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Fitness and Fatness: The Conflation of Weight with Health, and the Consequences of Fat-Shaming

Kristin Spurkland
Porltand State University

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Thesis Advisor: Dr. Gary Brodowicz

"By definition, of course, we believe the person with the stigma is not quite human. On this assumption we exercise varieties of discrimination, through which we effectively, if often unthinkingly, reduce his life chances."

-Erving Goffman, *Stigma: Notes on the Management of Spoiled Identity*, 1963

Research Question

What is the relationship between fat-shaming/obesity stigma and health behaviors of overweight and obese people, specifically their disposition to physical activity and exercise?

Abstract

Obesity is widely accepted as one of the major health crises facing the United States, and increasingly, the world. Labeled a disease by the American Medical Association, and frequently characterized as an epidemic, obesity is the target of high profile national health interventions, media campaigns, and a multi-billion dollar self-help industry. The message produced by public health agencies is that obesity is a killer, and that reducing weight is a beneficial and achievable goal generating many positive health outcomes.

This paper presents two primary arguments that counter the prevailing attitudes towards obesity: that as a stand-alone measure, Body Mass Index (BMI) is a poor metric for gauging health status of individuals; and that current public health messaging, with its implication that being fat is an inherently unhealthy and undesirable state, is counterproductive to the intended goal of motivating the public to engage in exercise and healthy dietary habits. Via a literature review and a survey, I demonstrate that obesity stigma and fat-shaming create an environment that stimulates and perpetuates poor lifestyle choices, and subjects fat people to dangerous psychological and physiologic stress. I also provide data demonstrating that cardiovascular fitness is a more meaningful health measure than is BMI. It is my contention that public health messaging should stop focusing on weight, drop references to weight reduction as a meaningful health goal, and instead

focus on goals of increased cardiovascular health and the development of healthy dietary habits.

Keywords: BMI, body mass index, obesity, stigma, fat-shaming, weight-bias, exercise, stress

The Case for Stigma

At the time of its 2010 publication *Vital Signs*, the Centers for Disease Control and Prevention estimated that over 72 million Americans were obese (Centers for Disease Control and Prevention, 2010). The CDC reported strong associations between obesity and the leading causes of death worldwide, including diabetes, cardiovascular diseases, and some cancers. They further cite poor mental health outcomes and reduced quality of life as additional potential consequences of obesity (Centers for Disease Control and Prevention, n.d.). Given disease status by a controversial vote of the American Medical Association in 2013 (AMA, 2013; Pollack, 2013), obesity is the target of high profile national public health interventions, media campaigns, and a 60 billion dollar U.S. weight loss industry (The U.S. Weight Loss & Diet Control Market, 2015). In justifying their vote to label obesity a disease (in defiance of the recommendation of the member committee assigned to study the validity of the disease designation), a representative of the AMA stated "Today, the AMA adopted policy that recognizes obesity as a disease requiring a range of medical interventions to advance obesity treatment and prevention. Recognizing obesity as a disease will help change the way the medical community tackles this complex issue that affects approximately one in three Americans...The AMA is committed to improving health outcomes and is working to reduce the incidence of cardiovascular disease and type 2 diabetes, which are often linked to obesity" (AMA, 2013).

In his essay *Obesity: Chasing an Elusive Epidemic,* medical bio-ethisist Dr. Daniel Callahan decries the failure of current medical and public health efforts in the battle against obesity. Citing what he perceives as a culture of problematic social permissiveness, he

argues that the era of “low-key exhortation” to improve one's lifestyle (and presumably one's weight status) must end. Instead, it is time for a mobilized citizenry and “a more invasive role for government”, these forces unified in creating a new paradigm in which “excessive weight and outright obesity are not socially acceptable any longer” (Callahan, 2013b). Characterizing current public health outreach as ineffective in its “safe and slow incrementalism that strives never to stigmatize obesity”, Callahan advocates taking an “edgier” approach in the battle against obesity: intentional, systematic stigmatization that will ultimately empower obese individuals to change their lifestyle and thus their body mass and health outcomes. In a companion editorial published in JAMA Pediatrics, Callahan stated: “The main and simple message is that obesity is bad, not to be accepted or delicately evaded or minimized” (Callahan, 2013a).

While Callahan's advocacy for the overt stigmatization of obese people may seem extreme, it can be viewed a logical extension of public health messaging characterizing overweight and obesity as inherently unhealthy and undesirable states (Lebesco, 2010). Some researchers suggest that obese individuals who experience greater levels of stigma are more successful in weight loss programs, concluding that “awareness—and fear—of the psychosocial consequences of obesity (are) associated with improved weight loss and maintenance of lost weight” (Latner, Wilson, Jackson, & Stunkard, 2009). Others propose that some degree of body image dissatisfaction, induced by social pressures to thin, may serve as a more potent motivator of beneficial lifestyle changes than inducements to eat right and exercise for the sake of health (Heinberg, Thompson, & Matzon, 2001). However, most stop short of advocating overt and intentional stigmatization of fat people, instead

proposing programs aimed at increasing awareness of the presumed health dangers of having a fat body.

A growing body of research suggests that both Callahan's approach to obesity and the milder approaches taken by government agencies and most health care professionals are ineffective and potentially dangerous. According to this research, obesity stigma poses serious threats to the physical and psychological health of obese individuals, is counter-productive to creating positive health behaviors, generates health disparities, and creates an environment of victim blaming (Hunger, Major, Blodorn, & Miller, 2015; Puhl & Heuer, 2010; Tomiyama, 2014; Vartanian & Smyth, 2013).

