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Updating Long-Held Assumptions About Fat Stigma: For Women, Body Shape Plays a Critical Role

Jaimie Arona Krems[1] and Steven L. Neuberg[2]

Abstract

Heavier bodies—particularly female bodies—are stigmatized. Such fat stigma is pervasive, painful to experience, and may even facilitate weight gain, thereby perpetuating the weight-stigma cycle. Leveraging research on functionally distinct forms of fat (deposited on different parts of the body), we propose that body shape plays an important but largely underappreciated role in fat stigma, above and beyond fat amount. Across three samples varying in participant ethnicity (White and Black Americans) and nation (United States, India), patterns of fat stigma reveal that, as hypothesized, participants differently stigmatized equally overweight or equally obese female targets as a function of target shape, sometimes even more strongly stigmatizing targets with less rather than more body mass. Such findings suggest value in updating our understanding of fat stigma to include body shape and in querying a predominating, but often implicit, theoretical assumption that people simply view all fat as 'bad' (and more fat as 'worse').

Keywords

stigma, prejudice, fat stigma, overweight/obesity, body shape

Fat stigma is pervasive and remains a socially acceptable form of prejudice; even parents stigmatize their higher weight children, especially daughters (Brewis, Wutich, et al., 2011; Crandall, 1994, 1995; Kenrick et al., 2013; Rubino et al., 2020).[1] The consequences of weight-based stigmatization are profound, including painful maltreatment, poorer medical outcomes, and diminished economic opportunities (e.g., Foster et al., 2003; Hatzenbuehler et al., 2013; Janssen et al., 2004; Puhl & Heuer, 2009; Sjöberg et al., 2005). For example, some physicians view visits with higher weight patients as wasted time and report less desire to help them (Hebl & Xu, 2001); this could be an underlying cause of people with overweight and obesity forgoing essential preventative healthcare (see Puhl & Heuer, 2009). Moreover, compared to thinner women, "very heavy" women earn US$25,000 less per year (Judge & Cable, 2011). Obesity is also associated with lower educational attainment, perhaps mediated in part by differential treatment from teachers (see Puhl & Heuer, 2009); in one study, 32% of women with overweight or obesity reported experiencing stigma from instructors, and 21% reported that this was a repeated occurrence (Puhl & Brownell, 2006).

Over and above direct physiological effects of weight, experiences of fat stigma can negatively affect health and well-being (Major et al., 2014, 2018; Puhl & Brownell, 2003; Tomiyama et al., 2018). Experiencing fat stigma might increase all-cause mortality and, insidiously, trigger obesogenic processes (e.g., increased eating, increased production of obesogenic hormones)—independent of baseline body mass index (BMI), experiences of fat stigma are linked to increased BMIs later in life (Jackson et al., 2014)—thereby perpetuating the weight-stigma cycle (Brewis et al., 2018; Major et al., 2018; Tomiyama et al., 2018). The costs of fat stigma are viewed as so great as to motivate researchers to issue an international consensus statement for ending it (Rubino et al., 2020).

Toward improving the outcomes of half a billion people worldwide—including 70% of U.S. adults with overweight or obesity and growing numbers of adults and children in the developing world—it is critical to more fully understand fat stigma. We focus here on building the logic underlying the straightforward but largely underappreciated notion that body shape plays a critical role in fat sigma toward women.[2] To support this view, we integrate classic work on fat stigma with both biomedical and evolutionary social science research, deriving

[1] Oklahoma Center for Evolutionary Analysis (OCEAN), Department of Psychology, Oklahoma State University, Stillwater, OK, USA
[2] Department of Psychology, Arizona State University, Tempe, AZ, USA

Corresponding Author:
Jaimie Arona Krems, Oklahoma Center for Evolutionary Analysis (OCEAN), Department of Psychology, Oklahoma State University, 116 Psychology Building, Stillwater, OK 74078, USA.
Email: jaimie.krems@okstate.edu

and testing hypotheses regarding the importance of body shape in driving fat stigma.

Why Is Fat Stigmatized? Traditional Accounts

In social psychology, explanations for why people stigmatize those—particularly women—with overweight and obesity abound (see Diedrichs & Puhl, 2017; Puhl & Brownell, 2003). The most empirically well-supported approach leverages attribution theory (see Diedrichs & Puhl, 2017); that approach, represented well by Crandall and colleagues (Crandall, 1994; Crandall & Schiffhauer, 1998), posits that individuals with overweight and obesity are stigmatized because the attributions social perceivers make about why those individuals are overweight and obese are negative (e.g., laziness). Another explanation posits that people with obesity are stigmatized because their bodies deviate from morphological norms—deviations that heuristically activate evolved disease avoidance mechanisms (Park et al., 2007; van Leeuwen et al., 2015). Still other approaches suggest that fat stigma results from culturally specific issues of social inequality or that Western media depictions of extremely thin women play a causal role (Frederick et al., 2008; Silverstein et al., 1986; Thompson & Heinberg, 1999).

Although diverse, these accounts have two prominent factors in common. First, they tend to implicitly assume that social perceivers view fat as 'bad' and more fat as 'worse.' This assumption is well-supported; people stigmatize higher weight people more than thin or so-called "healthy" weight people, and people with increasing weights are increasingly stigmatized (Puhl & Brownell, 2003). This holds across target gender, age, ethnicity, and society, as well as across perceiver gender, age, ethnicity, society, and weight (Barroso et al., 2010; Brewis et al., 2018; Brown & Konner, 1987; Clément et al., 2020; Diedrichs & Puhl, 2017). Second, these accounts have not foregrounded the role of varying body shapes, which can arise from fats—often distinct types of fats—deposited on different parts of the body.

The Functionality of Fat(s)

Fat can be biologically beneficial. It can buffer against periods of caloric scarcity and facilitate important physiological processes (e.g., reproduction, pathogen defense; Frisch, 2004; Han et al., 2017; Jasienska, 2013; Maner et al., 2017; Nettle et al., 2017). Moreover, a significant lack of fat can suggest a number of physiological problems, such that one is struggling with dangerous pathogens (e.g., wasting diseases; Park et al., 2007).

