past 2 weeks (0 = "not at all," 1 = "several days," 2 = "more than half the days," and 3 = "nearly every day"). DPQ-9 items were mean averaged (Cronbach's $\alpha = .85$). DPQ-9 data is publicly available for adult participants only, so the age range used for this analysis was 18 to 49.

As in the main text, the fit of four hierarchical statistical models were sequentially compared using log-likelihood tests: (1) the null model ($DV \sim 1$), (2) the main effect of fat percentage ($DV \sim \text{Fat } \%$), (3) the main effects of fat percentage and WHR ($DV \sim \text{Fat } \% + \text{WHR}$), and (4) the main effects and two-way interaction of fat percentage and WHR ($DV \sim \text{Fat } \% * \text{WHR}$). The continuous depression measure was analyzed using linear models. See Tables S7-8 for full model summaries and model comparisons. See Figure 1S for a regression plot of the this dependent measure.

Figure 1S. Study 1 linear regression displaying, as a function of fat percentage and WHR, reported frequency of depression symptoms. Vertical dotted lines mark fat percentage at the mean and at $\pm 1SD$. The shaded areas around each regression line mark the 95% CIs.

The model including the main effects of fat percentage and WHR (model 3) showed the best fit. Compared to the model including the main effect of fat percentage only (model 2), adding the main effect of WHR significantly improved model fit; adding the interaction term (model 4) did not significantly improve model fit. Fat percentage and WHR both significantly predicted reported frequency of depression symptoms ($b_{\text{fat}} = 0.01$, 95% CI = [0.00, 0.01], $p = 0.004$, $b_{\text{WHR}} = 0.74$, 95% CI [0.22, 1.25], $p = 0.005$). The reported frequency of depression symptoms in women of average fat percentage increased by 29% from 0.34 at low WHR ($-1SD$; 0.80) to 0.44 at high WHR ($+1SD$; 0.94).

Thus, the predictive effect of weight location reported in the main text extended to a broader mental health outcome—depression—such that, *controlling for fat amount*, women with more weight in the abdominal versus gluteofemoral region reported more frequent depression symptoms.

1.2. Study 2

The association between heavyweight and broader mental health and well-being outcomes was explored in three ways. Global life satisfaction was assessed using the 5-item Satisfaction with Life (SWL) scale (Diener et al., 1985). The SWL scale includes items such as "I am satisfied with my life" (1 = Strongly disagree, to 7 = Strongly agree); items were mean averaged (Cronbach's alpha = .85). Depression and anxiety were assessed using the subscales of the Brief Symptoms Inventory (Derogatis & Melisaratos, 1983). Participants were asked, "During the past 7 days, how much were you distressed by _____" with the 6-item depression subscale including items like "feeling lonely", and the 6-item anxiety subscale including items like "nervousness or shakiness inside" (0 = Not at all, to 4 = Extremely); items were mean averaged for both scales (Cronbach's alpha for depression = .87; Cronbach's alpha for anxiety = .86).

As in the main text, the fit of four hierarchical statistical models was sequentially compared for each dependent measure using log-likelihood tests. All dependent measures were analyzed using linear models. Neither fat amount by itself (Model 2), the main effects of fat amount and WHR (Model 3), nor the main effects and their interaction (Model 4) predicted any of these outcomes better than the null model (Model 1). See Tables S19-S24 for full model

summaries and model comparisons. See Figure S2 for regression plots of the mental health and well-being dependent measures.

Figure S2. Study 2 linear regressions displaying, as a function of fat percentage, WHR, and their interaction, estimates of women’s well-being (life satisfaction; A) and mental health (depression and anxiety; B-C). Vertical dotted lines mark fat percentage at the mean and at $\pm 1SD$. The shaded areas around each regression line mark the 95% CIs.

How might we reconcile these null findings with the Study 1 findings that fat amount and WHR each predicted depression? The main effects of fat percentage and WHR in Study 1 explained only 3% of the variance in depression, and sensitivity analyses revealed that Study 2 had much lower statistical power than Study 1. (Study 1 was able to detect with 95% power interaction effects as small as $R^2 = 2\%$, as compared to $R^2 = 8\%$ for Study 2). Thus, because any effects of fat amount and WHR on mental health and wellbeing are likely to be small, it seems likely that Study 2 would be under-powered to detect them.

1.3. General Discussion

In sum, an exploratory analysis in Study 1 found that fat amount and weight location additively predicted frequency of depression symptoms. However, in Study 2 neither fat amount nor weight location—by themselves or interactively—predicted any of the broader mental health and well-being outcomes (global satisfaction with life, depression, or anxiety). If such effects do exist, they may be relatively small, and Study 2 may have been underpowered to detect them (see sensitivity analyses). The literature on weight and mental health and well-being is mixed, however, and more research is needed to understand whether the effects of weight—by itself, additively, or interactively with weight location—extend to mental health and well-being outcomes, either in the general population or in segments of the heavyweight population (e.g., see Friedman & Brownell, 1995).

1.3. References

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3. Study 1 supplementary figures and tables

The fit of four hierarchical statistical models were sequentially compared for each dependent variable using log-likelihood tests: (1) the null model ($DV \sim 1$), (2) the main effect of fat percentage ($DV \sim \text{Fat } \%$), (3) the main effects of fat percentage and WHR ($DV \sim \text{Fat } \% + \text{WHR}$), and (4) the main effects and two-way interaction of fat percentage and WHR ($DV \sim \text{Fat } \% * \text{WHR}$). Binary dependent variables were analyzed using generalized linear models with binomial (logit) distributions; the continuous depression measure was analyzed using linear models. Tables S1, S3, S5, and S7 display the full model summaries for each of the four dependent variables.

Of the four models compared, the model including the main effects of fat percentage and WHR (Model 3) showed the best fit for each dependent variable. Compared to the model including the main effect of fat percentage only (Model 2), adding the main effect of WHR significantly improved model fit for all dependent variables; adding the interaction term (Model 4) did not significantly improve model fit for any dependent variable. Tables S2, S4, S6, and S8 display model comparisons for each of the four dependent variables.