A thoughtful reading of Callahan's essay raises a multitude of questions. What is weight stigma? Do overweight and obese people currently experience this stigma? If so, how does this stigma impact their behavior: does it motivate healthy change or drive unhealthy lifestyle choices? And finally, just how dangerous is it to have a fat body?

Stigma

Greg Crister opens his Harper's magazine article *Let them Eat Fat* with the following tableau: "Here, in the ghastly white light of modern American medicine, writhed a real-life epidemiological specter: a 500 pound twenty-two-year-old" (Crister, 2000). Crister describes the man as he "lay there nude, save for a small patch of blood-spotted gauze stuck to his lower abdomen...his eyes darted about in abject fear." The young man's mother is near, "watching in horror...her boy was suffocating in his own fat." This lurid description of a frightened, nude, 500 pound man, attached to "a ganglia of life-support systems" is clearly meant to invoke a sort of tantalizing horror in the reader (while enticing them to keep

reading). It also serves as an example of one of three classes of stigma identified by sociologist Erving Goffman in his seminal book *Stigma: Notes on the Management of Spoiled Identity.* Goffman characterized stigma as "an attribute that is deeply discrediting" and an "undesired differentness" from what those without the stigma ("normals" in Goffman's terms) expect (Goffman, 1963). Stigmas allow observers to define, categorize, and make assumptions about a person upon encountering them for the first time. Additional negative attributes and imperfections are assumed based on the original stigma; attempts by the stigmatized individual to defend themselves against these negative assumptions are seen as further expression of their defective character. The stigmatized person is likely to be aware that the "normals" do not accept him and are unwilling to treat him as an equal; ultimately he may come to agree that he does, in fact, fail to live up to "what he really ought to be" (Goffman, 1963).

In his book, Goffman identifies three classes of stigma. The first class of stigma involves "abominations of the body" or physical deformities (Goffman, 1963). *Ghastly, writhed, specter, blood-spotted, abject fear, horror, suffocating.* Crister's word choice makes clear the abominable nature of his subject's physical being. Media reports on the dangers of overweight and obesity are frequently accompanied by images of individuals at the extreme end of the obesity spectrum, often with their heads cropped out of the pictures – what psychotherapist and fat activist Charlotte Cooper termed the "headless fattie" image (Cooper, 2007). Employing images of depersonalized, headless, morbidly obese people magnifies the perception that obesity is deformity, reduces obese people to "specters" rather than full human beings, and make it easier to judge and then target fat people

specifically for lifestyle intervention (even though, as will be discussed later, a significant proportion of "normal weight" individuals face serious risk for cardiometabolic diseases). In his in-depth critique of Crister's article, writer Paul Campos sums it up thusly: "If one were forced to come up with a six-word explanation for the otherwise inexplicable ferocity of America's war on fat, it would be this: Americans think being fat is disgusting. It really is, on the important cultural and political levels, as simple as that. Crister's article is merely an unusually clear example of the commonplace social process by which a visceral reaction is transmuted into an aesthetic judgment, which in turn becomes a series of (imaginary) facts about the relationship between weight and health" (Campos, 2004, pg 67).

The second class of stigma identified by Goffman consists of "blemishes of individual character", including possession of a weak will, addiction, strong and/or unnatural passions, and mental health issues (Goffman, 1963). The labels "overweight" and "obese" are frequently associated with stereotyped negative characteristics, such as laziness, being unintelligent, lack of willpower and self-discipline, poor personal hygiene, and unattractiveness (Puhl, Moss-Racusin, Schwartz, & Brownell, 2007; Wott & Carels, 2010), and often come with a loss of social status (Hunger & Tomiyama, 2014). The implication of these combined stereotypes is that if a person is heavy, it is likely due to personal failings. Entertainment media and news coverage of weight-related issues both participate in this stereotyping, characterizing overweight and obese people as lacking personal responsibility and self-control (Puhl & Heuer, 2010).

A clip from the 2011 film *Samsara* opens with several minutes of disturbing scenes of factory farming, followed by a montage of giant supermarkets and fast food restaurants.

The camera then pans to three extremely obese people eating super-sized fast food meals (the woman in the group has not one, but two large cheeseburgers in front of her). The scene shifts again to an obese man in a doctor's office. Dressed only in his underwear and with his head cropped out of the frame, a surgeon is drawing a line drawn down the center of the man's abdomen, presumably in preparation for some type of weight-related surgery. The obvious reading of this clip is the parallel drawn between the chopping up of the animal bodies seen earlier, and the impending chopping up of this "headless fattie". A second implicit message is that over-consumption of cheap, poor quality food is what lead the man to the surgeon's office, and that people who are obese got that way through their lack of discipline and their poor choices (think of the obese woman shown eating *two* huge cheeseburgers). Delving further, the clip specifically links *obese* people to the consumption of the products of factory farming, making them complicit in the large scale suffering endured by those animals. In reality, the majority of Americans eat factory farmed animal products, and fast food is consumed in relatively equal proportion by people of all BMI categories and socioeconomic classes (Fryar & Ervin, 2013; Gallup, 2013; Kim & Leigh, 2011). The film makers could have shown a sleek, sexy athlete chowing down on a steak and still made the point that humans derive enjoyment from the products of inhumane agricultural practices. Instead, they went with the predictable stereotype of the self-indulgent fat person. The linking of these images (animal suffering, obese people, overindulgence in unhealthy food, and poor health outcomes) enforces negative stereotypes about fat people, and links obesity to character traits of poor self-control and morally suspect behavior.