The potential benefits (and costs) of fat partially depend on fat type. Biomedical research reveals that there are functionally distinct types of fat, which can be stored on different parts of the body (e.g., Jayedi et al., 2020; Kuk et al., 2006; Manolopoulos et al., 2010). We focus here on two prominent fats stored in two different locations—*abdominal fat*, stored on the midsection, and *gluteofemoral fat*, stored primarily on the hips, thighs, and buttocks. Although abdominal fat may confer some of the above benefits, negative outcomes traditionally associated with obesity (e.g., cardiovascular disease, type 2 diabetes) are often linked to fat stored on the midsection (Jayedi et al., 2020). Gluteofemoral fat is more likely to be stored by women than men, and it can confer significant sex- and age-specific functionality. For reproductive-aged women, gluteofemoral fat is associated with higher future reproductive potential and perhaps also better postpartum health and offspring cognitive development (Andrews et al., 2017; Frisch, 2004; Jasienska, 2013; Lassek & Gaulin, 2008, 2018a).

From Fat to Social Perception

Why might these biomedical facts contribute to social perceptions of fat and thus an understanding of fat stigma? Briefly, from an affordance management approach to social perception, people aim to manage the opportunities and threats afforded them by others. To accomplish this, people often rely on others' perceptible features (e.g., sex, facial expressions), which may be heuristically associated with those opportunities and threats (McArthur & Baron, 1983; Neuberg & Cottrell, 2008; Neuberg & Schaller, 2016; Neuberg et al., 2020). Because people's fat amounts and locations might provide some—albeit imperfect—diagnostic information (e.g., reproductive potential; Lassek & Gaulin, 2018a, 2018b), social perceivers might use this information, consciously or unconsciously, to infer targets' affordance implications and, consequently, value or devalue (i.e., stigmatize) them. This is not to suggest that these inferences are always accurate or that they are insensitive to ecological, cultural, or other circumstances (e.g., Anderson et al., 1992). It is to suggest, however, that social perceivers likely make inferences based not only on targets' body sizes—the focus of existing fat stigma research—*but also on targets' body shapes*.

A robust literature supports this notion that social perceivers use women's body shapes when making certain inferences about them. Specifically, women with significant gluteofemoral (but little abdominal) fat—that is, with lower waist-to-hip ratios (WHRs)—are deemed more physically attractive (Andrews et al., 2017; Marlowe et al., 2005; Pawłowski & Dunbar, 2005; Singh, 1993; Singh & Luis, 1995; Sugiyama, 2004; Tovée et al., 1999). This effect is cross-cultural and somewhat robust against fat amount (e.g., Lassek & Gaulin, 2018a, 2018b; Singh & Luis, 1995; Sugiyama, 2004) such that even higher BMI bodies are often found physically attractive when fat is distributed in this way, thereby underscoring the importance of body shape in social perception. Integrating this work to understand patterns of fat stigma implies, then, that even higher BMI women with gluteofemoral fat depositions might be viewed somewhat favorably and perhaps be somewhat buffered from fat stigma.

Implications for Fat Stigma: Overview and Novel Hypotheses

We build on these foundations to suggest two broad hypotheses about the psychology of fat stigma. First, in part, given the benefits associated with fat—and particularly young women's gluteofemoral fat—a woman with more fat might not always be more stigmatized than a woman with less fat. That is, in some instances, women with *less* fat might be *more* stigmatized. Second, body shape matters for stigma—over and above body size. This is not to say that targets carrying more fat will not be more stigmatized, for reasons including those delineated by existing work (Diedrichs & Puhl, 2017; Puhl & Brownell, 2003). This is to say, however, that attending solely to body size leaves much to be explained about the psychology of fat stigma. We test these two broad hypotheses via several specific predictions, employing a specifically designed stimulus set and complementary stigma measures, and in three samples varying in ethnicity and nation.

Consistent with the hypothesis that more fat is not always more stigmatized, we predict that (i) women will be stigmatized more when significantly underweight (lacking fat) than average-weight (with some sex-typical gluteofemoral fat). Consistent with the hypothesis that body shape influences fat stigma, over and above BMI, we predict that (iia) women with overweight will be *less* stigmatized when carrying gluteofemoral than abdominal fat and (iib) women with obesity will be *less* stigmatized when carrying gluteofemoral than abdominal fat or (iic) global fat (both gluteofemoral and abdominal fat). Integrating logic underlying both broad hypotheses, we further predict that women will be *less* stigmatized (iiia) when *obese* with gluteofemoral fat than *overweight* with abdominal fat and (iiib) when *overweight* with gluteofemoral (but not abdominal) fat than *underweight*.

Finally, (iv) we additionally test whether these predictions hold across participant ethnicity and society—U.S. adults, a cross-ethnic sample of U.S. adults, and adults from India. Given cross-ethnic and societal differences in fat stigma, investigating whether these predictions hold across ethnicity and society provides a stronger test of predictions: For example, Black Americans are less stigmatizing of higher BMI targets than White Americans (e.g., Grabe & Hyde, 2006; Hebl & Heatherton, 1998), highlighting possible ethnic differences in fat stigma. Anthropometry evidence also points to possible real-world differences in body measurements between White Americans and Indians; Indians may be considered obese and face related health issues at lower BMIs than White Americans (Snehalatha et al., 2003; World Health Organization [WHO], 2000), implying that body size norms might lead Indians to view a target that is average weight by White American standards as "too big."

To the best of our knowledge, similar predictions about body shape have not been derived from other accounts of fat stigma. Moreover, several predictions actually run counter to existing views—the predominating, if often implicit, view in existing fat stigma literature that fat is viewed as bad (and more fat is worse) and views emphasizing that Western media depictions cause preferences for, rather than stigmatization of, significantly underweight women (e.g., Silverstein et al., 1986; Thompson & Heinberg, 1999).[3]

Method

Participants

Sample 1 participants. Sample 1 participants were recruited as part of a larger study exploring inferences about targets from the novel BODy Size and Shape (BODSS) figure set (Neuberg & Krems, 2016), which includes over 50 figures varying in gender and life stage (infant, prepubescent, reproductive age, parenting age, postreproductive) and in which higher weight figures systematically vary in body size and shape. We aimed to glean usable data from 100 participants (50 female) for each of the 10 target gender × life-stage cells, using Amazon's Mechanical Turk (MTurk). Expecting some attrition, we over-recruited. Here, we focus on the 191 participants (103 female, 30 other or not reporting sex; $M_{age} = 36.77$; $SD_{age} = 13.29$) viewing the seven reproductively-aged female figures, yielding .95 power to detect small effects ($f < .15$) assuming .5 correlation among measures. In all samples, all participants completing dependent variables were included in analyses.