“Has a doctor or other health professional ever told you that you are overweight?” (1 = Yes, 0 =No).

Table S1. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	-0.57*** (0.06)	-9.36*** (0.64)	-13.24*** (1.10)	-23.63** (8.80)
Fat %		0.22*** (0.02)	0.20*** (0.02)	0.46* (0.22)
WHR			5.41*** (1.19)	17.36 ⁺ (10.08)
Fat % × WHR				-0.30 (0.25)
Log Likelihood	-686.66	-526.14	-515.56	-514.83
AIC	1,375.32	1,056.28	1,037.11	1,037.66

Note. N = 1,050. Standard errors in parentheses. AIC = Akaike Information Criterion. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S2. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	1,049	1,373.32			
2 vs. 1	1,048	1,052.28	1	321.05	< .001
3 vs. 2	1,047	1,031.11	1	21.16	< .001
4 vs. 3	1,046	1,029.66	1	1.46	.227
4 vs. 2	1,046	1,029.66	2	22.62	< .001

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

“Do you consider yourself now to be overweight, underweight, or about the right weight?” (coded as 1 = “overweight” and 0 = “about the right weight”; “underweight” responses were excluded from this analysis)

Table S3. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.17** (0.06)	-10.57*** (0.69)	-15.47*** (1.23)	-17.74 ⁺ (9.69)
Fat %		0.28*** (0.02)	0.25*** (0.02)	0.31 (0.25)
WHR			6.91*** (1.33)	9.54 (11.26)
Fat % × WHR				-0.07 (0.29)
Log Likelihood	-689.62	-472.13	-457.93	-457.90
AIC	1,381.23	948.25	921.85	923.79

Note. N = 1,000. Standard errors in parentheses. AIC = Akaike Information Criterion. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S4. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	999	1,379.23			
2 vs. 1	998	944.25	1	434.98	< .001
3 vs. 2	997	915.85	1	28.40	< .001
4 vs. 3	996	915.79	1	0.06	.814
4 vs. 2	996	915.79	2	28.46	< .001

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

“Would you like to weigh more, less, or stay about the same?” (coded as 1 = “less” and 0 = “stay about the same”; “more” responses were excluded from this analysis)

Table S5. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.98*** (0.07)	-7.44*** (0.60)	-10.11*** (1.15)	-13.77 ⁺ (8.15)
Fat %		0.23*** (0.02)	0.21*** (0.02)	0.31 (0.22)
WHR			3.99** (1.42)	8.32 (9.64)
Fat % × WHR				-0.12 (0.26)
Log Likelihood	-570.09	-428.24	-424.21	-424.10
AIC	1,142.19	860.48	854.41	856.20

Note. N = 974. Standard errors in parentheses. AIC = Akaike Information Criterion. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S6. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	973	1,140.19			
2 vs. 1	972	856.48	1	283.70	< .001
3 vs. 2	971	848.41	1	8.07	.004
4 vs. 3	970	848.20	1	0.21	.649
4 vs. 2	970	848.21	2	8.28	.016

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Depression: Depression Screener Questionnaire (DPQ-9) (0 = "not at all," 1 = "several days," 2 = "more than half the days," and 3 = "nearly every day")

Table S7. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.40*** (0.02)	-0.04 (0.09)	-0.54** (0.20)	-0.67 (1.26)
Fat %		0.01*** (0.002)	0.01** (0.003)	0.01 (0.03)
WHR			0.73** (0.26)	0.89 (1.49)
Fat % × WHR				-0.004 (0.04)
R ²	0.00	0.03	0.03	0.03
Adjusted R ²	0.00	0.02	0.03	0.03
Res. Std. Error	0.49	0.49	0.48	0.48
F Statistic		22.85*** (df = 1; 889)	15.44*** (df = 2; 888)	10.29*** (df = 3; 887)

Note. N = 891. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S8. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	890	215.48			
2 vs. 1	889	210.09	1	5.40	< .001
3 vs. 2	888	208.24	1	1.84	.005
4 vs. 3	887	208.24	1	0.003	.918
4 vs. 2	887	208.24	2	1.85	.020

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

4. Study 2 supplementary figures and tables

As in Study 1, the fit of four hierarchical statistical models were sequentially compared for each dependent measure using log-likelihood tests. All dependent measures were analyzed using linear models. Of the four models compared, the model including the two main effects of body fat percentage and WHR and their interaction (Model 4) showed the best fit for the self-devaluation and social devaluation outcomes, compared to both the model including the main effect of fat percentage only (Model 2) and the model including the main effects of fat percentage and WHR but not their interaction (Model 3). Tables S9, S11, S13, and S15, S17 display the full model summaries for each of the five social and self-devaluation dependent variables. Tables S10, S12, S14, S16, and S18 display model comparisons for these dependent variables.

Self-reported physical attractiveness: “How physically attractive are you, compared to the average same-sex individual of your approximate age?” (0 = Much less attractive than average, 50 = About average, 100 = Much more attractive than average)

Table S9. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	57.06*** (1.33)	73.18*** (5.32)	134.33*** (18.42)	-68.35 (65.46)
Fat %		-0.53** (0.17)	-0.32 ⁺ (0.18)	6.14** (2.01)
WHR			-79.24*** (22.91)	156.89* (76.66)
Fat % × WHR				-7.48** (2.32)
R ²	0.00	0.04	0.09	0.14
Adjusted R ²	0.00	0.04	0.09	0.13
Res. Std. Error	19.46	19.07	18.60	18.20
F Statistic		9.77** (df = 1; 213)	11.12*** (df = 2; 212)	11.20*** (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S10. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	81,045.33			
2 vs. 1	213	77,491.74	1	3,553.59	.001
3 vs. 2	212	73,351.06	1	4,140.69	< .001
4 vs. 3	211	69,913.58	1	3,437.48	.001

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Body image satisfaction: 6-item Body Image States Scale (BISS) (Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002). BISS includes items such as "Right now I feel _____ with my body size and shape" (1 = Extremely Dissatisfied, to 9 = Extremely Satisfied) and "Right now I feel that I look _____ than the average person looks" (1 = A great deal better, to 9 = A great deal worse).

