Weight Bias in Reproductive Medicine: A Curiously Unexplored Frontier

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Abstract

Obesity has been associated with a multitude of medical comorbidities, infertility, and adverse obstetric outcomes. Weight stigma and weight bias pervade not only the medical field but also education, employment, and activities of daily living. The experience of weight stigma has been shown to adversely impact not only the mental health of individuals with overweight or obesity but also worsen obesogenic behaviors, and medical comorbidities. This review frames the rise of weight stigma and weight bias within the context of the "obesity epidemic" and explores its associations with infertility and decreased access to health care and its subsequent impact on the lives of individuals. Furthermore, it explores the concepts of intrinsic and extrinsic weight stigma/bias and highlights the need for further examination and research into the impact of these factors on access to reproductive medicine and subsequent outcomes.

Keywords

- obesity
- weight stigma
- weight bias
- infertility
- access to care

Since the 1980s, the prevalence of overweight and obesity in the United States has steadily risen and has remained an area of significant interest in the realm of medicine and public health due to the associated increase in morbidity and mortality.[1] While obesity has been linked to cardiovascular disease, diabetes mellitus, and increased all-cause mortality, it has also been shown to have a detrimental effect on both fertility and pregnancy outcomes in reproductive-aged females.[2–8] Recent analyses of data collected by the 2017–2018 National Health and Nutritional Examination Survey (NHANES) demonstrate an increase in the prevalence of obesity—defined as body mass index (BMI) $\geq$30 kg/m^2—and severe obesity (BMI $\geq$40 kg/m^2) to 33.4 and 11.5%, respectively, among adult women in the United States.[9] Furthermore, longitudinal analyses of BMI from 2005 to 2014 demonstrated a positive linear trend with respect to overall and severe obesity among females that was not observed in males.[10] While multiple measures of adiposity or relative fat content exist, the dominant method of classification of an individual's weight/nutritional status remains BMI, though some debate exists regarding its ability to individualize medical risk.

Among females of reproductive age, obesity has been associated with higher rates of infertility, increased time to pregnancy, and lower live birth relative to "normal" weight peers.[5,11,12] While these trends are often attributed to chronic oligo-anovulation, they have been shown to persist even in obese females with regular menstrual cycles.[11] Furthermore, individuals with obesity who achieve a pregnancy experience higher rates of miscarriage, stillbirth, and pregnancy complications including gestational diabetes, preeclampsia, and cesarean delivery.[5,6,12,13]

Weight stigma is estimated to impact up to 57% of individuals regardless of body habitus.[14,15] Prior studies have argued that individuals with obesity face greater social stigma than any other social group.[15] The extrinsic and intrinsic devaluation that individuals with obesity experience as a result of weight stigma and bias has been linked not only to poor mental health outcomes but also decreased utilization of medical services, higher rates of hypertension, infertility, and all-cause mortality after controlling for BMI.[14,16] In the realm of assisted reproductive technology (ART), BMI restrictions are common at in vitro fertilization (IVF) clinics, therefore laying the groundwork for a potentially stigmatizing environment for patients with obesity who are seeking fertility care—and may be unable to access IVF without weight loss. Despite these trends and the

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established link between infertility and obesity, there is a dearth of evidence exploring the impact of weight stigma on access to reproductive medicine and outcomes in superovulation and ART cycles. The core clinical question is therefore, given the established relationship between obesity and poor reproductive/obstetric outcomes, what impact does weight bias and weight stigma have on these endpoints? The goal of this article is to explore the impact of weight bias and weight stigma on health outcomes of individuals and to draw attention to the gap in the literature with respect to the impact they may play in both access to and successful utilization of reproductive medicine services.

From Sought After to Stigmatized: Historical Trends and Obesity

The "ideal" body type set forward by society underwent a transformation as the world emerged into the era of globalization and modernity. Examination of some of the earliest artwork, known as "Venus statues," which date back to the Upper Paleolithic in Europe, depicts female bodies with high body fat and accentuated breasts, representing an idealized body type during a period of intense scarcity.[17] These figures reflected standards of beauty and fertility, promoting survival and reproductive fitness during a period of nutritional stress that defined the environment in which these individuals lived.[17] Therefore, the ideal female body type depicted in sculpture and art over the ages gives an observer a window into the value that society and culture placed on larger bodies at key periods in history. We are now in the era of an "obesity epidemic," where a body type that was previously revered as a symbol of beauty and fertility is stigmatized. A clear part of loosening the hold of weight stigma on individuals is removing the shame and blame leveled at those whose bodies do not conform to the standard set forward by the society.

