Chapter

Obesity Acceptance: Body Positivity and Clinical Risk Factors

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Abstract

Most people are aware of how they look and, whether poor or positive, have an opinion about their image. Social media influencers, pressure from societal norms, media images, and even friends and family can impact body image. Body positivity has undoubtedly gone mainstream. Included in this movement are obesity acceptance and its demarginalization. However, the acceptance of overweight and obesity may undermine the decades-long progress made toward reducing risk factors for cardiovascular disease (CVD). Obesity is a global epidemic disease with risk factors that include hypertension, inflammation, heart attack, stroke, and diabetes. Obesity is also associated with obstructive sleep apnea. Positive body image is an important component of overall health. However, also maintaining a proper clinical definition and self-perception of what constitutes "normal" weight, coupled with weight management, regular exercise, and monitoring blood pressure and blood sugar, will continue progress toward reducing the risk of cardiovascular disease.

Keywords: obesity, overweight, weight gain, weight reduction, diet, body image, self-image, cardiovascular disease, hypertension, heart disease, stroke, diabetes

1. Introduction

Obesity is a chronic disease with risk factors that include positive energy balance, resulting primarily from "obesogenic" changes that include economic growth, abundance, inexpensive and nutrient-poor food, industrialization, and sedentary lifestyles [1]. Comorbidities and sequelae associated with obesity include hypertension (HTN), inflammation, dyslipidemia, infertility, certain cancers, heart attack, stroke, type 2 diabetes, and obstructive sleep apnea [1, 2]. Weight stigmatization and its associated mental and behavioral consequences, economic burden, and premature death are also associated with obesity.

Historically, obesity went hand in hand with a poor sense of self-perception. Most people are aware of how they look, and whether poor or positive, have an opinion about their body image. Social media influencers, pressure from societal norms, and media images, as well as friends and family, all have an impact on body image. Over the past decade, the body positivity movement has undoubtedly gone mainstream. Often synonymous with this movement is fat acceptance, a movement focused on the demarginalization of the overweight or obese (OW/obese) population. Also mentioned in discussions of fat acceptance and fat rights activism is Health at Every Size® (HAES) as a public health approach to obesity. Yet, the acceptance of overweight and obesity in the absence of prevention or weight reduction threatens to undermine the decades-long progress made toward mitigating risk for cardiovascular disease (CVD).

Positive body image is indeed a necessary component of overall health and an important factor in determining one's ability to reach weight loss goals. An imperative complement to these movements, however, is adequate health literacy, or an ability to read, comprehend, and use information in a manner that promotes and maintains good health [3]. It is only with proper knowledge of what constitutes a clinical definition of "normal" weight versus higher weights associated with increased CVD risk, coupled with mindful weight management, regular exercise, monitoring blood pressure (BP), and maintenance of blood sugar, that will continue progress toward reducing CVD risk.

2. Obesity

2.1 The obesity pandemic

Over the past 40 years, there has been a sharp rise in worldwide obesity with prevalence nearly tripling since 1975 [4]. According to the World Health Organization (WHO), overweight and obesity are defined as having abnormal or excessive fat accumulation that may impair health [4]. Studies show the global obesity epidemic is worsening. In 2016, nearly 2 billion adults over 18 years worldwide were overweight and of these, over 650 million were obese [4].

Prevalence of obesity and severe obesity in the U.S. continue to rise [5]. Currently, the rates of obesity exceed 30% in most sex and adult age groups, whereas its prevalence has reached 17% among children and adolescents, defined as a BMI exceeding the 95th percentile [6]. In 2017–2018, it was estimated that 42.4% of U.S. adults aged 20 and over were obese (**Figure 1**) and 9.2% were severely obese [7] (**Figure 2**), and these may be underestimated. In a study comparing rates of obesity diagnosis to national rates of obesity based on BMI data from the Behavioral Risk Factor Surveillance System, the authors found that obesity is largely underdiagnosed and undertreated in clinical settings [8].

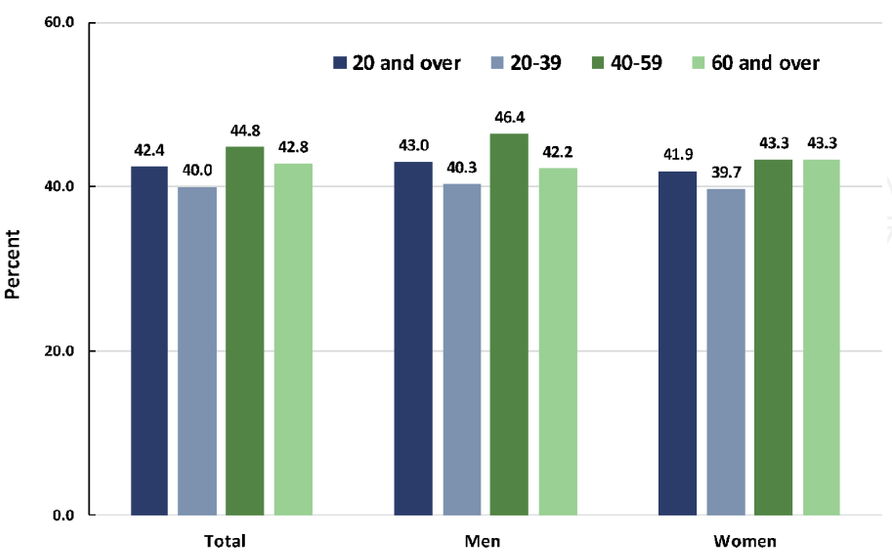

Figure 1.
Prevalence of obesity among adults aged 20 and over, by sex and age: United States, 2017–2018. Notes: Estimates for adults aged 20 and over were age-adjusted by the direct method to the 2000 U.S. Census population using the age groups 20–39, 40–59, and 60 and over. Crude estimates are 42.5% for total, 43.0% for men, and 42.1% for women. ***Figure 1*** *is adapted from data table at: https://www.cdc.gov/nchs/data/databriefs/db360_tables-508.pdf#1 [Accessed: 13 August 2020]. Source: National Center for Health Statistics (NCHS), National Health and Nutrition Examination Survey, 2017–2018.*