Goffman's third class of stigma is that of race, nationality, and religion (Goffman, 1963). Race is a running theme in *Let Them Eat Fat*, and while Los Angeles' Latino population serves as the article's focal point, Crister also directed some of his worry at the health of black America. Citing studies finding that while black girls are "more inclined to obesity" than white girls, they are also less likely to have negative body images than their white counterparts, Crister notes (as a positive) that relative to women of color, Anglo women experience greater anxiety about fatness. Contrasting the positive body image of black girls to the fat anxiety of white women, and referencing supermodel Kate Moss, he writes "maybe a few more black Kate Mosses might not be such a bad thing" (Crister, 2000). While it may be what was natural for her individual body, at 5'7" and 105 pounds (at the height of her modeling career), Kate Moss' BMI was 16. This would place most people in the dangerously underweight category. Is this really what we as a society should be wishing for young black women? Or is Crister applying his own eurocentric standards of what is "normal and healthy" to non-European people?

As it turns out, promoting Kate Moss-type proportions to women of African descent may not be in their best interest. Optimal BMI for black people may be higher than what is optimal for white people, with studies revealing that the relationship between BMI and relative mortality are not the same for black people as it is for whites (Stevens, 2000). A large (n=5,440) cross-sectional study found that overweight and obese non-Hispanic blacks were 18% more likely to be metabolically healthy than were non-Hispanic whites in the same weight range (Wildman, et al., 2008). Black women may not experience decreased life expectancy until they reach BMI levels of 37-38 (for black men, BMIs of 32-33 are

associated with decreased life expectancy), and modest obesity is associated with *increased* life expectancy for black people between 60-70 years of age (Fontaine, Redden, Wang, Westfall, & Allison, 2003). A comparison of graphs representing the impact of overweight and obesity on life expectancy dramatically illustrates the significant gulf between the threshold for weight-associated mortality between white people and black people (Appendices A and B). In this context, it becomes clear that blanket statements regarding the dangers of overweight and obesity, especially those that reference specific BMI cutpoints, operate from a eurocentric model. Fontaine et al. offer a single line summary of their findings: "Obesity appears to lessen life expectancy markedly, especially among younger adults" (Fontaine, et al., 2003), a statement that completely ignores the reality of the black people they studied. Applying white standards of "normal" body size to black people places heavy (but healthy) black people at risk for stigma for not meeting white societal expectations. And as for "a few more black Kate Mosses" not being a bad thing, the strongest correlation between BMI and relative mortality among black women was found in those whose BMIs fell below 18.5 (Stevens, 2000).

Crister's handling of black girls' weight and body image reveals an intersection between the second and third stigmas identified by Goffman (character blemishes and stigma of race and nationality). Returning to Paul Campos' critique, he notes that "in most cultures, some class of people is more or less required to play the role of those who make everybody else feel superior by comparison" (Campos, 2004); historically, in the United States, that role has been filled by various ethnic and racial minorities, poor people, women, homosexual people, and Jewish people. As these prejudices become less acceptable, society

seeks a different groups to play the role of social pariah, and in Campos' view, in the current era that role has been assigned to fat people. This is not to the exclusion of continued stigmatizing stigma's historical targets, however. One content analysis of media stories on obesity reveal that news reports on obesity are significantly more likely to blame obesity on poor personal choices (character blemishes) if the subjects of the report are poor and/or ethnic minorities (rather than white and/or upper middle class) (Saguy, 2013). For example, 54% of the reports analyzed blamed obesity on poor personal choices when the subjects were Latino, black, and/or poor; of the articles that did not focus specifically on the above mentioned groups, 38% of the reports blamed personal choices (Saguy, 2013). In another content analysis, articles reporting on poor people were 4 times as likely to blame obesity on sedentary lifestyles than were articles not focused on the poor; those that discussed blacks or Latinos were 13 times more likely to blame sedentary lifestyles, and 8 times more likely to blame poor food choices than were articles not focused on those groups (Campos, Saguy, Ernsberger, Oliver, & Gaesser, 2006).

How Dangerous is a Fat Body?

In a dramatic and frequently quoted speech made at the University of South Carolina, then Surgeon General Richard Carmona stated "Obesity is the terror within. Unless we do something about it, the magnitude of the dilemma will dwarf 9-11 or any other terrorist attempt" (Jackson, 2006). Central to the discussion of bodyweight and health is the question: Do overweight and obesity strictly correlate with negative health outcomes? In his essay, Callahan wrote that obese people are "guaranteed serious health problems" as they age. Is he correct?

Before addressing those questions, some definitions and history. In terms of current medical and public health discussions, weight status is commonly established by BMI, or body mass index. Developed in 1832 by Belgian mathematician, statistician, and astronomer Adolphe Quetelet, the "Quetelet Index" is calculated by dividing an individual's weight in kilograms by the square of their height in meters (Eknoyan, 2008). Quetelet was not concerned with matters of obesity and/or health when he developed his calculation; his goal was to delineate the physical attributes of the "normal" (average) man.

Quetelet never intended his formula to be used a tool for assessing health status, but 140 years after its invention, that's precisely what happened. In 1972, physiologist and obesity researcher Ancel Keys renamed the Quetelet Index the Body Mass Index, stating that BMI "proves to be, if not fully satisfactory, at least as good as any other relative weight index as an indicator of relative obesity" (Keys, Fidanza, Karvonen, Kimura, & Taylor, 2014). In other words, in terms of accessibility, affordability, and accuracy, BMI was a pretty good option.