Rethinking Measures of Adiposity: What Are Alternatives to BMI?

BMI remains the dominant method of classifying and categorizing the body composition of individuals, including the diagnosis of obesity and its relative classes, based on the established criteria by the World Health Organization (class I: BMI 30–34.9 kg/m^2; class II: BMI 35–39.9 kg/m^2; class III: BMI $\geq$40 kg/m^2). The origins of the BMI calculation date back to the 19th century when Belgian mathematician Adolphe Quetelet developed a theorem not to diagnose obesity but rather to characterize the average European man.[18] While BMI has been shown to be well correlated with overall body fat, a debate remains about its accuracy with respect to estimation of subsequent medical risk due to innate differences in the distribution of visceral fat—which is often attributed to increased risk of cardiovascular or metabolic dysfunction—especially among individuals of different sexes, ages, and racial/ethnic groups.[3,19] Utilizing dual-energy X-ray absorptiometry (DXA)—which allows for accurate measurement of total body adiposity through the relative attenuation of X-rays through body compartments—it has been shown among females that BMI is more strongly correlated with total percent body fat than anthropometric waist circumference (WC); although interestingly, BMI and WC were most strongly correlated with each other.[19,20] With that said, direct application of this to specific disease processes is challenging, as unique conditions or disorders may have both different associations with body composition and measures like BMI and WC.[19] Moreover, it has become clear that there are different risk profiles for different racial/ethnic groups when it comes to stratification of disease risk by BMI or anthropometric measures.[19] Furthermore, given differences in body type and fat distribution, arguments have been made for racially specific BMI cutoffs for obesity in individuals of East Asian descent to allow for appropriate screening and risk stratification.[21] Further critiques of BMI include underestimation of obesity in individuals with short stature and overestimation in those with tall stature or high muscle mass.

Other measures of estimating body adiposity have been developed including bioelectrical impedance analysis (BIA), which allows for assessment of body composition based on the conduction time of current through body issues. Utilizing this principle, BIA can be used to compute an individual's total body water and through this, body fat and free fat mass. However, this technique is less accurate for measuring visceral adipose tissue and can have significant variation in results based on an individual's hydration status, extremity length, electrode location, and exercise pattern.[20] As discussed earlier, DXA can be used to estimate total body fat; however, it cannot directly measure visceral adipose tissue, but rather computes this value based on anatomic modeling.[20] Fat-referenced MRI has been proposed as an alternate method of analyzing body composition, and a prior study has shown it to be strongly correlated with DXA with respect to total body fat.[20] However, in this analysis the correlation between these imaging modalities was weaker when examining visceral adiposity and agreement was also lower in obese subjects.[20] As a result, while there are a variety of measures and imaging studies that can be used to estimate an individual's body composition with respect to adipose tissue, BMI remains the standard for diagnosis of obesity and relative stratification of potential medical risk due to limited data for these alternative measures with respect to screening and outcomes.

Understanding the Problem: Unearthing Extrinsic and Intrinsic Weight Stigma

In a global society with a high prevalence of obesity, individuals with higher adiposity are subjected to discrimination and mistreatment related to their body size on a regular basis. This behavior and relative "social acceptance" of such a practice is rooted in a modern culture of "fat shaming" where individuals with bodies that do not approximate a lean archetype are demonized and devalued. This treatment is further spurred by a diet culture that floods individuals with advertisements and programs that consistently message to men, women, and children that they need to lose weight or

change their body composition. As Westbury argues, in a departure from trends seen in other public health issues such as tobacco use, attempts to make obesity socially undesirable have not successfully reduced obesity rates and have actually increased harm for people with obesity.[22] Such a society and such a culture have created fertile ground for the growth and entrenchment of weight stigma.