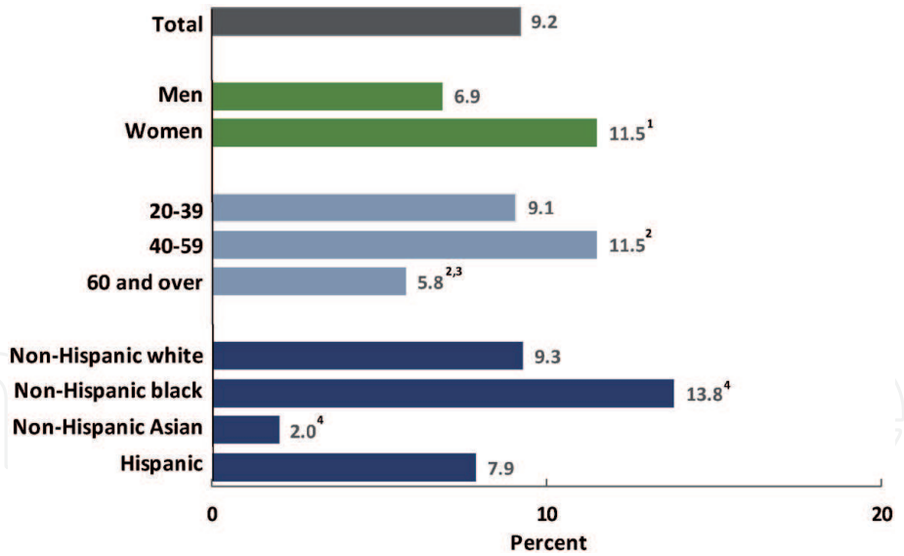

Figure 2.
Age-adjusted prevalence of severe obesity among adults aged 20 and over, by sex, age, and race and Hispanic origin: United States, 2017–2018. [1]Significantly different from men. [2]Significantly different from adults aged 20-39. [3]Significantly different from adults ages 40-59. [4]Significantly different from all other race and Hispanic-origin groups. Notes: Estimates for adults aged 20 and over were age-adjusted by the direct method to the 2000 U.S. Census population using the age groups 20–39, 40–59, and 60 and over. Crude estimates are 9.0% for total, 6.8% for men, and 11.1% for women. ***Figure 2*** *is adapted from data table at: https://www.cdc.gov/nchs/data/databriefs/db360_tables-508.pdf#3 [Accessed: 03 August 2020]. Source: Figure adapted from National Center for Health Statistics (NCHS), National Health and Nutrition Examination Survey, 2017–2018.*

Over the past 20 years, mean weight, waist circumference (WC), and BMI among U.S. adults over aged 20 increased across all age groups for non-Hispanic white and Mexican-American men and women, and for non-Hispanic black women [9]. Men had more obesity among those aged 20–39 and 40–59 than women in the same respective age groups, and less obesity among those 60 and over compared to women of the same age group [7]. However, none of the reported differences were significant. On the contrary, during this same time period, women reportedly had a higher overall prevalence of severe obesity than men, with significant differences in age groups race/ethnicity, and sex [7] (**Figure 2**).

2.2 Body mass index and other body composition methods

BMI is a useful inexpensive tool that has long been used to assess overweight, obesity, and risk for diseases that occur resulting from excess body fat. The internationally accepted standard cut-off points for defining a healthy or unhealthy weight is when body mass index (BMI) is 25 kg/m^2. The prevailing BMI classifications are underweight (BMI < 18.5 kg/m^2), normal weight (BMI of 18.5–24.9 kg/m^2), overweight (BMI of 25.0–29.9 kg/m^2), obesity$_{\text{Class I}}$ (BMI of 30.0–34.9 kg/m^2), obesity$_{\text{Class II}}$ (BMI of 35.0–39.9 kg/m^2), and extreme obesity$_{\text{Class III}}$ (BMI ≥ 40.0 kg/m^2) [5].

BMI is not without its limitations, often overestimating body fat in individuals with more muscle tissue, while underestimating body fat in individuals who have lost muscle [10]. Another challenge with using BMI as an adiposity metric is that it is unable to estimate percent body fat nor can it differentiate fat distribution for a given BMI, which can vary across age groups, sex, and race/ethnicity [11–13]. Results from some epidemiological investigations have even justified implementing adjustments to the cut-off values for classifying obesity and elevated WC among racial/ethnic populations [5, 14]. Lastly, using BMI percentile cutoffs to determine obesity and morbid obesity becomes especially problematic among children as it fails to consider large head size and high torso-to-leg ratio in the pediatric population [15]. The

variation of high BMIz values, due to sex and age, make it very difficult to interpret the high BMIz levels (and changes in these levels) among children with severe obesity, possibly leading to incorrect conclusions [16]. Despite its limitations, BMI is used in most clinical settings and is correlated to more direct measures of body fat, such as underwater weighing and dual energy X-ray absorptiometry [17].

When predicting cardiometabolic disease, many studies demonstrate the use of WC, a measure of visceral adipose tissue and commonly used to calculate waist-to-hip ratio, as a preferred approach over BMI for estimating body fat [5, 18]. A WC ≥ 102 cm in men and ≥ 88 cm in women can be an indicator of increased risk for type 2 diabetes, HTN, and CVD, even among individuals with normal weight [19]. Other studies have suggested a combination of adiposity metrics more efficiently identifies all CVD risk factors [20], while some have found the use of either BMI or WC as the index of adiposity identifying the same persons, with equal utility [21].