Sample 2 participants. To test cross-ethnic and cross-societal predictions, we aimed to combine Samples 2 and 3, as those participants completed the same exact procedure. Sample 2's participants were recruited by Qualtrics Panels to ensure roughly equal numbers of White and Black male and female Americans ($N = 295$; 70 White females, 77 Black females, 77 White males, 71 Black males; $M_{age} = 31.60$; $SD_{age} = 7.49$), controlling for educational attainment. We recruited as many participants as possible based on our funding limit. Combined with Sample 3, this yielded .95 power to detect small effects ($f < .10$) assuming .5 correlation among measures.

Sample 3 participants. To test cross-societal predictions, we aimed to recruit roughly 250 Indian participants via MTurk to create equivalent sample sizes for Samples 2 and 3. Over 300 participants began the survey. Sample 3 ultimately included 263 India-residing participants (82 female 29 not reporting; $M_{age} = 29.41$; $SD_{age} = 6.74$).

Materials

Although there exist numerous stimuli for assessing fat stigma (e.g., Gardner & Brown, 2010; Harris et al., 2008; Robinette et al., 2002; Swami et al., 2008), most do not include lower-weight figures (e.g., underweight) and/or are insufficiently specific to test the current predictions. Specifically, to the best of our knowledge, none systematically (and orthogonally) vary body size *and shape*. We worked with graphic artists and drew on existing body image scales, U.S. BMI data (e.g., from the Centers for Disease Control), and photographic databases of real people with varying BMIs and shapes (e.g., mybodygallery.com) to create the BODSS figure set (Neuberg & Krems, 2016). All participants viewed a subset from the BODSS—seven reproductively-aged female figures varying in body size and shape.

These seven figures include an "underweight" target, designed to be as underweight (in BMI units) relative to the "average-weight" target as the two "overweight" targets are overweight relative to the average-weight target. There is an average-weight target with a sex-typical BMI and body shape. There are two overweight targets, one carrying predominantly gluteofemoral fat and one carrying predominantly abdominal fat. Importantly, both overweight figures are designed to be the same exact height and weight (and thus BMI). And there are three "obese" targets, again all with the same BMI, but with one carrying predominantly gluteofemoral fat, another abdominal fat, and another globally distributed fat. This latter figure is included to reflect the traditional depictions of obesity in existing scales (e.g., Gardner & Brown, 2010; Gardner et al., 2009; Harris et al., 2008; Robinette et al., 2002; Stunkard et al., 1983; Swami et al., 2008).[4]

Targets with gluteofemoral fat were also designed to have some additional fat in the "chest" area as well, given work on WHR and shape, wherein such fats are often concomitant (Dixson, et al., 2010, 2011; Dixson, Sagata, et al., 2010; Singh, 1993, 1994).[5] For ease of describing results, we refer to such targets simply as having gluteofemoral fat.

Procedure and Design

Participants in each sample underwent a similar experimental procedure, whereby they provided evaluative responses to the seven reproductively aged female figures, each of which was presented individually along with descriptive text (i.e., "18-year-old female" for Sample 1 or "26-year-old female" for Samples 2 and 3) in random order and with faces obscured (to focus participants on bodies).

Sample 1 procedure and design. Participants in Sample 1 viewed figures labeled as "18-year-old females" and rated each on over 30 traits using 7-point Likert-type scales (1 = *not at all*, 7 = *very much*) as part of a large pilot study. Complementing the more traditional operationalization of stigma implemented for Samples 2 and 3, we operationalized stigma here by aggregating over six pairs of affectively opposing traits stereotypically associated with obesity, which were chosen from the larger set of trait inferences (negative = *physically gross, unhealthy, lazy, selfish, greedy,* and *gluttonous;* positive = *physically attractive, healthy, hardworking, cooperative, generous,* and *self-controlled*). These trait pairs were chosen a priori to reflect some of the most pervasive negative inferences about higher weight; because our framework also implies that people might view some higher weight targets positively, we additionally included the positive versions of these traits.

To compute stigma, for each figure, we computed a mean endorsement of positive stereotypes and a mean endorsement of negative stereotypes and then subtracted the mean endorsement of negative stereotypes from the mean endorsement of positive stereotypes. Thus, scores of zero indicate neutral feelings toward targets, higher scores indicate more favorable ratings and less stigmatization, and lower scores indicate less favorable ratings and more stigmatization. In the Supplementary Material, we also present separate analyses for the positive and also the negative aggregates. When analyzed separately, the positive and negative traits yield the same conclusions based on *p* values and direction of effects as does the stigma score with three exceptions, all for the negative traits (all conclusions for positive effects replicate). We present the full analysis of the positive and negative traits in the Supplementary Material. Because the patterns for the separate positive and negative aggregates largely replicate the pattern for stigma, we report only the findings for aggregated stigma in the main text.

Sample 2 and 3 design and procedure. Participants in Samples 2 and 3 viewed the same seven female figures, again presented individually and in random order with faces obscured. (Participants also viewed seven reproductively aged male figures and were randomly assigned to view either the full male or female set first; we do not discuss male figures here. The viewing order had no significant effects on figure ratings.)

To assess stigma, we employed a complementary and more traditional measure in which participants provided *positive* and *negative* feelings toward each target ("How [positively/negatively] do you feel about this person?") on 7-point Likert-type scales (1 = *not at all*, 7 = *very*). Participants also later reported other trait inferences unrelated to the hypotheses explored here.