While the principles are clear, there are varying definitions of weight stigma in the literature. Some authors define it as the devaluation of people or a specific group secondary to their body weight or size,[14] where others define it as the social rejection of individuals who do not comply with norms of weight or shape.[16,23] A joint international consensus statement for ending stigma of obesity builds upon these definitions, adding the potential for weight stigma to lead to negative attitudes, stereotypes, and discrimination with respect to an individual's body size.[24] Interestingly, upon examination of the affiliations of the more than 30 authors of this consensus statement and institutions that either endorsed the document or pledged to work on eliminating weight stigma, there is a clear dearth of parties from the realm of reproductive medicine and women's health. This raises the question: if we are not at the table, are we aware of the core problems of weight stigma and weight bias? If not, how do we target it in our patient population?

As addressed by the consensus statement earlier, weight stigma leads to prejudice and labeling of individuals as lazy, unintelligent, unmotivated, irresponsible, or unhygienic.[14,23] In fact, some authors have argued that individuals with obesity face more stigma than any other social group simply because its pervasiveness has made it "acceptable"; it has also been shown to rival racial discrimination, particularly among women.[14,15,25–27] Socially, disparaging comments about a person's body or size are not viewed with the same repugnance as other forms of outward prejudice. Moreover, globally there is a paucity of legislation providing protections for people with overweight or obesity against discrimination based on their weight. Furthermore, stigma can be related to the misconception that failure to lose weight is due to a relative lack of effort or will from a given individual; however, this fails to take into consideration the complex metabolic, physiologic, and obesogenic mechanisms that underlie this state and complicate both initial and sustained weight loss.[24] As a result, this leads to individual blame that fails to consider both individual autonomy (what if the individual does not wish to lose weight?) and the appropriate medical context.

There exist both extrinsic and intrinsic forms of weight stigma and bias. The societal conditions, attitudes, and values messaged to individuals of higher body size contribute to the perpetuation of extrinsic/enacted weight stigma and weight bias. This may manifest in myriad ways including discrimination, use of offensive comments, mistreatment, or bullying.[15] The impact of this will be explored in detail later in this article, but they have been shown to contribute significantly to adverse medical outcomes, poorer access to medical care, as well as educational inequalities and lower rates of employment.[25,26] It is, therefore, not surprising that consistent societal messaging that overweight or obese bodies are "unhealthy" or "undesirable" facilitates a sense of internalized weight stigma and bias within individuals with larger bodies. This is also referred to as weight self-stigma and is consistent with acceptance and internalization of societal messaging/external expressions of such stigma, facilitating feelings such as shame and worthlessness.[14,15,28,29] It is also important to understand the concept of implicit bias when analyzing and exploring weight stigma. Implicit bias refers to internalized attitudes or thoughts that unconsciously influence an individual's decision making or feelings but can be unearthed with certain testing modalities.[28] Further investigation is needed into the possible impact of race/ethnicity on weight bias. While Puhl et al have previously described an increased prevalence of reported weight bias among African American women when compared with Caucasian women, this difference was not found to be statistically significant in regression analysis.[27] However, the authors rightfully draw attention to the small number of studies analyzing the impact of race and ethnicity on weight stigma/bias and cite this as an area of need for investigators.[27]

Putting It into Perspective: The Pervasiveness of Weight Stigma in Modern Society

Outside of the societal messaging and social pressures discussed earlier, individuals with overweight or obesity have been shown to experience significant weight stigma when attempting to access basic human services like education, employment, or health care. Focusing on the realm of medicine, prior studies have shown that individuals with obesity are up to three times more likely to report being denied healthcare when compared with non-obese people.[22] Examination of the attitude and practices of medical professionals underscores some of the entrenched weight bias—both explicit and implicit—that can contribute to external stigma for these individuals. Several studies examining these trends have been performed utilizing medical students given their unique ability to observe patient treatment from a variety of different standpoints (physicians, trainees, nursing, etc.). In 2006, Wear et al surveyed a cohort of medical student at a single institution regarding patient groups that were the target of derogatory humor. Overwhelmingly, students reported patients with severe obesity were the most mistreated group among attending physicians, residents, and students—this was noted most commonly in the fields of surgery and obstetrics and gynecology.[30] Many students attributed patient obesity to a purported "lack of control," and how body habitus made procedures or clinical care more challenging for the medical team.[30] When looked at through the lens of the intergenerational transmission model, where the attitudes and behavior of students are passed down from the physicians training them, one can argue that students are being primed with behaviors that not only perpetuate weight stigma but also bias and discrimination which may persist into their own clinical practice.[30]