Many sophisticated direct volumetric techniques are available for body composition assessment that vary in sensitivity and specificity. For example, some more expensive methods include tracer dilution, bioelectrical impedance plethysmography, densitometry, dual-energy X-ray absorptiometry (DEXA), and air displacement plethysmography [22]. Still, other tools that can better visualize and quantify tissues, organs, muscle, and adipose tissue include imaging techniques such as nuclear magnetic resonance and computed tomography [14, 22]. However, in most clinical settings, BMI along with other simple, non-invasive anthropometric measures are used.

2.3 Factors driving obesity

On a physiological level, obesity is the result of an energy imbalance between calories consumed and the calories expended, creating an energy surplus and a state of positive energy balance resulting in excess body weight [1]. Obesity also arises from poor health behaviors (e.g., poor sleep habits, diet, physical activity), genetic and epigenetic factors, gut microbiota, and a failure of health care professionals to advise people with obesity on appropriate courses of action for weight reduction [13, 23, 24]. Other "obesogenic" environmental drivers of obesity include marketing of inexpensive nutrient-poor foods, sedentary places of employment, industrialization, mechanized transportation, and urbanization [1].

An indirect driver of increasing BMI is the increasing trend in mean body weight without corresponding increases in height over time. According to the National Health Statistics Report, there is a rising trend in BMI with no significant change in height, with even slight decreases in height among some racial/ethnic groups [9]. For example, among all men, mean height significantly increased from 1999 to 2000 (175.6 cm) to 2003 to 2004 (176.6 cm) and subsequently decreased until 2015–2016 (175.4 cm) [9]. Among all male racial/ethnic groups, only non-Hispanic black men experienced a significant decrease in mean height from 1999 to 2000 (176.0 cm) to 2015 to 2016 (175.5 cm). In contrast, among all women, no significant linear trends were observed over the same time period or for any racial/ethnic subgroup [9].

2.4 Obesity-related health risks and comorbidities

It is widely recognized that cardiovascular risk and metabolic complications are due to a constellation of obesity, physical inactivity, and primary HTN [25]. Compared to those with a healthy or normal weight, people with obesity are at especially increased risk for many adverse health outcomes, including high BP, higher levels of low-density lipoprotein cholesterol, lower levels of high-density

lipoprotein (HDL) cholesterol, type 2 diabetes, stroke, sleep apnea, and poor quality of life [7, 24, 26] (**Figure 3**). Obesity has also been linked to cancers of the esophagus, colon and rectum, liver, gallbladder and biliary tract, pancreas, breast, uterus, ovary, kidney, and thyroid. [26]. Individuals with severe obesity are further susceptible to obesity-related complications, such as coronary heart disease and end-stage renal disease [7].

A systematic evaluation of the health effects of high BMI revealed that in 2015, excess body weight accounted for about 4 million deaths worldwide, with an additional 120 million disability-adjusted life-years [26]. Higher BMI classified as overweight and not obese is also associated with mortality. Over one-third of global deaths and disability-adjusted life-years were related to BMI classified as overweight (less than 30 kg/m^2) [26].

In a U.S. study using National Health and Nutrition Examination Survey data examining the prevalence of 11 common chronic conditions, obesity experienced the largest significantly increased trend of any condition over the past 25 years (1998–2014) [27]. Due to its pervasiveness and its detrimental impact on morbidity and mortality, obesity is included as a chronic condition in multimorbidity models rather than as a control factor [27].

2.5 Characterization of metabolic profiles

Although obesity, particularly visceral adiposity, is typically associated with metabolic dysfunction and cardiometabolic diseases, there are some obesity

Figure 3.
Obesity-related health risks and comorbidities [7, 24, 26].

phenotypes that appear protected from some of the adverse metabolic effects of excess body fat [28]. Disease risk may not be uniform across all obese phenotypes.

The classification of an individual as "metabolically healthy" is not clearly defined, with 5 to more than 30 definitions documented across studies [28, 29]. In 2009, a harmonized definition for metabolic syndrome (MetS) was derived by The International Diabetes Federation Task Force on Epidemiology and Prevention, the National Heart, Lung, and Blood Institute, American Heart Association, World Heart Federation, International Atherosclerosis Society, and the International Association for the Study of Obesity [30]. According to this definition, participants who met ≥3 of the 5 abnormal criteria, excluding WC, were classified as having MetS and thus metabolically unhealthy and obese (MUO). These five components include high fasting blood glucose, high systolic and diastolic BP, elevated plasma triglyceride levels, low high-density lipoprotein cholesterol levels, and obesity (particularly central adiposity) [28, 30]. Obese participants who met 0, 1, or 2 of these criteria were classified as metabolically healthy but obese (MHO) [28, 31].

A classification of MHO should not be mistaken for metabolically unhealthy normal weight (MUN). These individuals are not phenotypically obese but share a metabolic profile similar to an overt obese person, including hyperinsulinemia, insulin resistance, and a predisposition to type 2 diabetes and premature CVD [32]. Studies suggest that MHO is a transient state and only a precursor to MUO [25, 33]. Data from longitudinal studies suggest that approximately 30% to nearly half of people with MHO transition back to MUO after 4 to 20 years of follow-up [28]. Indeed, in the absence of regular, systematic, and supervised diet and exercise programs, obese individuals with MHO profiles experience subsequent declines in cardiometabolic health [34].

Differences in metabolic profiles of those with MHO versus MUO could be due to phenotypic characteristics that lower risk of MetS, such as lower visceral adiposity, higher birth weight, adipose cell size characteristics, and genetic markers of adipose cells [35]. Alternatively, differentiation of these metabolic profiles has been attributed to variations in physical activity and cardiorespiratory fitness levels [28, 31], diet (e.g., lower intake of sugar, sugar-sweetened beverages, and saturated fat in MHO than MUO), and lower adiponectin concentrations in MUO than MHO [28].