We computed a measure of stigma toward each target by subtracting reported negative feelings from reported positive feelings. Scores of zero indicate neutral feelings toward targets, higher scores indicate more favorable ratings and less stigmatization, and lower scores indicate less favorable ratings and more stigmatization. In the Supplementary Material, we present separate analyses for these positive and negative ratings individually; because these analyses replicate findings using the combined measure, we report below findings from the stigma composite only. Data, measures, and code are available at Open Science Framework: osf.io/sfbtc/. The BODSS stimuli used here are available at osf.io/tvrb8/.

Results

More Fat, More Stigma

We first aimed to conceptually replicate the pattern of findings from traditional approaches. Because traditional approaches do not systematically vary target shape for heavyweight targets, we examined stigma toward overweight and obese women when *aggregating over target fat location* by averaging stigma ratings for the two overweight figures and for the three obese figures, respectively.[6] Replicating the robust pattern of findings from existing work, across all three samples, women were more stigmatized when overweight than average weight, and when obese than overweight.[7] See Figure 1 and Tables 1 and 2 (and Table S1 for means [SDs] for positive and negative responses). That these findings so strongly adhere to those using other

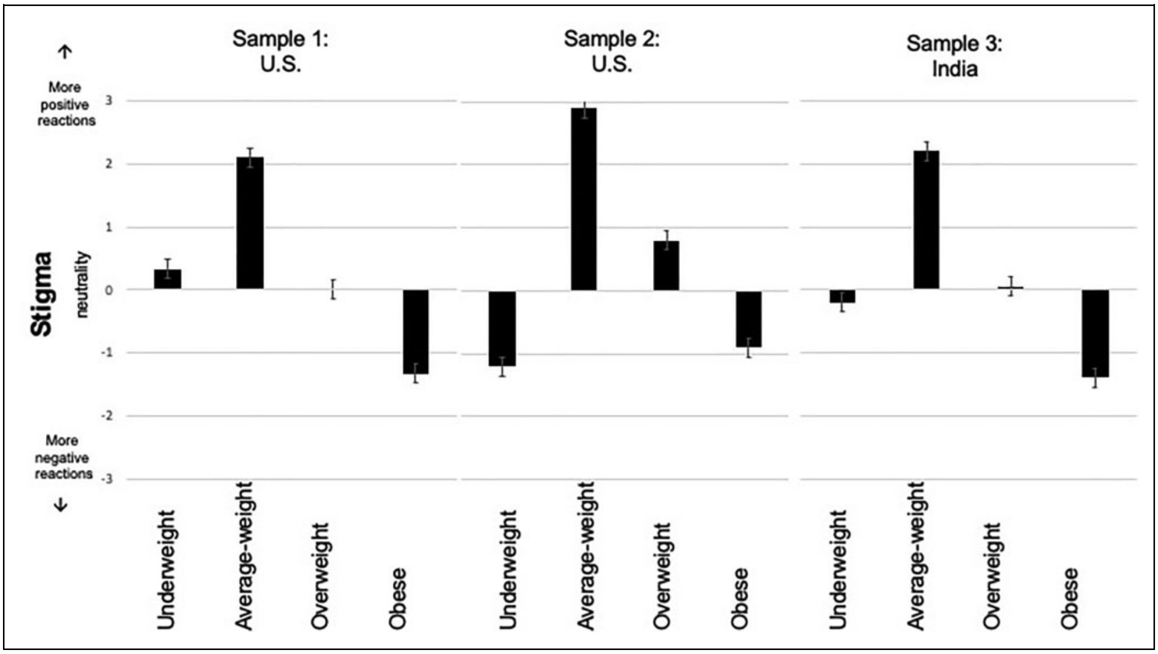

Figure 1. Stigma toward women in Samples 1, 2, and 3. *Note*. When aggregating across fat location for overweight and obese female targets, targets with increasing body mass indexes are increasingly stigmatized relative to average-weight targets, consistent with findings in the extant literature. We include underweight figures for reference. Error bars reflect standard errors.

Table 1. Means (*SDs*) for Stigma (Aggregated) in Samples 1–3.

	Sample				
Figure Size/Shape	Sample 1: United States	Sample 2: United States (Combined)	Sample 2: White Americans	Sample 2: Black Americans	Sample 3: India
Underweight	0.33 (1.56)	−1.20 (3.23)	−1.35 (3.19)	−1.04 (3.28)	−0.19 (2.84)
Average weight	2.10 (1.41)	2.85 (2.61)	3.09 (2.53)	2.61 (2.68)	2.20 (2.54)
Overweight with gluteofemoral fat	0.86 (1.64)	1.77 (2.57)	1.41 (2.40)	2.15 (2.70)	0.60 (2.38)
Overweight with abdominal fat	−0.79 (1.59)	−0.26 (2.89)	−0.27 (2.68)	−0.25 (3.10)	−0.49 (2.17)
Overweight (aggregated)	0.01 (1.30)	0.77 (2.26)	0.59 (2.17)	0.96 (2.35)	0.05 (1.87)
Obese with gluteofemoral fat	−0.28 (1.66)	0.60 (2.92)	0.24 (2.89)	0.99 (2.92)	−0.45 (2.63)
Obese with abdominal fat	−1.97 (1.81)	−1.82 (3.24)	−1.79 (3.23)	−1.85 (3.26)	−1.98 (2.81)
Obese with global fat	−1.64 (1.89)	−1.41 (3.28)	−1.34 (3.16)	−1.47 (3.40)	−1.83 (2.80)
Obese (aggregated)	−1.33 (1.53)	−0.88 (2.68)	−0.95 (2.68)	−0.80 (2.68)	−1.39 (2.29)

Table 2. Conceptually Replicating Fat Stigma (Aggregated) From Traditional Approaches in Samples 1–3.