Currently, overweight/obesity is defined as follows: overweight = BMI of 25 < 30 kg/m^2; obesity = BMI ≥ 30 $kg/m^{2.}$. "Obesity" can be further stratified into 3 levels:

- Grade 1 obesity = BMI of 30 <35 kg/m^2
- Grade 2 obesity = BMI 35 < 40 kg/m^2
- Grade 3 obesity = BMI ≥ 40 kg/m^2. Grade 3 is often referred to as "morbid obesity".
- "Normal" or "healthy" weight is defined as a BMI 18.5 – 24.9; underweight as < 18.5.

(Ogden, Kit, Carroll, & Flegal, 2014).

To put these categories in real-world terms, a 5'4" woman (the average height for an American woman) is overweight at 157 pounds (BMI 27), grade 1 obese at 186 pounds (BMI 32), grade 2 obese at 215 pounds (BMI 37), and grade 3 obese at 244 pounds (BMI 42). If we assume him to be of average height (5'9"), the 500 pound young man described in Crister's article would have an off-the-charts BMI of 73.8. Crister is not alone in framing an example from the extreme end of the weight spectrum as representative; analysis of news media coverage of overweight and obesity reveals a pattern of extreme cases (people whose BMI lands them in the highest 5% of the population) being put forward as representative of the obesity epidemic (Saguy & Almeling, 2008).

Regarding Callahan's claim of the inevitability of obesity-related health problems, there certainly is no shortage of epidemiological studies showing an association between excess body weight and increased mortality risk (Fontaine, et al., 2003; Masters, Powers, & Link, 2013; Mokdad, Marks, Stroup, & Gerberding, 2004). One of the most widely cited obesity studies, published in *JAMA* in 1999, attributed 280,000 US deaths annually to obesity (Allison, Fontaine, Manson, Stevens, & Vanitallie,1999). But not all epidemiological research uncovers the same associations. Senior CDC National Center for Health and Statistics epidemiologist Katherine Flegal and her team conducted a systematic review of all-cause mortality for overweight and obesity relative to normal weight in the general population (Flegal, Graubard, Kit, & Orpana, 2013). With a combined sample of over 2.88 million adults, Flegal et al. concluded that when obese people were grouped into a single cohort, they indeed experienced higher rates of all-cause morbidity than individuals in the normal BMI category. However, outcomes changed when subjects were divided into more

precise categories. When compared to "normal" weight individuals, grade 1 obesity was *not* associated with increased all-cause mortality. Only at grades 2 and 3 did the researchers find an increased association between BMI and all-cause mortality. Perhaps most surprisingly, analysis revealed that overweight was associated with *lower* all-cause mortality than any other BMI category, including "normal" BMI. Flegal and her team offered several hypotheses for this surprising finding: overweight and grade 1 obese people may present earlier with symptoms of disease and receive better medical treatment, increased body fat may impart cardioprotective metabolic benefits, and heavier people may have increased metabolic reserves that contribute to their survival when faced with serious illness. Regarding the first hypothesis, studies actually find that obese women frequently delay preventative medical screenings based on past shame-inducing experiences in medical settings, and the fear that those experiences will be repeated on subsequent visits (Hunger, Major, Blodorn, & Miller, 2015; Puhl & Heuer, 2009).

One could (and many do) argue that Flegal's findings are a result of flawed methodologies. Well-known obesity researcher and chair of the Harvard School of Public Health's nutrition department Walter Willet said of the study "This study is really a pile of rubbish, and no one should waste their time reading it (National Public Radio, 2013); he was not alone in his critique (Brown 2015; Hughes, 2013). However, the same criticisms can be leveled at those who's research supports the disease model of obesity, and there are many researchers who support Flegal's findings or at least would agree that BMI is a poor measure of health (Hughes, 2013). The reality is that obesity is a complex phenomena with a multitude of confounders, including age, smoking, race and ethnicity, socioeconomic

status, physical activity levels, and pre-existing disease. Selective inclusion or exclusion of any combination of these confounders can dramatically impact a study's outcome (Bacon, & Aphramor, 2011, Brown, 2015).

Leaving aside possible issues of selective inclusion/exclusion of obesity confounders, a possible explanation for the discrepancy among research findings is the failure distinguish between the risks of overweight/grade 1 obesity vs those associated with grades 2 and 3 obesity. For example, when discussing weight-associated health risks, the standard line from the CDC is that "more than two-thirds of adults (are) either overweight or obese" (Ogden, et al., 2014). Such statements make no distinction between a person with a BMI of 30 (the entry point for the obese category) and a BMI of 50 (morbidly obese). This lack of precision implies that a 5'4" woman who weighs 174 pounds and a 5'4" woman who weighs 291 pounds have the same risk of disease. This pattern repeats in news media coverage of overweight and obesity, where lumping overweight and obesity people into a single category is a frequent practice (Saguy & Almeling, 2008).

Perhaps the high BMI = negative health outcomes equation is too simplistic, even when obesity grades are taken into account. Gaining traction is the hypothesis that it's not fat in and of itself that leads to disease, rather that it is the *location* of the fat that counts. Specifically, central adiposity (fat distributed around the mid-section) could be the culprit behind many of the diseases associated with overweight and obesity (Ahima, & Lazar, 2013).