Recent studies have suggested that MHO profiles may not indicate a lower risk for mortality, particularly when compared to metabolically healthy normal weight [33], and lifestyle interventions (e.g., weight management and physical activity) should continue to be recommended to reduce total mortality in all obese individuals [35].

2.6 Other considerations of obesity

Obesity has a profound impact on the cost of health care. Direct costs refer to money consumed to treat obesity-related health problems such as hospitalization, medical consultations in outpatient clinics, and obesity-related medications [36]. Obesity is associated with increases in annual health-care costs of 36% and medication costs of 77% compared with being of normal weight [37]. In 2014, a pooled estimate of annual medical costs attributable to obesity was $1901 in USD (ranging from $1239–$2582), accounting for approximately $150 billion nationally, with variations in costs primarily driven by age and severity of obesity-related comorbid condition [6].

There are long-term negative economic consequences and indirect costs of obesity. Indirect costs refer to lost productivity or costs to the economy outside of the health sector. Childhood obesity is associated with truancy from school, even after controlling for key covariates [37]. According to the National Longitudinal Survey on Youth 1979 data, higher BMI in late-teen years was associated with 3.5% lower hourly wages for men and women [38]. Obese adolescents were also more likely to

be the victim of bullying (e.g., name-calling, teasing, physical abuse) and isolation during adolescence [37], which can result in an economic cost associated with (untreated) mental and behavioral health. If obesity could be addressed in early life by reducing the number overweight and obese 16 and 17-year-olds by 1%, then the number of adults with obesity would reduce by 52,812, and lifetime medical costs would decrease by $586 million [37].

Obesity is also a matter of national security. The impact of obesity on the U.S. military has largely been unreported [39]. Since 2002, there has been a 61% rise among active duty forces, with obesity-related healthcare spending and costs to replace personnel unfit to serve exceeding $1.5 billion USD [39]. The military is facing significant recruiting challenges, with nearly 25% of young adults and over 70% of citizens in most states ineligible to serve due to higher BMI [39]. Other obesity-related issues faced by the military include lost work among those in active duty totaling 656,000 days, violent intentions and behavior, food demand and insecurity, impaired responses to infectious diseases, and vulnerability to injury and death [40].

Currently, there are no accepted standards for what constitutes a health-related threat to national security. Focusing only on the harms of obesity to the wellbeing of the population at large, not just to individuals with obesity, carries with it a risk of perpetuating weight stigmatization [40]. However, framing obesity as a national security threat has significant public health importance, provided importance is placed on gathering quantitative and qualitative data that characterizes the threat, and correlation and causation relationships are properly differentiated [40].

3. Cardiometabolic research

3.1 Strides

Over the last 40 years, the decline in mortality from CVD in the U.S. has been a public health success story. In the U.S., coronary heart disease as a leading cause of death has fallen 60% from its peak in the mid-1960s, with similar declines observed in nearly all regions of the world, especially in high-income countries [41]. However, if we place a narrower focus on racial/ethnic subgroups, or select populations from developing countries, we find that progress has not been equally shared [41, 42].

The sharp decline in mortality rates has been fueled by swift progress in prevention and treatment efforts. These efforts include rapid declines in cigarette smoking, improved methods for treating and controlling HTN, the use of statins to lower circulating cholesterol levels, and limiting or preventing infarction through the use of sophisticated methods [43]. Other factors have resulted in decreases in the rate of CVD despite increases in BMI, such as improved treatment or changes in other risks [26]. Clinical interventions have also proven effective in treating and controlling major risk factors of CVD, such as high systolic BP, cholesterol, and fasting plasma glucose [26].

3.2 Setbacks

3.2.1 Medicalizing obesity

The medical profession and social constructionists profess different concepts of illness. The medical model approaches disease as a biological condition, universal and unchanging, independent of time or place; in contrast, social constructionists define illness as the social and cultural meaning of that condition [44].

The idea of obesity as a social and cultural construct has contributed to its shift from being viewed as a comorbidity that ultimately leads to more complex diseases to its own treatment as a chronic disease with a complex etiology. In 2013, the American Medical Association officially recognized obesity as a complex chronic or non-communicable disease requiring medical attention [5, 13, 45]. The medicalization of obesity has presented a setback in the progress toward combating obesity and its resulting morbidities. Treating obesity as a health outcome rather than a comorbid condition leading to a chronic disease influences policies to focus on medical solutions (e.g., gastric bypass surgeries or pharmacological treatment of obesity-related comorbidities) rather than social and environmental factors as primary drivers of obesity, such as health illiteracy, the role of nutrition-deficient product promotion by the food industry, or healthy food access in areas with high rates of OW/obesity [44]. Other observers have raised similar concerns, not only emphasizing medicalization's overexpansion of medicine's domain, but also proclaiming it to be a mechanism by which the pharmaceutical industry can increase markets [46]. These medical policy changes will thus further contribute to rising health care costs. The Food and Drug Administration similarly expresses concern that proposed obesity drugs themselves increase cardiovascular or other risks and may require changes to clinical research protocols [46]. By treating the medical and social narratives of obesity as mutually exclusive, we may indeed see a resurgence of CVD in the near future.

3.2.2 Constructionist view of the obesity pandemic

The concept of health, illness, and disease are defined differently based on various factors in society. A medical practitioner may define health in very different terms than social or cultural definitions. However, all modern concepts of health recognize health as more than the absence of disease, pointing toward a greater capacity of the individual for self-realization and self-fulfillment [47].