From a physician standpoint, multiple studies have demonstrated that a large percentage of primary care providers has a negative perception of patients with obesity, viewing them as noncompliant, lazy, and lacking in motivation.[26,31,32] A study examining the attitudes, beliefs, and perceptions of primary care providers with respect to management of obesity found that as BMI increased, they spent less time with patients, would report lower job satisfaction, and an increased feeling that the visits were futile.[26,33] The undercurrents of bias and stigma can be seen in these studies and in the attitudes and actions of providers. A study examining physician attitudes with respect to weight among patients demonstrates strong implicit and explicit "anti-fat" biases through utilization of the Weight Implicit Association Test.[16,34] Interestingly, a study examining perception among obesity specialists noted an increase in explicit "anti-fat" bias between 2001 and 2013.[35] This serves to underscore the pervasiveness of weight bias in the medical field and the need for its continued examination and interrogation.

The question then remains, given the entrenchment of weight stigma described earlier, how does this and societal messaging influence access to and subsequent treatment when seeking medical care? Unsurprisingly, patients who experience weight stigma have been shown to have lower health care utilization including decreased access to preventative care.[26] In the realm of gynecologic care, Amy et al demonstrated that women with a BMI above 55 kg/m^2 reported delays in presenting for cervical cancer screening due to weight stigma.[36] They further explained that factors such as negative attitudes of providers, use of inappropriately sized medical equipment, and embarrassment related to being weighed were all barriers to gynecologic care.[36] Finally, they noted that the percentage of women who reported these barriers increased linearly with BMI.[36] Further delays in access to preventative medicine with respect to breast and colorectal cancer screening for patients with obesity who experience stigma have also been noted.[26] Moreover, it has been shown that patients with severe obesity report they are denied access to medical care and face discrimination in clinical environments.[16,37] Furthermore, patients who experience weight stigma when working on lifestyle interventions with their primary care provider have been shown to lose less weight than those who do not experience it.[16,38]

Understanding the Impact: Assessing the Influence of Weight Stigma on Health Outcomes

Mental Health

The pervasiveness of weight stigma and weight bias in both modern culture and in the medical field has been shown to have clear impacts on the mental health of individuals with overweight or obesity. This includes but is not limited to issues like depression, body image, self-esteem, and disordered eating. A recent systematic review by Wu et al noted that increased weight stigma is associated with a rise in depression, anxiety, abnormal body image, and a decrease in self-esteem.[28] Furthermore, this affirmed prior research which argued that the experience of weight stigma may increase the incidence of disordered eating, including both bingeing and emotional eating, as a coping mechanism for stress related to systemic weight stigma.[28,39,40] Therefore, it appears that weight stigma may lead to behaviors in individuals that further exacerbate obesogenic behaviors.[16] Finally, it is important to note that while trends can be appreciated in the literature that individuals may have differing levels of psychosocial or somatic stress related to weight bias which creates the potential for heterogeneity in terms of its subsequent impact on health outcomes.[28]