A study published in 2015 followed 15,184 men and women, ages 18-90, for over 14 years, with an objective to examine the relationship between BMI, central obesity, total

mortality, and cardiovascular mortality risk. Working from a hypothesis that people with normal BMI but excess fat deposition around the waist would experience greater mortality risk than those without central fat deposition (regardless of BMI), researchers analyzed the associations between obesity patterns (that is, *where* excess weight was stored on the body) and health outcomes (Sahakyan, et al., 2015). Using waist-to-hip ratio (WHR) as a measure of central adiposity, results showed that normal-weight central obesity was associated with higher mortality than simply having a BMI in the overweight/obese range. Most significantly, researchers found that men with normal-weight central obesity had *twice* the mortality risk than men who were overweight/obese but with no central obesity. Quoting the researchers, "Men with normal-weight central obesity would have a higher total mortality risk than men with *any other combination* of BMI and WHR" (italics added). The same pattern applied to women: when compared to overweight/obese women without central adiposity, normal-weight, centrally obese women had a 40% or 32% higher total mortality risk (when compared to the overweight or obese women, respectively). Summarizing their findings, the researchers stated "normal-weight U.S. adults with central obesity have the worst long-term survival compared with participants with normal fat distribution, regardless of BMI category, even after adjustment for potential mediators" (Sahakyan, et al., 2015).

A recently published longitudinal study of 41,451 adults found that the best predictor of weight-associated mortality risk was not BMI, but central obesity (waist circumference, or WC). People defined as obese according to their BMI, but not according to their WC, had the same all-cause mortality risk as those with both "normal" BMI and WC;

those defined as obese by their WC were at increased all-cause mortality risk regardless of BMI status. The authors wrote “Our findings indicate that the estimated proportion of deaths (or more precisely, the excess risk of mortality) that could theoretically be avoided by targeting those with an obese WC...would be greater than the proportion of deaths that would be avoided by targeting population BMI alone (the status quo of current obesity prevention and intervention strategies)” (Tanamas, et al., 2016).

There are several possible explanations for these collective findings. Normal-weight obesity has been linked to cardiometabolic dysregulation, metabolic syndrome, and increased risk for cardiovascular disease (Romero-Corral, et al., 2010). Additionally, people with normal-weight central adiposity are unlikely have significant fat deposits on their hips and thighs, fat which has been shown to impart health benefits via improved blood lipid and glucose profiles, and decreases in cardiovascular and metabolic risk. (Manolopoulos, Karpe, & Frayn, 2010).

Perhaps most importantly, relying on BMI to determine who is at risk for metabolic diseases overlooks the millions individuals who are at risk due to being normal weight while carrying more than average amounts of fat tissue (Gómez-Ambrosi, et al., 2011; Tomiyama, Hunger, Nguyen-Cuu, & Wells, 2016). A 2008 study found that 23.5% of American adults age 20 and older carry significant risk of for metabolic diseases, despite being in the “normal” BMI category (Wildman, et al., 2008). The same study found that 51.3% of “overweight” adults and 31.7% of “obese” adults were metabolically healthy. Of note was the finding that “the beneficial effect of leisure-time physical activity was statistically significant in both the normal-weight and the over-weight and obese

individuals" (Wildman, et al., 2008). In other words, the normal-weight people with poor metabolic profiles were associated with low levels of physical activity, while the heavy people with healthy metabolic profiles were associated with greater physical activity levels. These findings are supported by recent analysis using data from the Aerobics Center Longitudinal Study (ACLS). Researchers investigated the health risks associated with being obese but metabolically healthy (as defined by blood lipid profiles, cardiovascular measures, and plasma glucose). When comparing health risks between normal-weight/ metabolically healthy, obese/metabolically healthy, and obese/metabolically unhealthy individuals, researchers found no difference in risk between the normal-weight/ metabolically healthy and obese/metabolically healthy groups (Ortega, et al., 2013). In light of their findings, the authors labeled obese/metabolically healthy a "benign condition". Similar to Wildman, et al., the researchers identified fitness level as the crucial factor differentiating health outcomes between the two obese groups.

The paper *Actual Causes of Death in the United States, 2000* attributed 400,000 deaths to poor diet and inactivity (Mokdad, et al., 2004). In explaining their methods, the authors write "To assess the impact of poor diet and physical inactivity on mortality, we computed annual deaths due to overweight." In other words, they looked at mortality data for overweight and obese people, attributed those deaths to lifestyle choices, and came up with 400,000 deaths attributable to "poor diet and physical inactivity". The underlying assumption is that poor diet and physical inactivity = fat (and, presumably, good diet and physical activity = thin). This approach erases from the equation both the metabolically

healthy fat person, along with the sedentary, metabolically unhealthy thin, to the detriment of both groups.

Obesity Stigma and Fat Shaming: Motivating or Discouraging?