According to the WHO, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity [48]. Other definitions of health can be found in three main models that include social, biomedical, and functional aspects. The social model places its focus on the social determinants of health and illness and argues that the way society is structurally organized affects the etiology of health and illness [49]. It highlights changes that need to be made by society, including health disparities by social class, occupation, race/ethnicity, gender, and income, in order to make the population healthier [49]. The biomedical model of health, currently dominant in medical practice, focuses on biological determinants playing a key role in explaining disease as a condition, primarily caused by external (e.g., physical, chemical, and microbiologic factors) or internal (e.g., vascular, immunologic, and metabolic) factors [50]. In this model, the physical or biological aspects of disease and illness serves as the focal endpoint and is associated with the diagnosis, cure, and treatment of disease. Lastly, functional medicine model focuses more on the dynamic functional processes that result in a person's disease and less with disease as the endpoint [51].

There are skeptics, primarily influenced by the social model of health, who assert the obesity epidemic, and even the idea of health itself, is socially constructed. Holland et al. view obesity as a construct propagated by scientific discourse, which functions within a context of social surveillance and bio-power, even though they acknowledge obesity rates as "social facts" and being obese as a reality [52]. The Association for Size Diversity and Health, an international professional organization and strong proponent of the HAES® movement, asserts that, "health exists on a continuum that varies with time and circumstance for each

individual. Health should be conceived as a resource or capacity available to all regardless of health condition or ability level, and not as an outcome or objective of living [53]."

Natalie Boero characterizes the obesity epidemic as a "postmodern epidemic," or "epidemics in which unevenly medicalized phenomena lacking a clear pathological basis get cast in the language and moral panic of "traditional" epidemics [54]." The "postmodern" and constructed labels given to the obesity epidemic are said to be justified due to there being no known discrete cause of obesity, having been attributed to a wide range of factors, from genetic predisposition, to socioeconomic factors (e.g., food quality/scarcity), to the built environment. Adding to this argument is the idea that obesity research tends to conflate overweight and obesity, largely attributable to a critical reliance on a fluid metric (due to its changing categories) to diagnose health [54] and issues with participant selection in study populations [55].

The constructionist view of obesity, largely endorsed by sociologists and members of fat activism, and those that treat obesity as a biomedical fact and health risk, undoubtedly occupy two poles of obesity scholarship. Both hold influence on how the public views and treats OW/obesity. Yet, how can we continue our public health campaign of reducing obesity while avoiding what members of the fat acceptance movement label as "fat shaming"? Is there still a platform wherein OW/obesity and its health ramifications can be publicly discussed from a biomedical perspective while also avoiding weight stigmatization? Until these questions are addressed, the contention between these two groups will remain and the growing popularity of body positivity and fat activism, without regard for the health risks that accompany obesity, will render the public health message of the health advantages of preventing or treating obesity largely ignored.

4. Body image

Body image involves a person's perceptions, thoughts, behaviors, and feelings regarding his or her appearance. There are several aspects of body image that can be explored: perceptual, attitudinal, and psychological [56]. Perceptual body image investigates the accuracy of body size estimations relative to its actual size. Attitudinal body image assesses an overall subjective satisfaction of the body, personal feelings and beliefs about the body, and avoidance of exposure of the body to others [56]. Finally, psychological measures combine one or more of these components. In all aspects, body image is a subjective concept and experience.

Any aspect of body image an individual has of his or her body is pivotally determined by interactions within obesogenic environments [57], (social) media [58], fitness imagery [59], and sociocultural experiences [59–61]. For example, in a study examining the impact of different forms of inspirational fitness ("fitspiration") images on women's image of their bodies, the authors found that exposure to "fitspiration" images led to decreased body satisfaction and increased negative mood over time [59].

Body image satisfaction also exhibits elasticity and can change throughout developmental periods. For example, adolescents display body image elasticity as they undergo the significant physical and psychological changes of puberty [56]. Other examples of groups who may pay special attention to body-related imagery and display sensitivity to media cues are pregnant women, bodybuilders, athletes, and people with eating disorders. Research suggests there are also qualitative differences in body image that vary between men and women, by age group, sexual orientation, and race/ethnicity [56, 62].

5. Weight stigmatization

5.1 The role of culture and society

Western societies, particularly those with affluence in the twenty-first century, have generally associated thinness with happiness, success, youthfulness, and social acceptance [56]. Most citizens of the Western world view fatness as a negative that is to be avoided. There has been a cultural prejudice and stigma toward those with overweight or obesity [60]. However, weight stigmatization has itself become a public health concern due to the associated psychological and physical health consequences to OW/obese individuals. The psychological and social stigmata associated with being OW/obese often makes this population vulnerable to discrimination in their personal and work lives [5]. Often blamed for their weight, the OW/obese are labeled as lazy, weak-willed, out of control, and lacking motivation [2, 56, 60]. The prevailing message in the media is that the cause and cure for obesity lies within the individual [60]. In a study examining obesity perception among policymakers from over 10 developed countries, over 90% saw lack of personal motivation as having a "strong" or "very strong" impact on obesity [23].

Nevertheless, weight stigmatization has been a long-standing approach to reducing obesity. However, it has not proven to be a motivator for weight loss [60]. There are studies that show stigmatizing weight is counterproductive. Individuals who experience weight stigma or perceived weight discrimination are at increased risk for anxiety, depression, bulimia, body dissatisfaction, low self-esteem and other psychological disorders [24]. Other findings have shown that even after controlling for key covariates such as BMI, age, and sex, these psychological outcomes remain, indicating that overweight perception rather than obesity is associated with psychological distress [63].

Weight stigma perpetuates unhealthy behaviors, including increased eating, reduced self-regulation, and avoidance of exercise [64]. Further, chronic stress resulting from weight stigma contributes to the development and/or pathophysiology of obesity, independent of adiposity [64]. Stress has been found to induce high levels of cortisol (an obesogenic hormone), leading to increased activity of the sympathetic nervous system (SNS) and release of corticotrophin-releasing hormone. Chronically elevated SNS activity could deregulate hypothalamic-pituitary-adrenal axis activity, thus further contributing to the etiology of obesity [65].