Metabolic and Cardiovascular Disease, All-Cause Mortality

A growing area of interest is in the impact of weight stigma and weight bias on an individual's risk for various conditions or diseases. As discussed earlier, obesity is related to a variety of medical comorbidities, and it has been shown that the systemic stress brought upon by weight stigma may actually increase a person's risk of metabolic dysfunction, cardiovascular disease, and all-cause mortality. Approximately 36% of individuals in one study who reported the experience of weight stigma noted that their provider dismissed a medical issue because of their size.[14] In this same study, after controlling for covariates, individuals reporting enacted/extrinsic weight stigma were found to have an increased odds of hypertension, hyperglycemia, thyroid disease, anxiety/depression, and infertility.[14] A report of significant weight self-stigma was significantly associated with increased odds of hypertension, hyperglycemia, anxiety/depression, and eating disorders. A systematic review that predates this study noted a paucity of data with respect to cardiovascular disease and weight bias internalization; however, they did note that when stratified by Weight Bias Internalization Scores (WBIS) that among participants with the highest WBIS score the odds of developing metabolic syndrome were three times higher than those with lower WBIS scores.[29,41] In a secondary analysis of the Health and Retirement Study (HRS) and the Midlife in the United States Study (MIDUS), it was demonstrated that people who experience weight stigma had a nearly 60% increase in all-cause mortality after controlling for BMI and demographic covariates.[42] It therefore implies that there is something about the physiologic stress experienced by individuals who are exposed to weight stigma and weight bias outside of the risk factors posed by obesity itself.

Weight Stigma and Reproductive Outcomes: Infertility and Obstetrics

There is a true paucity of data with respect to the impact of weight stigma and weight bias on reproductive health care. Of the studies included in two systematic reviews[28,29] there is no discussion of infertility, intended family size, or pregnancy outcomes. A study by Mulherin et al analyzed the impact of weight stigma in a cohort of Australian pregnant people and found an association between higher pre-pregnancy BMI and poorer patient perception of maternity care both during

pregnancy and postpartum periods.[43] Furthermore, among preclinical trainees presented with a hypothetical cohort of pregnant people, participants with both low and high levels of "weight stigmatizing attitudes" had more negative associations related to the care of people with overweight or obesity relative to those with a normal BMI.[43] Overall, this may highlight the potential pervasiveness of weight stigma and bias in pregnancy care. With respect to fertility care and reproductive medicine, there is a dearth of studies exploring the roles of weight stigma and weight bias, even though there is a clear link between obesity and adverse fertility and pregnancy outcomes. As mentioned earlier, Prunty et al laid the groundwork for future research given the findings of increased infertility in patients experiencing extrinsic weight stigma.[14] This is especially necessary given that it is common for fertility clinics to have BMI cutoffs for patients who wish to access specific services such as IVF which vary based on specific clinic policies and insurance policies. Based on the factors outlined earlier, such an environment where patients may feel pressured to lose weight to achieve their family building goals may perpetuate weight stigma and weight bias. Further examination and research in this area is critical to ensure that patients who seek fertility care are provided with a safe and supportive environment to achieve their family goals.

Moreover, while polycystic ovary syndrome (PCOS) can be associated with comorbid obesity, even lean individuals with PCOS have been shown to have elevated cardiometabolic risk. Therefore, these sequelae should not be viewed as an "obesity problem" but rather related to the complex endocrinologic pathways that underpin PCOS. Nonetheless, women with PCOS have been shown to experience weight stigma when accessing healthcare, and this concept as well as strategies to address weight stigma were directly addressed in the 2023 International Evidence-based Guideline for the Assessment and Management of PCOS (►**Table 1**).[44]

Obesity and Infertility: Does Weight Loss Improve Outcomes?

With respect to weight loss interventions, a combination of lifestyle/diet modification with or without pharmacotherapy may be recommended by providers to women with obesity prior to proceeding with infertility treatment. However, while weight loss may increase the chances of spontaneous ovulation (in oligo-anovulatory patients) and unassisted conception in patients with obesity and infertility, studies have failed to demonstrate a difference in live birth rate between patients who lose weight with lifestyle intervention prior to treatment and those who proceed with immediate fertility treatment.[45,46]

Table 1 Strategies to promote weight inclusivity and limit weight stigma in clinical practice