Question	Sample 1—United States	Sample 2—United States (Combined)	Sample 3—India
Are targets stigmatized more when overweight versus average weight?	Yes, $F(1, 176) = 239.15$, $p < .001$, $\eta_p^2 = .576$, 95% CI = [−2.35, −1.82]	Yes, $F(1, 280) = 141.46$, $p < .001$, $\eta_p^2 = .336$, 95% CI = [−2.41, −1.73]	Yes, $F(1, 246) = 157.82$, $p < .001$, $\eta_p^2 = .391$, 95% CI = [−2.50, −1.82]
Are targets stigmatized more when obese versus overweight?	Yes, $F(1, 183) = 156.35$, $p < .001$, $\eta_p^2 = .461$, 95% CI = [−1.53, −1.11]	Yes, $F(1, 280) = 169.72$, $p < .001$, $\eta_p^2 = .377$, 95% CI = [−1.91, −1.41]	Yes, $F(1, 155) = 111.43$, $p < .001$, $\eta_p^2 = .304$, 95% CI = [−1.75, −1.20]

stimulus sets enhances the credibility of this new stimulus set as a method for investigating fat stigma.

. . . But Not Always, and Shape Is Critical

Findings also reveal, however, that fat stigma is more nuanced than this. First, supporting Prediction i, and thereby the broader hypothesis that more fat is not always more stigmatized, participants tended to stigmatize women more when those women were underweight than average weight. See Tables 2 and 3 (and Tables S1 and S2 for findings for positive and negative responses).

Second, women were differently stigmatized as a function of their shapes, supporting our other broad hypothesis. Across participant ethnicity/society, women with overweight were less stigmatized when carrying gluteofemoral versus abdominal fat (Prediction iia); women with obesity were less stigmatized when carrying gluteofemoral versus either abdominal (Prediction iib) or global fat (Prediction iic). See Figure 2 and Tables 2 and 3 (and Tables S1 and S2 for positive and negative responses).

Third, and supporting both broad hypotheses, people more strongly stigmatized women with underweight than with overweight and carrying gluteofemoral fat (Prediction iiia). People also more strongly stigmatized women with overweight carrying abdominal fat than women with obesity carrying gluteofemoral fat (Prediction iiib). Findings suggest that shape is sufficiently important in driving fat stigma that it buffers objectively higher BMI women against the otherwise stigmatizing implications of carrying more fat. See Figure 2 and Table 3. Fourth, these findings largely held across participant ethnicity/society, supporting Prediction iv (see Tables 2 and 3).

In combined Samples 2 and 3, we also explored possible ethnic/societal differences in fat stigma, given past research (e.g., Clément et al., 2020; Cogan et al., 1996; Hebl & Heatherton, 1998). We find that Black Americans stigmatized women with overweight and obesity less than did White Americans, in line with past work, and less than did Indian participants. But our data additionally reveal that this obtained only when women's fat was gluteofemoral. See Figures 2 and 3; see Table 4 for statistical analyses. White Americans also stigmatized women with gluteofemoral fat less than did Indian participants. By contrast, Indian participants tended to be both *less* stigmatizing of the underweight woman and *more* stigmatizing of the average weight woman than Black or White Americans, which might reflect genuine anthropometric differences in normative body sizes in India versus the United States (e.g., WHO, 2000).

Discussion

In cross-ethnic and cross-societal samples, and using complementary measures of stigma, we first conceptually replicated the robust pattern that people stigmatize women with higher BMIs (when aggregating over higher BMI targets' shapes). However, we also found strong support for our two broad hypotheses, which suggest fat stigma is more nuanced than this: First, more fat is not always more stigmatized. People

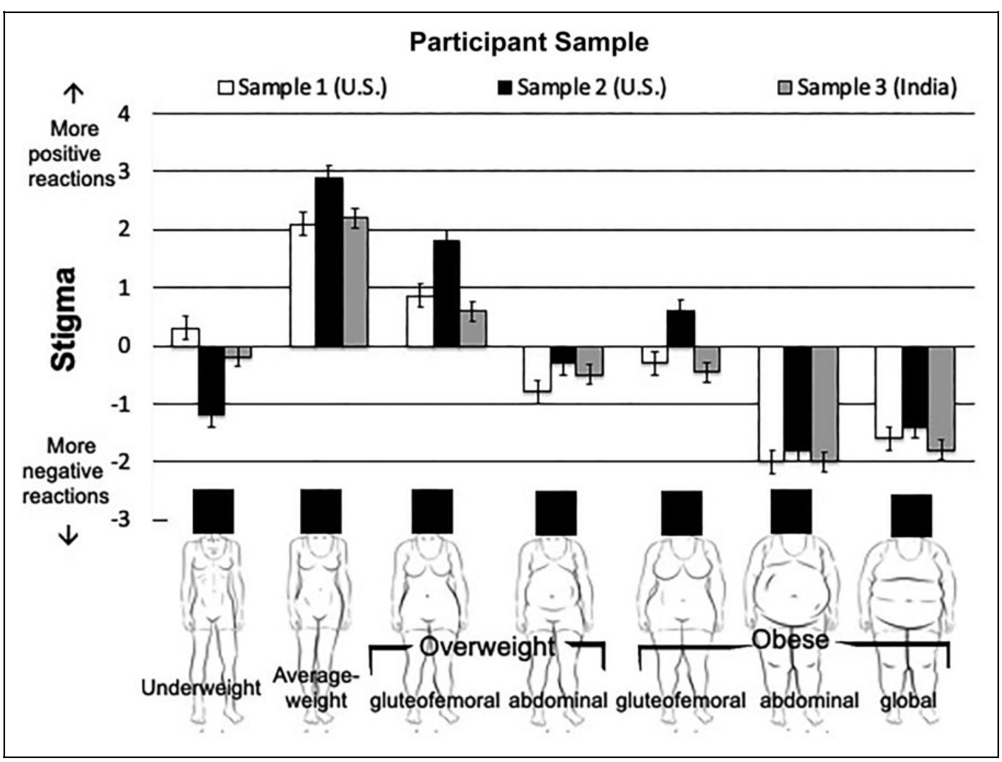

Figure 2. Stigma toward women in Samples 1, 2, and 3. *Note*. Across samples, fat deposition location (body shape) strongly influences fat stigma of overweight and obese women. The two overweight figures have the same body mass indexes (BMIs), and the three obese figures have the same BMIs. Error bars represent standard errors.

Table 3. Statistical Analyses Testing Predictions i–iv for the Fat Stigma (Aggregated) Measure.