Table S11. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	5.11*** (0.10)	6.78*** (0.41)	9.27*** (1.45)	-0.12 (5.24)
Fat %		-0.05*** (0.01)	-0.05*** (0.01)	0.25 (0.16)
WHR			-3.23 ⁺ (1.81)	7.71 (6.14)
Fat % × WHR				-0.35 ⁺ (0.19)
R ²	0.00	0.08	0.09	0.10
Adjusted R ²	0.00	0.07	0.08	0.09
Res. Std. Error	1.53	1.47	1.47	1.46
F Statistic		17.59*** (df = 1; 213)	10.48*** (df = 2; 212)	8.22*** (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S12. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	501.20			
2 vs. 1	213	462.97	1	38.23	< .001
3 vs. 2	212	456.11	1	6.86	.072
4 vs. 3	211	448.73	1	7.38	.063

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Self-esteem: “I have high self-esteem” (1 = Not very true of me, 5 = Very true of me; Robins, Hendin, & Trzesniewski, 2001).

Table S13. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	3.27*** (0.07)	3.44*** (0.27)	4.83*** (0.96)	-3.51 (3.43)
Fat %		-0.01 (0.01)	-0.001 (0.01)	0.27* (0.11)
WHR			-1.80 (1.19)	7.92 ⁺ (4.02)
Fat % × WHR				-0.31* (0.12)
R ²	0.00	0.002	0.01	0.04
Adjusted R ²	0.00	-0.003	0.003	
Res. Std. Error	0.97	0.97	0.97	0.95
F Statistic		0.42 (df = 1; 213)	1.36 (df = 2; 212)	3.06* (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S14. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	200.35			
2 vs. 1	213	199.96	1	0.39	.512
3 vs. 2	212	197.82	1	2.14	.125
4 vs. 3	211	192.00	1	5.83	.011

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5-item Perceived Weight Discrimination (PWD) scale (Hunger & Major, 2016). On the PWD scale, respondents were asked "In the past 12 months, how often have you been discriminated against because of your weight?", and it included items such as "How often have people acted as if they are better than you because of your weight?" and "How often have you been teased or harassed because of your weight?" (1 = Never, to 5 = All the time).

Table S15. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.39*** (0.04)	-0.28 (0.18)	-0.60 (0.63)	5.70* (2.22)
Fat %		0.02*** (0.01)	0.02*** (0.01)	-0.18** (0.07)
WHR			0.41 (0.78)	-6.91** (2.60)
Fat % × WHR				0.23** (0.08)
R ²	0.00	0.07	0.07	0.11
Adjusted R ²	0.00	0.07	0.06	0.10
Res. Std. Error	0.63	0.61	0.61	0.60
F Statistic		15.47*** (df = 1; 199)	7.85*** (df = 2; 198)	8.33*** (df = 3; 197)

Note. N = 201. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S16. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	200	79.98			
2 vs. 1	199	74.21	1	5.77	< .001
3 vs. 2	198	74.11	1	0.16	.590
4 vs. 3	197	70.97	1	3.13	.003

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5-item Weight Stigma Concerns (WSC) scale (Hunger & Major, 2016). The WSC scale included items such as "I am concerned that other people's opinion of me will be based on my weight" and "I am afraid that other people will reject me because of my weight" (1 = Strongly disagree, to 7 = Strongly agree)

Table S17. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	1.47*** (0.11)	-0.98* (0.43)	-3.46* (1.53)	5.55 (5.49)
Fat %		0.08*** (0.01)	0.07*** (0.01)	-0.21 (0.17)
WHR			3.19 ⁺ (1.90)	-7.28 (6.42)
Fat % × WHR				0.33 ⁺ (0.19)
R ²	0.00	0.15	0.16	0.17
Adjusted R ²	0.00	0.14	0.15	0.16
Res. Std. Error	1.62	1.50	1.49	1.48
F Statistic		34.37*** (df = 1; 199)	18.76*** (df = 2; 198)	13.60*** (df = 3; 197)

Note. N = 201. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S18. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	200	523.29			
2 vs. 1	199	446.21	1	77.08	< .001
3 vs. 2	198	439.91	1	6.30	.091
4 vs. 3	197	433.50	1	6.41	.088

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5-item Satisfaction With Life (SWL) scale (Diener, Emmons, Larsen, & Griffin, 1985). The SWL scale includes items such as "In my ways my life is close to my ideal" and "I am satisfied with my life" (1 = Strongly disagree, to 7 = Strongly agree).

Table S19. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	4.69*** (0.09)	4.81*** (0.36)	4.46*** (1.28)	-2.44 (4.58)
Fat %		-0.004 (0.01)	-0.01 (0.01)	0.21 (0.14)
WHR			0.45 (1.58)	8.48 (5.35)
Fat % × WHR				-0.25 (0.16)
R ²	0.00	0.001	0.001	0.01
Adjusted R ²	0.00	-0.004	-0.01	-0.002
Res. Std. Error	1.24	1.24	1.24	1.24
F Statistic		0.13 (df = 1; 198)	0.10 (df = 2; 197)	0.89 (df = 3; 196)

Note. N = 200. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S20. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	199	304.04			
2 vs. 1	198	303.85	1	0.19	.722
3 vs. 2	197	303.72	1	0.13	.773
4 vs. 3	196	299.96	1	3.76	.117

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Depression: subscales of the Brief Symptoms Inventory (Derogatis & Melisaratos, 1983).
 "During the past 7 days, how much were you distressed by ____" with the 6-item depression subscale showing items like "feeling lonely" and "feeling no interest in things" (0 = Not at all, to 4 = Extremely)

Table S21. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	1.09*** (0.06)	1.14*** (0.26)	0.81 (0.91)	4.78 (3.29)
Fat %		-0.002 (0.01)	-0.003 (0.01)	-0.13 (0.10)
WHR			0.42 (1.13)	-4.20 (3.86)
Fat % × WHR				0.15 (0.12)
R ²	0.00	0.0002	0.001	0.01
Adjusted R ²	0.00	-0.004	-0.01	-0.01
Res. Std. Error	0.91	0.91	0.92	0.92
F Statistic		0.04 (df = 1; 213)	0.09 (df = 2; 212)	0.58 (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; ^{*} $p < 0.05$; ^{**} $p < 0.01$; ^{***} $p < 0.001$