5.2 Weight bias in clinical settings

Reducing obesity rates has become a target for public health action, due to the link between obesity and a range of chronic diseases and premature mortality. However, critics of this view suggest that obesity has been primarily framed within a medical narrative, thus generating greater social anxiety and fears of "fatness" [66]. Some argue that dominant medical narratives are responsible for the discourse circulating around the idea of fatness as a pathology and a moral failing [66], further asserting that all the statistics on fat people being unhealthy are baseless due to the failure of society to delineate between fat and fat stigma [67]. The supposed bias of physicians has increasingly come under scrutiny. Physicians are said to notoriously view fat patients as noncompliant, or unwilling to follow their directions [67]. Some medical and allied health professionals have been overtly labeled "fat phobic" and showing weight bias. Weight bias is defined as having a widespread stereotypical and prejudicial attitude, assumption, belief, or judgment toward fat people [68, 69]. Studies show widespread weight bias among medical professionals [70], medical students and physician assistants [71], and exercise and nutrition professionals [72], with no

clearly defined approach to reduce these biases among students and professionals across various health disciplines [69]. There have even been reports of obese women avoiding routine gynecological exams, despite having higher rates of gynecological cancers than nonobese women, due to weight stigmatization and the corresponding negative attitudes of health care professionals toward overweight people [44]. The obesity problem we are facing is only exacerbated when participants express reluctance to address weight concerns with their health care providers for fear they will not be taken seriously [70], or avoid seeing their primary care physician or specialist entirely.

6. Body positivity

There has been a growing awareness of the psychosocial harms of weight stigmatization and fat shaming. Our culture is moving more toward body positivity, self-empowerment, inclusivity, and encouraging individuals to take pride in and accept their bodies, despite having BMI's that classify them as clinically OW/obese. Popularized through Instagram, with over 11 million posts tagged with #bodypositive, 4 million for #bodypositivity, and more than 1 million for #bopo [73]. Indeed, an internet search of body positivity will yield more than 112 million results [73]. Body positivity aims to challenge dominant body image ideals, promote acceptance and respect of all bodies, irrespective of shape, size, and features, focusing more on appreciating the functionality and health of the body rather than only its appearance [73] (**Figure 4**).

Positive body image is indeed a key factor in determining one's ability to reach weight loss goals. However, setting positive weight loss goals is an assumption in traditional approaches to weight loss [74]. Other assumptions include 1) the notion that adiposity increases risk of morbidity and mortality, 2) maintaining weight loss can be achieved through proper diet and exercise, which will prolong life, 3) obese individuals can improve health only through weight loss, 4) and finally, the high

Figure 4.
A group of women at a fitness facility stretch to hold a child's pose with their hands all reaching in to form a circle. Body positivity promotes strength and fitness coming in many forms, no matter the body shape or size (photo by: Sarah Pflug. Available from: https://burst.shopify.com/photos/ladies-stretch-circle?c=yoga [Accessed: 13 August 2020]).

economic burden on the health care system incurred by obesity-related costs can be mitigated by obesity treatment and prevention [74].

Many people who pursue weight-loss programs are seemingly motivated to lose weight to be normal, wear smaller clothes, and avoid weight stigmatization and discrimination rather than by the dangers of obesity or its associated health risks [54]. OW/obese individuals are now being more positively represented in the media, movies, and even in arenas where they have historically been absent or ignored, such as in the fitness and fashion industries, or as role models in music and entertainment. However, visual normalization of larger bodies, that is, more habitual visual exposure to people with excess weight, may further contribute to the higher prevalence of overweight and obesity, particularly among those with lower levels of education and income [75].

7. Fat acceptance and health at every size movements

7.1 Fat acceptance

Established in 1969, the National Association to Advance Fat Acceptance (NAAFA) is a fat-rights organization congealed out of early protests of fat activists (**Figure 5**). Established as a support movement, the organization protests discrimination in the workplace and lack of fat acceptance in society [76]. The organization is dedicated to protecting the rights and improving the quality of life for fat people [77].

Fat acceptance and body positivity have become synonymous terms of late. Arguing that the former term is rooted in the latter term, some claim that fat acceptance is threatening to destroy the body positive movement. They contend that those originally intended to benefit from body positivity were individuals like cancer survivors who have suffered physical disfigurement, people with physical disabilities, and members of underrepresented racial/ethnic groups frequently ignored by the media. These individuals have no control over primarily physical factors that have set them apart.

Parallels have been drawn between fatness and smoking (i.e. an unhealthy and deadly condition brought on by behaviors, but difficult to change once the behavior is set in motion) [78]. It follows that those with no apparent medical reason for OW/obesity (e.g., medications, Cushing's syndrome, polycystic ovary syndrome), on some level, choose to be OW/obese. Conversely, there are those that believe the idea that fat is permanently changeable to be a myth, citing studies that report participants gaining more weight than originally lost within three years of ending a diet [67].

Culture, society, (social) media, and reality TV have all influenced obesity perception, outpacing influential and well-established clinical definitions and medical advice warning of the cardiometabolic risks of obesity. For example, the terms "fat," "curvy," "plus-sized," and "full-figured" are more frequently used among plus-size fashion bloggers, reclaiming the use of the word "fat," and lessening the weight stigma around obesity [79]. OW/obese people can now be found on the glossy covers of magazines and amassing followers on social media outlets such as blog sites, Instagram, YouTube, TikTok, Tumblr, Twitter, and other online spaces. Under the guise of glamor and glitz, OW/obese social media and reality TV influencers advertise "fit, fabulous, and fat" lifestyles, which only serve to contradict public health messaging discouraging unhealthy lifestyles. While fat activists and the fat acceptance movement are working to reduce weight stigmatization, their influence on the public, particularly those with central adiposity, can potentially undermine the recognition of being overweight and its health consequences [75].