Predictions	Sample 1—United States	Sample 2—United States (White Americans)	Sample 2—United States (Black Americans)	Sample 3—India
Higher BMI targets are not (always) more stigmatized				
Are women stigmatized more when underweight than average weight? (Predictions i, iv)	Yes, $F(1, 172) = 169.06$, $p < .001$, $\eta_p^2 = .496$, 95% CI = [−2.06, −1.52]	Yes, $F(1, 139) = 170.58$, $p < .001$, $\eta_p^2 = .551$, 95% CI = [−5.14, −3.80]	Yes, $F(1, 133) = 112.23$, $p < .001$, $\eta_p^2 = .458$, 95% CI = [−4.41, −3.02]	Yes, $F(1, 245) = 123.89$, $p < .001$, $\eta_p^2 = .336$, 95% CI = [−2.82, −1.97]
. . . and fat is stigmatized differently depending on its location				
Are women stigmatized less when overweight with gluteofemoral fat versus abdominal fat? (Predictions iia, iv)	Yes, $F(1, 170) = 109.16$, $p < .001$, $\eta_p^2 = .391$, 95% CI = [1.33, 1.94]	Yes, $F(1, 140) = 59.51$, $p < .001$, $\eta_p^2 = .298$, 95% CI = [1.27, 2.15]	Yes, $F(1, 132) = 74.96$, $p < .001$, $\eta_p^2 = .362$, 95% CI = [1.98, 3.16]	Yes, $F(1, 244) = 38.66$, $p < .001$, $\eta_p^2 = .137$, 95% CI = [0.72, 1.40]
Are women stigmatized less when obese with gluteofemoral fat versus abdominal fat and global fat? (Predictions iib, iic, iv)	Yes, $F(1, 175) = 175.64$, $p < .001$, $\eta_p^2 = .501$, 95% CI = [1.44, 1.95]; $F(1, 169) = 96.66$, $p < .001$, $\eta_p^2 = .364$, 95% CI = [1.05, 1.58]	Yes, $F(1, 141) = 76.13$, $p < .001$, $\eta_p^2 = .351$, 95% CI = [1.57, 2.49]; $F(1, 141) = 40.61$, $p < .001$, $\eta_p^2 = .224$, 95% CI = [1.08, 2.05]	Yes, $F(1, 132) = 91.16$, $p < .001$, $\eta_p^2 = .408$, 95% CI = [2.25, 3.43]; $F(1, 133) = 75.73$, $p < .001$, $\eta_p^2 = .363$, 95% CI = [1.90, 3.02]	Yes, $F(1, 245) = 67.79$, $p < .001$, $\eta_p^2 = .217$, 95% CI = [1.20, 1.95]; $F(1, 245) = 59.38$, $p < .001$, $\eta_p^2 = .195$, 95% CI = [1.07, 1.80]
Are women stigmatized more when underweight versus overweight with gluteofemoral fat? (Predictions iiia, iv)	Yes,[a] $F(1, 167) = 9.54$, $p = .002$, $\eta_p^2 = .054$, 95% CI = [−0.84, −0.18]	Yes, $F(1, 139) = 80.61$, $p < .001$, $\eta_p^2 = .367$, 95% CI = [−3.41, −2.18]	Yes, $F(1, 128) = 92.35$, $p < .001$, $\eta_p^2 = .419$, 95% CI = [−4.02, −2.65]	Yes, $F(1, 244) = 12.80$, $p < .001$, $\eta_p^2 = .050$, 95% CI = [−1.21, −0.35]
Are women stigmatized more when overweight with abdominal fat versus obese with gluteofemoral fat? (Predictions iiib, iv)	Yes,[a] $F(1, 179) = 96.25$, $p < .001$, $\eta_p^2 = .350$, 95% CI = −1.43, −0.95]	Yes,[a] $F(1, 141) = 5.59$, $p = .019$, $\eta_p^2 = .010$, 95% CI = [−0.95, −0.08]	Yes, $F(1, 134) = 23.65$, $p < .001$, $\eta_p^2 = .150$, 95% CI = [−1.69, −0.71]	No, $F(1, 244) = 0.05$, $p = .817$, $\eta_p^2 < .000$, 95% CI = [−0.39, 0.31]

Note. BMI = body mass index.
[a]The corresponding effect is not significant on the negative trait rating (see Supplemental Material for details).

stigmatized women more when those women were underweight than average-weight. This effect challenges assumptions of fat being viewed as solely ‘bad’ and accords with both biological research underscoring the beneficial functionality of fat (e.g., Nettle et al., 2017) and also underexplored implications from evolutionary accounts (i.e., social perceivers may infer significantly underweight persons as posing possible disease threats and stigmatize them; Park et al., 2007).

Second, and more potentially transformative, body shape plays a powerful but heretofore underappreciated role in fat stigma. Even when controlling for body size, people stigmatized higher weight women more when those women carried abdominal versus gluteofemoral fat. This effect accords with implications derived from biological, medical, and evolutionary social science work on fats (e.g., Andrews et al., 2017; Frisch, 2004; Jasienska, 2013; Singh, 1993). Although not previously shown in empirical work, this finding might also be viewed as reflecting women’s lived experiences and/or intuitions; women have long considered shape to an important factor affecting appearance perceptions (e.g., Stevens, 1995; Tovar, 2012).

Third, people sometimes reported greater stigmatization of objectively *lower* versus higher weight women. People were less stigmatizing when women had obesity and gluteofemoral fat than overweight and abdominal fat; people were less stigmatizing when women had overweight and gluteofemoral fat than underweight. This again suggests that more fat is not always deemed worse and also further underscores the importance of body shape in driving fat stigma. In combination with the finding that women were stigmatized more when underweight versus average weight, these effects challenge lay expectations that people, at least in the West, prefer thin to average-weight women (but see, e.g., Johnson & Engeln, 2020). We discuss this further in the Supplementary Materials, where we also explore participant sex differences.