Table S22. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	178.33			
2 vs. 1	213	178.30	1	0.04	.836
3 vs. 2	212	178.18	1	0.12	.708
4 vs. 3	211	176.87	1	1.32	.210

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Anxiety: subscales of the Brief Symptoms Inventory (Derogatis & Melisaratos, 1983). "During the past 7 days, how much were you distressed by _____" with the 6-item anxiety subscale showing items like "nervousness or shakiness inside" and "feeling tense or keyed up" (0 = Not at all, to 4 = Extremely)

Table S23. *Regression results for the four models of fat percentage and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.94*** (0.06)	0.66** (0.24)	-0.32 (0.84)	-1.77 (3.07)
Fat %		0.01 (0.01)	0.01 (0.01)	0.05 (0.09)
WHR			1.27 (1.05)	2.96 (3.59)
Fat % × WHR				-0.05 (0.11)
R ²	0.00	0.01	0.01	0.02
Adjusted R ²	0.00	0.002	0.005	0.001
Res. Std. Error	0.85	0.85	0.85	0.85
F Statistic		1.53 (df = 1; 213)	1.50 (df = 2; 212)	1.07 (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; ^{*} $p < 0.05$; ^{**} $p < 0.01$; ^{***} $p < 0.001$

Table S24. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	155.72			
2 vs. 1	213	154.61	1	1.11	.216
3 vs. 2	212	153.55	1	1.06	.228
4 vs. 3	211	153.38	1	0.18	.622

Note. Model 1 = DV ~ 1; Model 2 = DV ~ Fat %; Model 3 = DV ~ Fat % + WHR; Model 4 = DV ~ Fat % + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5. Could the observed interactions between body fat and WHR be due to a curvilinear relationship between body fat and devaluation?

The documented effects of body weight on physical health are curvilinear (e.g., Lassek & Gaulin, 2018), with underweight and heavyweight women having worse physical health than average-weight women. Body fat and WHR are positively correlated, which means that women with low WHRs also have lower-than-average body fat, whereas women with high WHRs have above-average body fat. If the correlation between body fat and devaluation is curvilinear (a positive exponential), then the observed linear interaction between body fat and WHR may simply be picking up on that curvilinear effect of body fat (i.e., at low WHR—relatively low body fat—the slope for body fat is relatively flat, but at high WHR—relatively high body fat—the slope is positive).

We checked this by comparing the following equations for each of the self- and perceived social devaluation DVs: (1) a first-degree polynomial of body fat ($DV \sim Fat\%$) (Model 1), (2) a second-degree polynomial of body fat ($DV \sim Fat\%^2$) (Model 2), (3) a first-degree polynomial of body fat and its interaction with WHR ($DV \sim Fat\% * WHR$) (Model 3), and (4) a second-degree polynomial of body fat and its interaction with WHR ($DV \sim Fat\%^2 * WHR$) (Model 4).

First, for three of the five DVs (attractiveness, body image satisfaction, and perceived weight discrimination), the second-degree polynomial of body fat was a significantly or a marginally better predictor of variance explained, thereby supporting the proposal that the effects of body fat on devaluation can be curvilinear. Second, for four of the five DVs (attractiveness, body image satisfaction, self-esteem, and weight stigma concerns) the linear interaction of body fat and WHR ($DV \sim Fat * WHR$) was a significantly or marginally better predictor of variance explained than the second-degree polynomial of body fat ($DV \sim Fat\%^2$), thereby ruling-out the

possibility that the effects reported here are merely due to a curvilinear relationship between body fat and devaluation. Finally, and further ruling this possibility out, for none of these four DVs was a second-degree polynomial of body fat and its interaction with WHR (DV ~ *Fat* %² * WHR) a better predictor than the simple linear interaction of body fat and WHR. Tables S25, S27, S29, and S31, S33 display the full model summaries for each of the five social and self-devaluation dependent variables. Tables S26, S28, S30, S32, and S34 display model comparisons.

Self-Reported Attractiveness.

Table S25. Regression results for the polynomial models of fat % and WHR.

	Model 1	Model 2	Model 3	Model 4
poly(Fat %, 1)	-59.61** (19.07)			
poly(Fat %, 2)1		-59.61** (18.75)		-26.17 (20.91)
poly(Fat %, 2)2		-54.73** (18.75)		-29.11 (20.53)
Fat %			6.14** (2.01)	
WHR			156.89* (76.66)	
Fat % x WHR			-7.48** (2.32)	
poly(WHR, 1)				-59.58** (19.64)
poly(Fat %, 2)1 x poly(WHR, 1)				-540.20* (259.02)
poly(Fat %, 2)2 x poly(WHR, 1)				-96.11 (231.71)
Constant	57.06*** (1.30)	57.06*** (1.28)	-68.35 (65.46)	57.94*** (1.30)
R ²	0.04	0.08	0.14	0.15
Adjusted R ²	0.04	0.07	0.13	0.13
Residual Std. Error	19.07	18.75	18.20	18.19
F Statistic	9.77** (df = 1; 213)	9.32*** (df = 2; 212)	11.20*** (df = 3; 211)	7.17*** (df = 5; 209)

Note. N = 215.

+p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table S26. Log-likelihood tests for the fit of the four hierarchical statistical models.

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	213	77,491.74			
2 vs. 1	212	74,496.28	1	2,995.46	.003
3 vs. 2	211	69,913.58	1	4,582.70	< .001
4 vs. 3	209	69,174.32	2	739.26	.327

Note. Model 1 = DV ~ Fat %; Model 2 = DV ~ Fat %²; Model 3 = DV ~ Fat % * WHR; Model 4 = DV ~ Fat %² * WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Body Image Satisfaction.

Table S27. Regression results for the polynomial models of fat % and WHR.