Weight stigma has been defined as "negative weight-related attitudes and beliefs that are manifested by stereotypes, rejection and prejudice towards individuals because they are overweight or obese" (Puhl, Moss-Racusin, Schwartz, & Brownell, 2007). Implicit in Callahan's argument is the belief that obese people do not currently experience significant stigma. Research by Lewis, et al. (2011) showed otherwise, uncovering three distinctive patterns of stigma: Direct (verbal attacks, work policies that denied opportunity or advancement based on weight criteria); indirect (onlooker stares when eating out or food shopping, being ignored by staff in retail and service establishments); and environmental (workplace seating too small to accommodate their size, lack of clothing options, lack of positive images of fat people in the media). Repercussions of this three-pronged stigma included decreased self-esteem, resistance to exercising in public spaces, participation in extreme weight loss regimens, social disconnection, and compromised sense of identity (Lewis, et al. 2011). These findings are supported by other research that identified negative assumptions, physical barriers, and social rejection as the most common forms of stigma experienced by obese people, with associated increased depression, reduced self-esteem, and body image distress (Freidman, et al., 2005). Higher BMIs are associated with increased experiences of weight stigma (Freidman, et al., 2005; Wott & Carels, 2010); however it also appears that anyone who is overweight, even if by just a few pounds, is at risk for stigma's negative effects (Puhl, et al., 2007).

Anthropologist and obesity researcher Alexandra Brewis has identified four mechanisms by which fat stigma negatively impacts obese people: 1) fat stigmatized people are less likely to engage in exercise and healthy dietary habits; 2) stigmatized individuals experience physiological stress and depression that can contribute to weight gain; 3) stigmatized individuals may develop social patterns that promote weight gain; 4) weight discrimination reduces work, training, education, and career opportunities which in turn may lead to reduced economic status (a risk factor for obesity) (Brewis, 2014). Mechanisms 1 and 2 are of primary interest in this paper.

Weight stigmatized individuals experience physiological stress and depression that can contribute to weight gain (Brewis, 2014, Wott & Carels, 2010). Weight stigma is associated with increased depression and poor mental health outcomes (Friedman, et al., 2005), and predicts reduced success in weight loss interventions (Wott & Carels, 2010). Some researchers posit that the negative psychological states associated with being overweight (including depression, anxiety, lowered self-esteem, and reduced quality of life), are more accurately attributable to the social stigma experienced by overweight people than to the weight itself (Hunger, et al., 2015). Stigma may generate feelings of shame and embarrassment, particularly in anticipation of negative responses from other people in the exercise environment (Vartanian & Novak, 2011; Vartanian & Shaprow, 2008). Experiences of weight based stigma have been associated with avoidance of exercise, reduced motivation to exercise in public (Lewis, et al. 2011; Vartanian & Novak, 2011), and reduced calorie expenditure through physical activity (Wott & Carels, 2010). People who are consciously aware of weight-based stigmas and stereotypes may show reduced disposition

to exercise, regardless of their individual BMI status: “Obesity is as much a state of mind as it is an objective measure of weight. Consequently, individuals who have a poor body image or perceive themselves as being heavy are as susceptible to weight-related stigma as those who are not objectively overweight or obese” (Schmalz, 2010). This suggests a potential negative consequence of public health campaigns focused on weight-related goals: they may in fact reduce motivation towards physical activity in those people who are sensitive about their weight (Schmalz, 2010).

Exposure to weight stigmatizing media has been demonstrated to stimulate markedly increased calorie consumption in overweight and obese women (Schvey, Puhl, & Brownell, 2011), and to reduce self-efficacy for dietary control among women who perceive themselves as overweight (Major, Hunger, Bunyan, & Miller, 2014). Experiences with interpersonal and institutional stigma are associated with increased binge eating (Wott & Carels, 2010), and positively correlates with eating pathologies (Vartanian & Novak, 2011). Elevated cortisol in response to chronic stress has been linked to increased food intake, particularly increased consumption of calorically dense foods high in sugar and fat (Torres, & Nowson, 2007). Quoting Wott & Carels, “...overt weight stigma may have a detrimental impact on overweight and obese individuals’ ability to lose weight and engage in behaviors consistent with weight loss (i.e. limiting calorie intake, engaging in physical activity). Additionally, weight-related stigma is directly associated with psychological distress and maladaptive eating.”

Research demonstrates that pathologizing obesity is a poor strategy for motivating health behaviors. Experimental studies examined the impact of the American Medical

Association's June 2013 vote to recognize obesity as a disease; specifically how the obesity-as-disease designation affected the health behaviors of obese people. The AMA felt that calling obesity a disease would strike fear and motivate obese people to lose weight, however researchers predicted that labeling obesity a disease would *reduce* the concern obese individuals feel regarding their weight, decrease their body dissatisfaction, and reduce their motivation to engage in healthy eating behaviors. They hypothesized that people experience reduced self-efficacy and responsibility when they believe they have a disease, based on the belief that diseases are cured by doctors, not by lifestyle changes. In a series of two experiments, subjects were exposed to either an article about the AMA vote to recognize obesity as a disease, or a standard public health information article about weight (containing no mention of obesity as a disease). Subjects were then given surveys intended to measure their attitudes and concerns about their own weight. Researchers found that those subjects exposed to the article about the AMA vote expressed less concern about their weight in the follow up surveys, thus confirming the authors' predictions, and leading them to conclude that designating obesity a disease may lead to reduced self-regulatory behavior on the part of obese individuals (Hoyt, Burnette, & Auster-Gussman, 2013).

Central to current public health messaging is the concern that due to complications from obesity, today's children may have a shorter life expectancy than their parents (Olshansky, et al., 2005). While this prediction was speculative, it has had far-reaching consequences, including generating public-health campaigns directed as addressing the problem of childhood overweight and obesity. In his JAMA Pediatrics editorial, Dr. Callahan notes that “childhood obesity once established carries over into adulthood and is

exceedingly difficult to treat" (Callahan, 2013). For that reason, he advocates tactics that may stigmatize the parents of obese children in an effort to motivate the parents to take action to change their child's weight. This suggestion carries the implicit belief that identifying a child as "fat" will reduce the likelihood that the fat child grows into a fat adult. A recent longitudinal study uncovered the opposite effect: children labeled "too fat" at age 10 had greater odds of reaching "obese" BMI status by age 19 (Hunger & Tomiyama, 2014), regardless of BMI status in childhood. The study authors attribute these increased odds to obesogenic stress induced by weight labeling, and to possible overeating as a coping mechanism.