Fourth, these findings largely held across participant ethnicity/society. However, compared to White Americans and Indian participants, Black Americans were less stigmatizing of women with overweight or obesity—but only when that fat was gluteofemoral (and not abdominal). Thus, data are consistent with findings that Black Americans are less stigmatizing

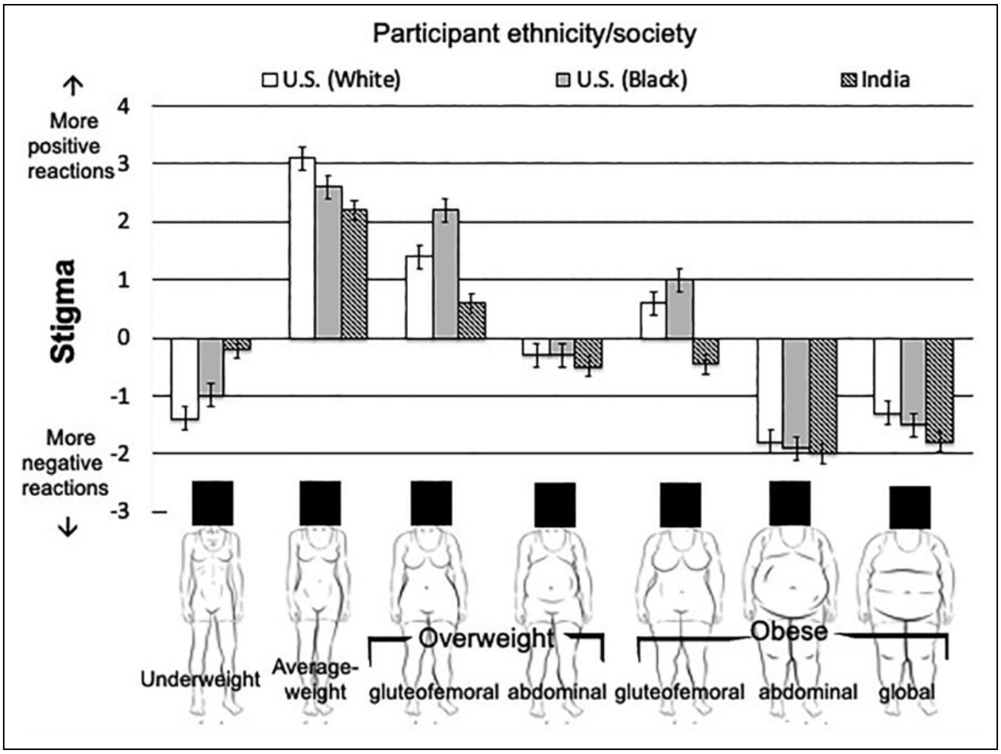

Figure 3. Stigmatization of women as a function of size (body mass index [BMI]), shape, and participant ethnicity/society in Samples 2 (White and Black Americans) and 3 (India). *Note*. The two overweight figures have the same BMIs; the three obese figures have the same BMIs. Error bars represent standard errors.

Table 4. Prominent Cross-Ethnic and Cross-Societal Differences in Fat Stigma (Aggregated).

Comparing Black and White American Participants	Comparing Black American and Indian Participants	Comparing White American and Indian Participants
Black Americans tend to stigmatize higher weight women with gluteofemoral (but not abdominal fat) less than White Americans or Indian participants		
Black Americans stigmatized the target with overweight and gluteofemoral fat less than did White Americans: $F(1, 260) = 4.64$, $p = .032$, $\eta_p^2 = .018$, 95% CI = [−1.30, −0.06]	Black Americans stigmatized the target with overweight and gluteofemoral fat less than did Indian participants: $F(1, 357) = 30.04$, $p < .001$, $\eta_p^2 = .013$, 95% CI = [−0.66, −0.04]	White Americans stigmatized the target with overweight and gluteofemoral fat less than did Indian participants: $F(1, 371) = 10.62$, $p < .001$, $\eta_p^2 = .028$, 95% CI = [−1.36, −0.34]
Black Americans stigmatized the target with obesity and gluteofemoral fat less than did White Americans: $F(1, 260) = 4.43$, $p = .036$, $\eta_p^2 = .017$, 95% CI = [−1.47, −0.05]	Black Americans stigmatized the target with obesity and gluteofemoral fat less than did Indian participants: $F(1, 357) = 20.85$, $p < .001$, $\eta_p^2 = .055$, 95% CI = [−0.80, −0.10]	White Americans stigmatized the target with obesity and gluteofemoral fat less than did Indian participants: $F(1, 371) = 4.45$, $p = .036$, $\eta_p^2 = .012$, 95% CI = [−1.20, −0.04]
Targets with overweight and abdominal fat and with obesity and abdominal or global fat were not differently stigmatized: $ps < .670$	Targets with overweight and abdominal fat and with obesity and abdominal or global fat were not differently stigmatized: $ps < .310$	Targets with overweight and abdominal fat and with obesity and abdominal or global fat were not differently stigmatized: $ps < .110$
Indian participants tend to stigmatize underweight women less (and average-weight women more) than Americans		
	Indian participants stigmatized the underweight target less than did Black Americans: $F(1, 357) = 8.41$, $p = .004$, $\eta_p^2 = .005$, 95% CI = [0.31, 1.60]	Indian participants stigmatized the underweight target less than did White Americans: $F(1, 371) = 13.98$, $p < .001$, $\eta_p^2 = .036$, 95% CI = [0.57, 1.82]
	Indian participants stigmatized the average-weight target more—but not significantly—than did Black Americans: $F(1, 357) = 1.64$, $p = .201$, $\eta_p^2 = .005$, 95% CI = [−0.94, 0.20]	Indian participants stigmatized the average-weight target more than did White Americans: $F(1, 371) = 10.67$, $p = .001$, $\eta_p^2 = .028$, 95% CI = [−1.43, −0.36]

toward higher weight figures (Grabe & Hyde, 2006) while underscoring the importance of body shape in the social perception of fat put forward here.