	Model 1	Model 2	Model 3	Model 4
poly(Fat %, 1)	-6.18*** (1.47)			
poly(Fat %, 2)1		-6.18*** (1.47)		-5.60*** (1.67)
poly(Fat %, 2)2		-2.64 ⁺ (1.47)		-1.61 (1.64)
Fat %			0.25 (0.16)	
WHR			7.71 (6.14)	
Fat % x WHR			-0.35 ⁺ (0.19)	
poly(WHR, 1)				-2.68 ⁺ (1.57)
poly(Fat %, 2)1 x poly(WHR, 1)				-30.17 (20.74)
poly(Fat %, 2)2 x poly(WHR, 1)				23.05 (18.56)
Constant	5.11*** (0.10)	5.11*** (0.10)	-0.12 (5.24)	5.15*** (0.10)
R ²	0.08	0.09	0.10	0.11
Adjusted R ²	0.07	0.08	0.09	0.09
Residual Std. Error	1.47	1.47	1.46	1.46
F Statistic	17.59*** (df = 1; 213)	10.50*** (df = 2; 212)	8.22*** (df = 3; 211)	5.43*** (df = 5; 209)

Note. N = 215.

⁺p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table S28. Log-likelihood tests for the fit of the four hierarchical statistical models.

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	213	462.97			
2 vs. 1	212	456.02	1	6.96	.070
3 vs. 2	211	448.73	1	7.28	.064
4 vs. 3	209	443.62	2	5.12	.300

Note. Model 1 = DV ~ Fat %; Model 2 = DV ~ Fat %²; Model 3 = DV ~ Fat % * WHR; Model 4 = DV ~ Fat %² * WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Self-Esteem.

Table S29. Regression results for the polynomial models of fat % and WHR.

	Model 1	Model 2	Model 3	Model 4
poly(Fat %, 1)	-0.63 (0.97)			
poly(Fat %, 2)1		-0.63 (0.97)		0.62 (1.10)
poly(Fat %, 2)2		-1.14 (0.97)		0.12 (1.08)
Fat %			0.27* (0.11)	
WHR			7.92+ (4.02)	
Fat % x WHR			-0.31* (0.12)	
poly(WHR, 1)				-1.17 (1.03)
poly(Fat %, 2)1 x poly(WHR, 1)				-28.48* (13.63)
poly(Fat %, 2)2 x poly(WHR, 1)				-9.04 (12.19)
Constant	3.27*** (0.07)	3.27*** (0.07)	-3.51 (3.43)	3.32*** (0.07)
R ²	0.002	0.01	0.04	0.04
Adjusted R ²	-0.003	-0.001	0.03	0.02
Residual Std. Error	0.97	0.97	0.95	0.96
F Statistic	0.42 (df = 1; 213)	0.90 (df = 2; 212)	3.06* (df = 3; 211)	1.94+ (df = 5; 209)

Note. N = 215.

+p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table S30. Log-likelihood tests for the fit of the four hierarchical statistical models.

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	213	199.96			
2 vs. 1	212	198.67	1	1.30	.235
3 vs. 2	211	192.00	1	6.67	.007
4 vs. 3	209	191.48	2	0.51	.757

Note. Model 1 = DV ~ Fat %; Model 2 = DV ~ Fat %²; Model 3 = DV ~ Fat % * WHR; Model 4 = DV ~ Fat %² * WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Perceived Weight Discrimination (PWD).

Table S31. Regression results for the polynomial models of fat % and WHR.

	Model 1	Model 2	Model 3	Model 4
poly(Fat %, 1)	2.47*** (0.63)			
poly(Fat %, 2)1		2.38*** (0.60)		2.67*** (0.68)
poly(Fat %, 2)2		2.50*** (0.60)		2.20** (0.67)
Fat %			-0.18** (0.07)	
WHR			-6.91** (2.60)	
Fat % x WHR			0.23** (0.08)	
poly(WHR, 1)				0.31 (0.65)
poly(Fat %, 2)1 x poly(WHR, 1)				15.84+ (8.39)
poly(Fat %, 2)2 x poly(WHR, 1)				-19.17* (7.65)
Constant	0.39*** (0.04)	0.39*** (0.04)	5.70* (2.22)	0.37*** (0.04)
R ²	0.07	0.15	0.11	0.18
Adjusted R ²	0.07	0.14	0.10	0.16
Residual Std. Error	0.61	0.59	0.60	0.58
F Statistic	15.47*** (df = 1; 199)	16.88*** (df = 2; 198)	8.33*** (df = 3; 197)	8.57*** (df = 5; 195)

Note. N = 201.

+p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table S32. Log-likelihood tests for the fit of the four hierarchical statistical models.

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	199	74.21			
2 vs. 1	198	68.33	1	5.88	< .001
3 vs. 2	197	70.97	1	-2.64	NA
4 vs. 3	195	65.57	2	5.40	< .001

Note. Model 1 = DV ~ Fat %; Model 2 = DV ~ Fat %²; Model 3 = DV ~ Fat % * WHR; Model 4 = DV ~ Fat %² * WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Weight Stigma Concerns (WSC).

Table S33. Regression results for the polynomial models of fat % and WHR.

	Model 1	Model 2	Model 3	Model 4
poly(Fat %, 1)	9.02*** (1.54)			
poly(Fat %, 2)1		8.98*** (1.54)		8.43*** (1.73)
poly(Fat %, 2)2		0.98 (1.54)		-0.24 (1.70)
Fat %			-0.21 (0.17)	
WHR			-7.28 (6.42)	
Fat % x WHR			0.33+ (0.19)	
poly(WHR, 1)				2.84+ (1.66)
poly(Fat %, 2)1 x poly(WHR, 1)				42.49* (21.42)
poly(Fat %, 2)2 x poly(WHR, 1)				-33.10+ (19.53)
Constant	1.46*** (0.11)	1.46*** (0.11)	5.55 (5.49)	1.40*** (0.11)
R ²	0.15	0.15	0.17	0.18
Adjusted R ²	0.14	0.14	0.16	0.16
Residual Std. Error	1.50	1.50	1.48	1.48
F Statistic	34.37*** (df = 1; 199)	17.34*** (df = 2; 198)	13.60*** (df = 3; 197)	8.79*** (df = 5; 195)

Note. N = 201.