Figure 5.
The National Association to Advance Fat Acceptance (NAAFA) is an all-volunteer, multigenerational fat-rights organization seeking to change the narrative around fatness, fight for fat-rights, and increase respect for all people, regardless of body type or size. Available from: https://naafa.org/ [Accessed: 13 August 2020].

Civil lawmakers are also shifting the narrative to more acceptance and inclusivity as it relates to OW/obese perception. Antidiscrimination law theorizes unfairness based on government classifications of a group of people who are singled out and burdened without sufficiently good reason or in employment decisions based on protected traits outlined in Title VII of the 1964 Civil Rights Act. Fat advocates have become familiar with the difficulty of seeking legal arguments for fat rights protection under Title VII while also arguing that obesity is a medicalized impairment and disability [78].

7.2 Health at every size

Like the fat acceptance movement, HAES® is a weight-neutral approach that advocates the idea that health can be achieved and sustained, independent of weight status. The HAES® approach advocates intuitive eating, which involves listening to and acting on internal hunger and satiety cues and preferences. A HAES® approach attempts to addresses weight bias and stigma in individuals living with obesity, and is touted as a promising public health approach instead of focusing on weight status as an ultimate health outcome [74]. Proponents of HAES® assert that the long-term sustainability of traditional medical or behaviorally based interventions (e.g., pharmacological, surgical, and behavioral) for obesity has been disappointing. HAES® is emerging as standard practice in the eating disorders field [80] whose principles are professed by an array of civil rights groups and international professional organizations dedicated to promoting fat acceptance and fighting weight discrimination [80].

There is evidence supporting the notion of fit at every size. Higher fitness levels among the MHO are associated with fewer metabolic complications and lower prevalence of MetS at any age and across different weight status groups [31]. However, as previously mentioned, MHO has been shown to be a transient state to MUO [25, 33].

It is important to emphasize that health is a continuum on which every person lies, with one end of the spectrum representing morbidity/mortality and the other

health and vitality. There is a size threshold, albeit non-discrete, over which a person crosses over into a state of increased risk of, or overt illness. Established comorbidities and sequelae frequently accompany sustained obesity, despite practicing intuitive eating, that reduce quality of life, not the least of which include increased risk of musculoskeletal pathology [81], arthritis/joint pain, respiratory conditions/diseases (e.g., sleep apnea, asthma), depression/anxiety, inability to participate in certain activities, and physical disability [1]. Additionally, the association between intuitive eating and diet quality remains unclear in epidemiologic literature. Nevertheless, HAES® holds value in its deemphasis on restrictive dieting, which has been associated with increased psychological stress, increased cortisol levels, and subsequent weight gain [65].

Despite years of empirical medical and comprehensive epidemiological research, many fat activists take pride in maintaining higher BMI and embracing their size, all while holding in contempt any efforts to increase health and wellness. Permeating through activism, academia, fashion, and even sports, the HAES® approach appears to promote not only acceptance, but pride in the esthetic of the fat body. Members of this movement seek to bring people of larger size back from the margins of society, fiercely labeling those who oppose their ideas as "body-shamers" and "fat phobic" perpetuators of societal norms.

While the OW/obese may find intuitive eating and HAES® approaches successful, there still remains a tremendous (mental) health care cost of obesity-related illnesses. These costs are a real economic impact to society. Years of medical and scientific research has provided irrefutable evidence of the deadly cost of condoning preventable OW/obesity and unhealthy lifestyles of over 650 million OW/obese worldwide. Simultaneously, the medical and public health community must not use the campaign to reduce fat as justification for prejudice and oppression. OW/obese individuals have a right to make their own choices; but health literacy and knowledge of the correct information and use of that information to make informed health decisions is of utmost public health concern.

8. Preventing the reversal of progress made in CVD research

8.1 Health behaviors

At the primary level of prevention, modifying health behaviors, such as incorporating healthy eating and fitness habits into everyday lifestyles, can reduce metabolic risk factors (e.g., cholesterol levels, blood sugar levels, and BP) [25, 82]. The benefits of both reducing sedentary behavior together with increasing physical activity, especially in the elderly, is associated with a reduced risk for type 2 diabetes, compared with those physically inactive [82]. Lowering body fat, even if from obesity to overweight, can result in a reduction in metabolic abnormalities and lower levels of systemic inflammation, and lower BP [25]. The Look AHEAD study examined the effects of an intensive lifestyle intervention and found that lifestyle interventions can produce long term weight loss and improvement in fitness and sustained beneficial effects on CVD risk factors [83].

8.2 Health literacy

While self-acceptance and positive self-perception are certainly noble attributes, scientific knowledge of well-established risks of clinical obesity, particularly excess central body fat, cannot go unheeded. Health literacy, in combination with body positivity, may prevent reversal of the strides made in the reduction of CVD.

Health literacy is the degree to which individuals are able to access, understand, and use or process basic health information and services, thereby promoting good health for themselves, their families, and their communities [3]. Insufficient health literacy has been associated with poorer outcomes prior to and following coronary events, excess body weight, higher morbidity and mortality rates, healthcare use, and costs [84, 85] (**Figure 6**). Increasing health literacy will contribute to greater ability to read food labels, determine energy content, and make better food choices complementary to a healthy, physically active lifestyle. Health literacy should be evaluated as part of secondary prevention programs aiming to reduce CVD risk, such as dropout rates in cardiac rehabilitation [84].

With the power to fundamentally change the way the population regards obesity and its health risks, health literacy has the potential to profoundly reduce barriers to health delivery, reduce health care costs, and improve overall health status.