The shape-related hypotheses tested here may be understudied for several reasons. First, existing stimulus sets have not systematically manipulated target size *and shape* (but see Connell et al., 2006; Hu et al., 2018; Sheldon, 1950; Thoma et al., 2012). Rather, stimulus sets typically depict higher weight figures as having increasing amounts of abdominal or global (but not solely gluteofemoral) fat. If stimuli do not systematically manipulate body shape, researchers cannot discover the effects of body shape (e.g., on stigma). Related, because of its focus, fat stigma research might be less likely to include response options assessing positive attitudes or inferences (e.g., physically attractive) in addition to negative attitudes or inferences. As we describe further in the Supplementary Materials, such "positive" measures may be particularly useful for revealing size-and-shape-related differentiation (even more so than negative attitudes and/or endorsement of negative trait inferences). See Tables S1 and S2.

Limitations, Implications, and Future Directions

One might wonder whether these findings are conceptually irrelevant artifacts of idiosyncratic stimulus features. This is somewhat unlikely, given the process used to generate the stimuli (i.e., mimicking BMIs gleaned from the Centers for Disease Control data and real-world body shapes), and that the stimuli (when aggregated over fat lot locations) produce the same pattern as existing work and because perceivers from different ethnicities/societies viewed the same stimuli in cogently distinct ways. One might also wonder whether the presence of additional breast tissue on figures with gluteofemoral fat caused those figures to be buffered from stigmatization. Follow-up studies in the United States—using figures having both faces *and chests* obscured—have replicated the pattern of results reported here (Krems & Bock, 2021). It remains an open question, however, whether breast tissue differentially affects stigma across societies. Even as stimulus effects, alone, are unlikely to be driving results, future research using alternative stimuli—varying in age, ethnicity, photorealism, and so on—would further increase confidence in these findings. We note again, however, that our stimuli were created to test novel hypotheses about fat amount and location, for which, to our knowledge, other existing stimulus sets are insufficient.

We focused on stigma toward women because women face greater weight-based stigmatization (e.g., Puhl & Heuer, 2009) and because of the straightforward hypotheses our framework generates about women given the sex-specific functionality of gluteofemoral fat. We would not, however, argue that body shape is irrelevant for men. Whereas women have relatively greater fat mass, men have relatively greater muscle mass. One might speculate that weight-based stigmatization of men might be influenced not only by men's fat amount and deposition but also—and perhaps more strongly—by men's muscle amount and deposition (e.g., Frederick & Haselton, 2007; see also Sacco et al., 2020).

These findings have potentially major implications for future research and intervention. Specifically, body shape may be usefully incorporated into existing theories of fat stigma. For example, higher BMI targets with different body shapes might evoke different attributions, suggesting extensions for attribution theory accounts of fat stigma (e.g., Crandall, 1994). Body shape might also be incorporated into other relevant research (e.g., on perceived fat stigma, body image). For example, these findings imply that, compared to higher weight women with gluteofemoral fat, same-weight women with abdominal fat may report more frequent and/or harsher experiences of weight-based stigma and discrimination—and might thus be at greater risk for experiencing the negative effects of fat stigma. If so, considerations of body shape might improve our understanding of the psychology of fat stigma and have direct, translational impact for intervention research and implementation.

Conclusions

Theories drive research, application, and intervention. To the extent that existing fat stigma work did not foreground fat-linked differences in body shape via theory, stimuli, or measures, the effects of body shape on fat stigma have gone empirically underexplored. Yet, body shape is likely to strongly influence the stigmatization of those with overweight or obesity—approximately 70% of U.S. adults and growing numbers of adults and children in the developing world (NHANES, 2018). Effective health policy requires a full understanding of fat stigma (Brewis, Hruschka, & Wutich, 2011). The present work provides novel, actionable insights into fat stigma toward women.

Declaration of Conflicting Interests

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ORCID iD

Jaimie Arona Krems https://orcid.org/0000-0002-2590-2241

Supplemental Material

The supplemental material is available in the online version of the article.

Notes

1. There remains debate among stigma and obesity researchers, as well as other medical professionals and activists, as to ethical language. One view advocates for person-first language when using

terms like "obesity" (e.g., "people with obesity"), arguing that it is less pejorative than alternatives (see, e.g., Ravussin & Ryan, 2015). Another view suggests that person-first language can be "medicalizing" (see, e.g., Meadows & Daníelsdóttir, 2016). We recognize that each approach seeks both scientific clarity and compassion. Here, we generally adopt the person-first convention, as it is presently the one most commonly employed by researchers of obesity and its effects, but we acknowledge that the field and society may one day deem this approach to be less than ideal.

2. Men's shapes likely also play a role in their stigmatization. We return to this in the Discussion.
3. Some accounts imply effects of perceiver sex. Although space limitations prohibit a full discussion of this, we test and discuss perceiver sex effects in the Supplementary Material. The pattern of findings largely replicated across sex.
4. Figure terminology was based on body mass index (BMI) categories; for example, the "average-weight" target refers to a "healthy" BMI.
5. In ongoing research using these stimuli, the presence of chest-area fat seems irrelevant to fat-based stigma; targets with only faces obscured (as here) and targets with faces *and chests* obscured produce the same patterns of stigma in U.S. participants (Krems & Bock, 2021). We return to this in the Discussion.
6. One might consider this a conservative test of whether the BODy Size and Shape (BODSS) figures produce the same pattern of stigma as traditional figures. That is, traditional figure sets often locate "excess" fat in the abdominal region, whereas we aggregate over figures with fat in abdominal and potentially less stigmatized gluteofemoral regions; thus, perhaps a more direct "replication" would use only those higher weight BODSS figures with abdominal fat.
7. We present omnibus tests in the Supplemental Material.

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Author Biographies

Jaimie Arona Krems is a social psychologist and a co-founding member of The OCEAN (Oklahoma Center for Evolutionary Analysis), housed in the Department of Psychology, where she is an Assistant Professor. Broadly, her research asks how people navigate their social world to meet their social goals. Her primary work draws on interdisciplinary tools to (a) examine understudied aspects of women's cognition and behavior and (b) challenge existing knowledge on well-worn topics in social psychology (e.g., stigma, well-being).

Steven L. Neuberg is Foundation Professor of Psychology at Arizona State University, where he directs the Evolution, Ecology, and Social Behavior Lab. He takes an evolutionary approach to better understand stigma, stereotyping, and prejudices; motivated social cognition; and, more generally, how people identify and manage the opportunities and threats they confront each day.

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