+p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table S34. Log-likelihood tests for the fit of the four hierarchical statistical models.

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	199	446.21			
2 vs. 1	198	445.31	1	0.91	.520
3 vs. 2	197	433.50	1	11.80	.020
4 vs. 3	195	427.06	2	6.44	.230

Note. Model 1 = DV ~ Fat %; Model 2 = DV ~ Fat %²; Model 3 = DV ~ Fat % * WHR; Model 4 = DV ~ Fat %² * WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

6. Study 1 re-analysis using body-mass-index (BMI) instead of fat percentage

The fit of four hierarchical statistical models were sequentially compared for each dependent variable using log-likelihood tests: (1) the null model ($DV \sim 1$), (2) the main effect of BMI ($DV \sim BMI$), (3) the main effects of BMI and WHR ($DV \sim BMI + WHR$), and (4) the main effects and two-way interaction of BMI and WHR ($DV \sim BMI * WHR$). Binary dependent variables were analyzed using generalized linear models with binomial (logit) distributions; the continuous depression measure was analyzed using linear models. Tables S35, S37, S39, and S41 display the full model summaries for each of the four dependent variables.

Of the four models compared, the model including the main effects and two-way interaction of BMI and WHR (Model 4) showed the best fit for the three dependent variables indexing perception of others' views of one's own weight, and perception of one's own weight. The model including the main effects of BMI and WHR only (Model 3) showed the best fit for the one dependent variable indexing mental health. Tables S36, S38, S40, and S42 display model comparisons for each of the four dependent variables. Figure 2S displays model plots.

“Has a doctor or other health professional ever told you that you are overweight?” (1 = Yes, 0 =No).

Table S35. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	-0.57*** (0.06)	-8.42*** (0.50)	-8.40*** (1.10)	-32.66*** (6.58)
BMI		0.27*** (0.02)	0.27*** (0.02)	1.09*** (0.22)
WHR			-0.03 (1.34)	27.53*** (7.39)
BMI × WHR				-0.93*** (0.24)
Log Likelihood	-686.66	-437.21	-437.21	-429.87
AIC	1,375.33	878.42	880.42	867.74

Note. N = 1,050. Standard errors in parentheses. AIC = Akaike Information Criterion. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S36. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	1,049	1,373.33			
2 vs. 1	1,048	874.42	1	498.91	< .001
3 vs. 2	1,047	874.42	1	0.001	.983
4 vs. 3	1,046	859.74	1	14.68	< .001
4 vs. 2	1,046	859.74	2	14.68	.001

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

“Do you consider yourself now to be overweight, underweight, or about the right weight?” (coded as 1 = “overweight” and 0 = “about the right weight”; “underweight” responses were excluded from this analysis)

Table S37. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.17** (0.06)	-10.26*** (0.65)	-10.75*** (1.23)	-34.02*** (8.10)
BMI		0.38*** (0.02)	0.38*** (0.03)	1.24*** (0.30)
WHR			0.741 (1.58)	27.32** (9.18)
BMI × WHR				-0.98** (0.33)
Log Likelihood	-689.615	-392.223	-392.112	-387.977
AIC	1,381.230	788.445	790.224	783.954

Note. N = 1,000. Standard errors in parentheses. AIC = Akaike Information Criterion. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S38. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	999	1,379.23			
2 vs. 1	998	784.45	1	594.79	< .001
3 vs. 2	997	784.22	1	0.22	.638
4 vs. 3	996	775.95	1	8.27	.004
4 vs. 2	996	775.95	2	8.49	.010

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

“Would you like to weigh more, less, or stay about the same?” (coded as 1 = “less” and 0 = “stay about the same”; “more” responses were excluded from this analysis)

Table S39. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.98*** (0.07)	-7.35*** (0.60)	-7.25*** (1.19)	-27.27*** (6.93)
BMI		0.32*** (0.02)	0.32*** (0.03)	1.12*** (0.27)
WHR			-0.16 (1.59)	22.89** (7.92)
BMI × WHR				-0.91** (0.31)
Log Likelihood	-570.09	-394.60	-394.60	-390.58
AIC	1,142.19	793.20	795.19	789.16

Note. N = 974. Standard errors in parentheses. AIC = Akaike Information Criterion. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S40. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	973	1,140.19			
2 vs. 1	972	789.20	1	350.98	< .001
3 vs. 2	971	789.19	1	0.01	.922
4 vs. 3	970	781.16	1	8.04	.005
4 vs. 2	970	781.16	2	8.05	.018

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Depression: Depression Screener Questionnaire (DPQ-9) (0 = "not at all," 1 = "several days," 2 = "more than half the days," and 3 = "nearly every day")

Table S41. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.40 ^{***} (0.02)	0.10 (0.06)	-0.40 ⁺ (0.21)	-1.20 (0.84)
BMI		0.01 ^{***} (0.002)	0.01 ^{**} (0.002)	0.04 (0.03)
WHR			0.68 [*] (0.27)	1.58 (0.97)
BMI $\times$ WHR				-0.03 (0.03)
R ²	0.00	0.03	0.03	0.04
Adjusted R ²	0.00	0.03	0.03	0.03
Res. Std. Error	0.492	0.49	0.48	0.48
F Statistic		24.65 ^{***} (<i>df</i> = 1; 889)	15.57 ^{***} (<i>df</i> = 2; 888)	10.70 ^{***} (<i>df</i> = 3; 887)

Note. N = 891. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; ^{*} $p < 0.05$; ^{**} $p < 0.01$; ^{***} $p < 0.001$

Table S42. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	890	215.48			
2 vs. 1	889	209.67	1	5.81	< .001
3 vs. 2	888	208.18	1	1.49	.012
4 vs. 3	887	207.96	1	0.22	.332
4 vs. 2	887	207.96	2	1.71	.026

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Figure 2S. Study 1 logistic and linear regressions displaying, as a function of BMI and WHR, (A) women's self-reports of how healthcare professionals perceive their weight, (B-C) women's perceptions of their own weight, and (D) self-reported frequency of depression symptoms. Vertical dotted lines mark fat percentage at the mean and at ± 1 SD. The shaded areas around each regression line mark the 95% CIs.