Strategy	Application
- Practice patient-centered communication	- Ask for permission to discuss a patient's weight: "Is it okay if we talk about your weight?" o If the response is "no," respect their boundaries but offer opportunities to revisit the topic in the future o If "yes," ask them to describe how their weight has changed over time ▪ What has or has not successfully worked? - If advising weight loss, frame this in terms of how it may benefit the patient based on their presenting concerns to appropriately set the context - Assess their readiness for weight loss intervention and connect with appropriate resources or schedule follow-up if appropriate - Utilize person-first language - Avoid terms like "morbid obesity"
- Create a welcoming, size inclusive office	- Appropriate stocking and use of correct blood pressure cuff size, dressing gown sizes, exam beds, etc. - Avoid use of stigmatizing language if the incorrect size is used
- Weigh patients only when medically necessary	- If weighing is necessary, do so in a private location - Further promote privacy by avoiding publicly stating the patient's weight, simply record in the medical record
- Approach the "whole person"	- Avoid discussions that focus on specific numbers or BMI - Counseling should focus on sustainable lifestyle interventions that match the patient's goals - Screen for eating disorders if appropriate - Initiate consults when appropriate for comorbid conditions not simply because of an individual's BMI
- Avoid diagnostic codes or patient instructions that utilize terms such as "morbid obesity"	- Select codes or diagnoses that utilize BMI range or WHO class
- Identify individual or practice weight bias	- Utilize screening tools to allow individual providers to understand their own possible weight bias or implicit bias - Provide appropriate professional development or continuing education sessions about weight bias and weight stigma and its impact to follow-up

Note: Strategies for reducing weight stigma in reproductive medicine practices.

Interventions can take significant time to achieve weight loss which given the data described earlier may represent a delay in family building possibly without an improvement in live birth rate. Furthermore, for women who undergo bariatric surgical procedures to achieve pre-pregnancy weight loss, centers commonly recommend a waiting period of 1 to 2 years to allow for stabilization of post-procedural weight loss prior to proceeding with pregnancy which may represent a further delay.[45,47] Preconception lifestyle and weight loss counseling for patients with infertility should therefore be individualized, balancing factors such as ovarian reserve, maternal age, and potential for increased time to conception. While there are other medical benefits to lifestyle changes and weight loss, counseling regarding this prior to fertility treatment should include an honest discussion of the existing data and shared decision making.

Moreover, data from the Society for Assisted Reproductive Technology (SART) notes that upward of 65% of member clinics have BMI thresholds for ART treatment, with the majority falling into the range of 35 to 45 kg/m^2. The rationale for a pretreatment BMI cutoff is in many cases related to increased anesthetic risk (especially with respect to airway management) given many oocyte retrievals are performed in the outpatient setting as well as potential difficulty with cycle monitoring and ovarian accessibility.[45] A prior case series examining the safety of oocyte retrieval in patients with a BMI above 40 kg/m^2 argues that the procedure can be safely performed in the correct setting, though they did note higher doses of anesthetic were required as well as longer procedural length with increasing BMI when compared with women below this threshold.[45,48] Overall, a comprehensive patient evaluation taking BMI as well as medical comorbidities into account with respect to procedural and anesthetic risk is necessary to ensure the safe provision of care. Collaboration or pre-procedural evaluation by anesthesiology may be beneficial in these situations. Due to limited evidence, the American Society for Reproductive Medicine (ASRM) does not advocate for a universal BMI cutoff for ART clinics as has been adopted by some other countries.[45] Instead, they argue clinics should determine such a threshold based on their ability to provide safe surgical and anesthetic care and the resources available to them.[45]

Conclusion

The pervasiveness of weight stigma generated by a mismatch between society's idealized thin body shape and the steady rise in overweight and obesity across the world has led not only to negative psychosocial impacts for individuals with larger bodies but also discrimination and adverse health outcomes—often related to access to care. There has been a great deal of research exploring the role of weight stigma and weight bias in the realm of medicine and the subsequent effect that this has on both patients and providers. However, there is a gap in the literature with respect to the prevalence of weight stigma in the realm of reproductive medicine and infertility care. Given the inherent stress, anxiety, and uncertainty that can come with subfertility or infertility, it can be argued that such environments would also be fertile ground for both intrinsic and extrinsic weight stigma/bias for individuals with overweight or obese. An emphasis should be placed on understanding the roles that weight stigma and bias may play in reproductive medicine clinics to then allow for examination of possible impacts on treatment or pregnancy outcomes. Furthermore, such research would allow for the development of best practices or tool kits for clinics to address and limit potentially stigmatizing language, practices, or situations when providing care to individuals with overweight or obesity with the overall goal of providing more equitable, inclusive care for all patients.

Conflict of Interest
None declared.

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