A recent study investigated the outcomes of a 2003 Arkansas legislative initiative mandating that all children enrolled in the Arkansas public school system have their BMI measured annually, with a subsequent Child Health Report sent home to parents. At a cost of approximately $96,500 for the 2007—2008 school year, the report informed the parents of the dangers of overweight/obesity, and offered advice on how parents could promote healthy diet and exercise habits. The study examined the impact of the program on the weight of 11th and 12th graders who had been previously screened in early adolescence (Gee, 2015). No statistically significant changes were found in BMI, dietary habits, or exercise habits among adolescents who received annual BMI report cards. The study's conclusions bring into question the usefulness of BMI labels as a motivational tool, at least when dealing with children and their parents. Gee noted that while no positive health outcomes were generated by the program, no negative health outcomes were generated either.

This conclusion runs counter to research conducted by Women's Studies researcher Dr. Carla Rice. Rice explored the relationship between fat identity developed in childhood and/or the witnessing of anti-fat attitudes directed towards fat kids, cultural messages around fatness and fitness, and the subsequent health behaviors (Rice, 2007). Interviews with 81 women from diverse ethnic and socioeconomic backgrounds revealed that many women subjected to anti-fat messaging in childhood, particularly the message that one can not be both fat and fit, experienced decreased motivation to exercise or engage in physical activity as teens and adults. Subjects reported that childhood fitness testing in school resulted in shame and reduced interested in exercise, and addressed painful feelings of remembered childhood shame when confronted with public health messages decrying obesity. As being fat became the subjects' primary identity, a correlating identity as unfit was forced upon them (regardless of their actual physical habits and abilities). An important distinction between in-school fitness testing (as experienced by Rice's subjects) and take-home BMI reports (Gee's subjects) is that the fitness tests were conducted publicly (in gym class, for example), while the results of the BMI testing were not publicly disclosed. Thus opportunities for public shaming were minimized among Gee's subjects, but were maximized among Rice's subjects (likely explaining of negative outcomes experienced by Rice's subjects as compared to Gee's).

Fat-Shaming is Stressful

When confronted with a stressor (actual or imagined, physical or psychological) the body's systems kick into high gear, in preparation to fight back or escape. This revving up of

the body knocks it out of homeostasis, and creates a concurrent need to re-establish systemic equilibrium once the threat passes or has been evaded (Kyrou & Tsigos, 2009).

This stress response is designed to be transient, lasting long enough to ensure survival of the organism, but not so long that the organism's health is threatened by the long-term effects of the mechanisms involved in the response. Chronic stress, and thus chronic exposure to stress hormones (cortisol, epinephrine, and norepinephrine), weakens immunity, suppresses secretion of sex hormones, reduces wound healing, increases risk of infection, and has been linked to increased risk for hypertension, coronary heart disease, and some forms of cancer (Saladin, 2000). The chronically stressed individual is also at risk for metabolic imbalances, reduced insulin sensitivity, immunosuppression, and increased systemic inflammation (Kyrou, Chrousos & Tsigos, 2006; Kyrou & Tsigos, 2009). Additionally, cortisol directly promotes accumulation of abdominal fat (Kyrou & Tsigos, 2009; Torres, & Nowson, 2007), which has been shown to pose a threat to health regardless of BMI (Sahakyan, et al., 2015). Stress induced increases in blood pressure and heart rate have been linked to increased risk of hypertension and heart disease, especially if the stress response is chronic due to repeated physical and/or psychological stressors (Spalding, Lyon, Steel, & Hatfield, 2004). Thus, people experiencing chronic stress are at increased risk for the diseases most often linked to obesity: diabetes and cardiovascular disease (Hunger, et al., 2015).

Women exposed to weight-based stigmatizing stimulus experienced an increase in cortisol secretion, regardless of their weight (Himmelstein, Incollingo & Tomiyama, 2015; Schvey, Puhl, & Brownell, 2014). In other words, women across a range of BMI levels, from

thin to obese, demonstrate negative physiological responses to weight-based stigma; stress reactions to weight-based stigma related more strongly to the women's *perceived* weight status, rather than to their actual BMI measure. Himmelstein et al. found that regardless of actual weight, women who characterized themselves as too heavy demonstrated elevated cortisol when subjected to weight stigma. Women who characterized themselves as being at a "normal" weight (even those who qualified as overweight or obese by current BMI measures) did not experience elevated cortisol when exposed to similar stigmas.

Focusing on the stress induced by specifically by weight-based stigma, and drawing from the fields of neuroendocrinology and social and health psychology, researcher A. Janet Tomiyama constructed the cyclic obesity/weight-based stigma (COBWEBS) model. The COBWEBS model states that the stress resulting from obesity stigma creates a vicious cycle: stress increases cortisol secretion, driving (poor) eating behaviors and abdominal fat accumulation, ultimately leading to increased shame and further stigmatization. The obese person is thus trapped in a perpetual cycle of stigma, stress, shame, and weight gain (Tomiyama, 2014). Of possible interest to Dr. Callahan: Tomiyama proposes that the negative health outcomes generally attributed to weight may be more accurately attributed to the negative effects of stigma-induced stress responses. In her conclusion, Tomiyama writes that the COBWEBS model underscores "the importance of reframing weight stigma as a risk factor for overeating, weight gain, and a barrier to weight loss, justifying efforts to decrease stigma, discrimination, and prejudice against individuals considered to be overweight or obese" (Tomiyama, 2014).