7. Study 2 re-analysis using body-mass-index (BMI) instead of fat percentage

As before, the fit of four hierarchical statistical models were sequentially compared for each dependent variable using log-likelihood tests: (1) the null model ($DV \sim 1$), (2) the main effect of BMI ($DV \sim BMI$), (3) the main effects of BMI and WHR ($DV \sim BMI + WHR$), and (4) the main effects and two-way interaction of BMI and WHR ($DV \sim BMI * WHR$). All dependent measures were analyzed using linear models. Tables S43, S45, S47, S49, and S51 display the full model summaries for each of the five social and self-devaluation dependent variables. Tables S44, S46, S48, S50, and S52 display model comparisons for these dependent variables. Figure 3S displays model plots.

Of the four models compared, the model including the main effects and two-way interaction of BMI and WHR (Model 4) showed the best fit for two of the three self-devaluation dependent variables: self-reported physical attractiveness and self-esteem. The model including the main effects of BMI and WHR only (Model 3) showed the best fit for the remaining self-devaluation dependent variable: body image satisfaction. The model including the main effect of BMI only (Model 2) showed the best fit for the two social devaluation dependent variables: perceived weight discrimination and weight stigma concerns.

The above patterns of findings did not extend to broader mental health and well-being outcomes (life satisfaction, depression, and anxiety), however. Neither BMI by itself (Model 2), the main effects of BMI and WHR (Model 3), nor the main effects and their interaction (Model 4) predicted any of these outcomes better than the null model (Model 1). See Tables S53-S58 for full model summaries and model comparisons. See Figure S4 for regression plots of the mental health and well-being dependent measures.

Self-reported physical attractiveness: “How physically attractive are you, compared to the average same-sex individual of your approximate age?” (0 = Much less attractive than average, 50 = About average, 100 = Much more attractive than average)

Table S43. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	57.06*** (1.33)	72.51*** (6.30)	136.26*** (18.47)	-94.99 (75.67)
BMI		-0.66* (0.26)	-0.32 (0.27)	9.28** (3.06)
WHR			-84.31*** (23.05)	179.04* (86.67)
BMI × WHR				-10.87** (3.45)
R ²	0.00	0.03	0.09	0.13
Adjusted R ²	0.00	0.02	0.08	0.11
Res. Std. Error	19.46	19.22	18.69	18.31
F Statistic		6.30* (df = 1; 213)	10.02*** (df = 2; 212)	10.26*** (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S44. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	81,045.33			
2 vs. 1	213	78,718.84	1	2,326.49	.008
3 vs. 2	212	74,044.51	1	4,674.33	< .001
4 vs. 3	211	70,724.56	1	3,319.95	.002

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Body image satisfaction: 6-item Body Image States Scale (BISS) (Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002). BISS includes items such as "Right now I feel _____ with my body size and shape" (1 = Extremely Dissatisfied, to 9 = Extremely Satisfied) and "Right now I feel that I look _____ than the average person looks" (1 = A great deal better, to 9 = A great deal worse).

Table S45. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	5.11*** (0.10)	6.80*** (0.49)	9.53*** (1.46)	3.32 (6.12)
BMI		-0.07*** (0.02)	-0.06** (0.02)	0.20 (0.25)
WHR			-3.62* (1.83)	3.45 (7.01)
BMI × WHR				-0.29 (0.28)
R ²	0.00	0.06	0.07	0.08
Adjusted R ²	0.00	0.05	0.06	0.06
Res. Std. Error	1.53	1.49	1.48	1.48
F Statistic		12.44*** (df = 1; 213)	8.27*** (df = 2; 212)	5.88*** (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. + $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S46. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	501.20			
2 vs. 1	213	473.55	1	27.65	< .001
3 vs. 2	212	464.92	1	8.63	.047
4 vs. 3	211	462.53	1	2.40	.296

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Self-esteem: “I have high self-esteem” (1 = Not very true of me, 5 = Very true of me; Robins, Hendin, & Trzesniewski, 2001).

Table S47. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	3.27*** (0.07)	3.38*** (0.32)	4.84*** (0.95)	-4.42 (3.95)
BMI		-0.005 (0.01)	0.003 (0.01)	0.39* (0.16)
WHR			-1.94 (1.19)	8.61 ⁺ (4.52)
BMI × WHR				-0.44* (0.18)
R ²	0.00	0.001	0.01	0.04
Adjusted R ²	0.00	-0.004	0.004	0.03
Res. Std. Error	0.97	0.97	0.97	0.96
F Statistic		0.12 (df = 1; 213)	1.38 (df = 2; 212)	2.89* (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S48. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	200.35			
2 vs. 1	213	200.24	1	0.11	.728
3 vs. 2	212	197.78	1	2.47	.100
4 vs. 3	211	192.45	1	5.32	.016

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5-item Perceived Weight Discrimination (PWD) scale (Hunger & Major, 2016). On the PWD scale, respondents were asked "In the past 12 months, how often have you been discriminated against because of your weight?", and it included items such as "How often have people acted as if they are better than you because of your weight?" and "How often have you been teased or harassed because of your weight?" (1 = Never, to 5 = All the time).