8.3 Social media

Social media is a crowded space that is filled with competing health messages. These platforms play a principal role in attempting to change health behavior and prevent or improve CVD health outcomes. Social media messages have influenced the health care decision making among patients, not all of whom always check the authenticity of information received. For example, in a study exploring the impact of health-related information sharing and the influence of social media on people's online health information-seeking behavior, the authors found that social media users received health information (80–90%), and admitted to starting (47%), and stopping medication (42%) after reading messages received on a social media platform [86]. Taking this into account, public health practitioners must focus their resources on platforms to counter sociological agendas. For example, most tenets of fat acceptance, body positivity (independent of weight status), and HAES® openly contradict health guidelines that are based on years of medical research. They must increase the amount of available information on CVD health, reinforce its salience

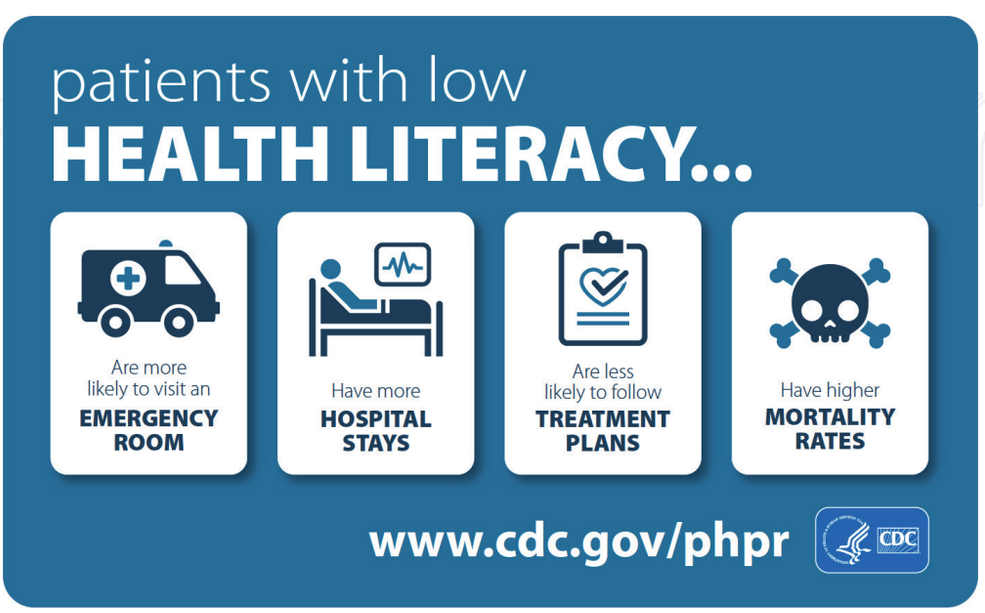

Figure 6.
Adverse health risks for patients with low health literacy (source: Centers for Disease Control and Prevention (CDC), Center for Preparedness and Response. Available from: https://www.cdc.gov/cpr/infographics/healthliteracy.htm [Accessed: 03 August 2020]).

as a CVD risk factor and public health problem, attract the attention of the OW/obese population, and offer practical solutions [87].

Medical advice must be translated into lay terms, adjusting for multiple levels of health literacy. Messages must include health incentives that are relatable to their audience. A successful public health campaign will include communication that is sensitive to the body positivity movement, one that encourages self-acceptance, and supports the mental health of this population. Incorporating elements from the social, biomedical, and functional models of health may elucidate why reducing body fat is beneficial for cardiometabolic health.

8.4 Clinical settings

In clinical settings, it is imperative that medical professionals, including physician assistants [71] and exercise and nutrition professionals [72], increase their awareness of their own weight bias, as well as that of their colleagues. Creating a welcoming setting where the OW/obese do not feel stigmatized will open more opportunities for doctor-patient educational discourse on the health benefits of reducing body weight, restructure how they are clinically monitored, and reduce bias while profiling their CVD risk.

The biomedical model has been the dominant approach in medicine. However, in its organ-oriented approach and its failing to take psychosocial aspects of disease into account, its efficacy in the advent of chronic disease prevalence has become questionable [50]. There is an increasing recognition of the influential role of culture and society in our perception of health and healthy behaviors. Rather than medical practitioners taking the historic biomedical model approach to obesity in clinical settings, a more effective approach will be to incorporate ideas from the social model (e.g., screening for social and environmental contributors to obesity), together with concepts from the functional model (e.g., examining functional health of the OW/obese). Building bridges across models will advance our prevention efforts and holistic treatment in this population.

9. Chapter conclusion

Obesity is still a pervasive problem, confirming its intractability. Obesity is a well-known risk factor for CVD, which is still a leading cause of morbidity and mortality in the U.S. and most developed countries. Yet, strides have been made in reducing CVD mortality rates. Over the last 40 years, we have seen a decline in mortality from CVD in the U.S. and many regions of the world. In response, there have been major setbacks to this progress, namely the fat acceptance and body positivity movements. Principally rooted within sociological frameworks, these movements appear inattentive to the established adverse health risks of maintaining an OW/obese status; nor do they promote efforts to modify health behaviors that reduce obesity and thus decrease risk of type 2 diabetes and CVD. Yet these emerging views are gaining momentum, revealing key changes in trends in fat identity and fat acceptance. These trends have key public health implications with a direct impact on a generation who daily engages with social media influencers who promote such messages. The parallel trend of the body positivity movement, in the absence of weight status consideration, threatens to reverse decades of progress made toward reducing coronary heart disease and its comorbidities.

The urgency of reducing obesity as a public health message continues. The body positivity and fat activism communities must reconcile with medical and public health professionals to equally address both the mental health benefits of

self-acceptance and positive body image, while also bearing in mind the short- and long-term health advantages of preventing or treating obesity. Both groups must weigh in and not compete to win on framing the narrative of obesity. The future of cardiovascular health relies upon this collaboration.

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