Table S49. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.39*** (0.04)	-0.73*** (0.20)	-0.68 (0.60)	1.74 (2.48)
BMI		0.05*** (0.01)	0.05*** (0.01)	-0.05 (0.10)
WHR			-0.06 (0.75)	-2.81 (2.83)
BMI $\times$ WHR				0.11 (0.11)
R ²	0.00	0.14	0.14	0.15
Adjusted R ²	0.00	0.14	0.13	0.13
Res. Std. Error	0.63	0.59	0.59	0.59
F Statistic		33.13*** (df = 1; 199)	16.48*** (df = 2; 198)	11.33*** (df = 3; 197)

Note. N = 201. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S50. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	200	79.98			
2 vs. 1	199	68.57	1	11.41	< .001
3 vs. 2	198	68.56	1	0.002	.936
4 vs. 3	197	68.21	1	0.35	.314

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5-item Weight Stigma Concerns (WSC) scale (Hunger & Major, 2016). The WSC scale included items such as "I am concerned that other people's opinion of me will be based on my weight" and "I am afraid that other people will reject me because of my weight" (1 = Strongly disagree, to 7 = Strongly agree)

Table S51. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	1.47*** (0.11)	-1.35** (0.51)	-3.82* (1.53)	-3.23 (6.33)
BMI		0.12*** (0.02)	0.11*** (0.02)	0.08 (0.25)
WHR			3.25 ⁺ (1.91)	2.59 (7.23)
BMI × WHR				0.03 (0.29)
R ²	0.00	0.14	0.15	0.15
Adjusted R ²	0.00	0.13	0.14	0.14
Res. Std. Error	1.62	1.50	1.50	1.50
F Statistic		32.08*** (df = 1; 199)	17.64*** (df = 2; 198)	11.71*** (df = 3; 197)

Note. N = 201. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S52. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	200	523.29			
2 vs. 1	199	450.65	1	72.64	< .001
3 vs. 2	198	444.14	1	6.51	.089
4 vs. 3	197	444.12	1	0.02	.924

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

5-item Satisfaction With Life (SWL) scale (Diener, Emmons, Larsen, & Griffin, 1985). The SWL scale includes items such as "In my ways my life is close to my ideal" and "I am satisfied with my life" (1 = Strongly disagree, to 7 = Strongly agree).

Table S53. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	4.69*** (0.09)	4.58*** (0.42)	4.50*** (1.27)	-2.64 (5.22)
BMI		0.005 (0.02)	0.004 (0.02)	0.30 (0.21)
WHR			0.10 (1.58)	8.22 (5.97)
BMI × WHR				-0.33 (0.24)
R ²	0.00	0.0004	0.0004	0.01
Adjusted R ²	0.00	-0.005	-0.01	-0.005
Res. Std. Error	1.24	1.24	1.24	1.24
F Statistic		0.07 (df = 1; 198)	0.04 (df = 2; 197)	0.69 (df = 3; 196)

Note. N = 200. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S54. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	199	304.04			
2 vs. 1	198	303.93	1	0.11	.790
3 vs. 2	197	303.93	1	0.01	.949
4 vs. 3	196	300.87	1	3.05	.158

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Depression: subscales of the Brief Symptoms Inventory (Derogatis & Melisaratos, 1983).
 "During the past 7 days, how much were you distressed by _____" with the 6-item depression subscale showing items like "feeling lonely" and "feeling no interest in things" (0 = Not at all, to 4 = Extremely)

Table S55. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	1.09*** (0.06)	1.26*** (0.30)	0.82 (0.91)	2.71 (3.79)
BMI		-0.01 (0.01)	-0.01 (0.01)	-0.09 (0.15)
WHR			0.58 (1.13)	-1.57 (4.34)
BMI × WHR				0.09 (0.17)
R ²	0.00	0.002	0.003	0.004
Adjusted R ²	0.00	-0.003	-0.01	-0.01
Res. Std. Error	0.91	0.91	0.92	0.92
F Statistic		0.33 (df = 1; 213)	0.30 (df = 2; 212)	0.28 (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; ^{*} $p < 0.05$; ^{**} $p < 0.01$; ^{***} $p < 0.001$

Table S56. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	178.34			
2 vs. 1	213	178.06	1	0.28	.565
3 vs. 2	212	177.84	1	0.22	.610
4 vs. 3	211	177.62	1	0.22	.608

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Anxiety: subscales of the Brief Symptoms Inventory (Derogatis & Melisaratos, 1983). "During the past 7 days, how much were you distressed by _____" with the 6-item anxiety subscale showing items like "nervousness or shakiness inside" and "feeling tense or keyed up" (0 = Not at all, to 4 = Extremely)

Table S57. *Regression results for the four models of BMI and WHR.*

	Model 1	Model 2	Model 3	Model 4
Intercept	0.94*** (0.06)	0.66* (0.28)	-0.35 (0.84)	-5.58 (3.51)
BMI		0.01 (0.01)	0.01 (0.01)	0.22 (0.14)
WHR			1.33 (1.05)	7.29 ⁺ (4.02)
BMI × WHR				-0.25 (0.16)
R ²	0.00	0.01	0.01	0.02
Adjusted R ²	0.00	0.0005	0.003	0.01
Res. Std. Error	0.85	0.85	0.85	0.85
F Statistic		1.10 (df = 1; 213)	1.36 (df = 2; 212)	1.70 (df = 3; 211)

Note. N = 215. Standard errors in parentheses. Res. Std. Error = Residual Standard Error. ⁺ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table S58. *Log-likelihood tests for the fit of the four hierarchical statistical models.*

Model Comparisons	Res.Df	RSS	Df	Sum of Sq	Pr (> Chi)
1	214	155.72			
2 vs. 1	213	154.91	1	0.80	.291
3 vs. 2	212	153.74	1	1.17	.202
4 vs. 3	211	152.05	1	1.70	.125

Note. Model 1 = DV ~ 1; Model 2 = DV ~ BMI; Model 3 = DV ~ BMI + WHR; Model 4 = DV ~ BMI + WHR. Res.Df = Residual Degrees of Freedom; RSS = Residual Sum of Squares; Df = Degrees of Freedom; Sum of Sq = Sum of Squares; Chi = Chi-Square Test.

Figure S3. Study 2 linear regressions displaying, as a function of BMI, WHR, and their interaction, (A-C) estimates of women's self-devaluation (self-reported physical attractiveness, body image satisfaction, and self-esteem) and (D-E) perceived social devaluation (perceived discrimination and concerns about weight stigma). Vertical dotted lines mark fat percentage at the mean and at $\pm 1SD$. The shaded areas around each regression line mark the 95% CIs.

Figure S4. Study 2 linear regressions displaying, as a function of BMI, WHR, and their interaction, estimates of women's well-being (life satisfaction; A) and mental health (depression and anxiety; B-C). Vertical dotted lines mark fat percentage at the mean and at $\pm 1SD$. The shaded areas around each regression line mark the 95% CIs.