Exercise (with our without accompanying weight loss) can provide a protective benefit against the negative impacts of stress. In his popular book *Why Zebras don't get Ulcers* (1994), Robert Sapolsky offers a concise summary of the various ways exercise is thought to improve chances of surviving stress: 1) exercise reduces risk of cardiovascular and metabolic diseases, which in turn minimizes stress' power to influence those disease processes; 2) via beta-endorphin release, exercise can improve mood (provided the person exercising enjoys, or is at least willingly engaging in, the exercise), which in turn blunts the negative effects of stress; 3) exercise can increase one's sense of self-efficacy, potentially increasing one's resiliency in the face of a stressor; 4) vigorous aerobic exercise provokes many of the physiological events that occur during the fight of flight response (increased blood flow to muscles, increased heart rate, and release of catecholamines), but unlike, for example, sitting through a combative board meeting, the hormones released during the stress response can actually be put to use. Exercise is a stressor, but it's a *positive* stressor—the body gets to activate the muscles and cardiovascular system, making use of the stress response and ultimately reducing tension (Sapolsky, 1994).

Over time, regular aerobic activity can lead to what has been called "Cross-Stressor Adaptation (CSA)", the idea that regular exercise leads to changes that result in reduced physiological responses in the face of (non-exercised induced) stress, and a faster return to homeostasis (Klaperski, Von Dawans, Heinrichs & Fuchs, 2012). Regularly performed exercise is believed to have an overall beneficial effect in terms of managing both immediate stress *and* the consequences of chronic stress. Physically active people may be less susceptible to the adverse effects of stress, and demonstrate reduced stress reactivity

when confronted with a psychological stressor (Rimmele, et al., 2009). Exercise induced reduced cardiovascular reactivity in the face of chronic stress may provide a cardioprotective benefit, and reduce the risks of age-associated cardiovascular disease (Spalding, Lyon, Steel, & Hatfield, 2004). Studies demonstrating a reduction in cortisol secretion in aerobically trained individuals (Klaperski, et al., 2012) indicate that regular aerobic exercise may protect against the development of metabolic disorders, including diabetes (Kyrou & Tsigos, 2009).

Relevant to the health of overweight and obese people, this would be promising save for this inherent twist: Stress induces a physiological state (increased secretion of stress hormones) that over the long term is associated with negative health outcomes, these outcomes can be at least partially mitigated by exercise; however, a common effect of weight stigma is reduced motivation to exercise; thus the stimulus (weight-based stigma) creates a dangerous condition (increased stress hormone secretion) while also suppressing disposition towards an effective treatment (exercise). The task facing health and fitness professionals is how to sensitively respond to the negative consequences of weight induced stigma (and address their own stigmatizing attitudes) while also encouraging one of stress' primary mediators, exercise.

Fitness and Fatness: Exercise as a Mediator of Disease Risk

Whether or not one subscribes to the belief that the United States is in the midst of a dire health crises brought on by an obesity epidemic, there is no doubt that many overweight and obese people desire to lose weight, be it for perceived health, aesthetic, and/or social reasons. To that end, Americans are generally offered advice along these

lines: Eat more fruits and vegetables, reduce consumption of sugary beverages and processed foods, limit tv watching, and “try going for a 10-minute brisk walk, 3 times a day, 5 days a week” (Centers for Disease Control and Prevention, 2010). According to Surgeon General Richard Carmona “There’s a *simple* prescription that can end America’s obesity epidemic: every American needs to eat healthy food in healthy portions and be physically active every day” (Carmona, 2003).

While following the above suggestions can contribute to a healthy lifestyle and improved health outcomes, the reality is that major weight loss requires major effort, and won't be achieved via 10 minute walks. To achieve a BMI of 24 (the high end of "normal"), a woman with a BMI of 35 (5'4” and 204 pounds) would need to reduce her weight to 140 pounds, a weight loss of 64 pounds. This degree of weight loss doesn't come easy. Data collected by the National Weight Control Registry (an ongoing, long-term prospective cohort study that tracks people who have maintained at least a 30 pound weight loss for one year or longer) shows that those individuals who successfully maintain significant weight loss average 1 hour of moderate-intensity physical activity per day, while consuming an average of 1,381 calories (24% from fat) per day (Wing & Hill, 2001; Wing & Phelan, 2005). The “average” NWCR member is female, 45 year old, and weighs 145 pounds (http://www.nwcr.ws/Research/default.htm). If we assume her to be of average height (5'4”), her estimated caloric needs to maintain her weight while engaging in 60 minutes of moderate intensity activity per day is 2,329 calories (http://fnic.nal.usda.gov/fnic/interactiveDRI/). Meaning, the “average” female NWCR member lives her life operating at a 948 calorie deficit per day. Even with allowances for

the generalized nature of these numbers, that's a pretty significant restriction to maintain over a lifetime.

Very few people succeed in maintaining such dramatic weight loss over the long term. A 10-year study of 176,000 men and women (aged 20 and older) found that for those who started out with a BMI between 30.0 and 34.9, annual odds of attaining a normal BMI were 1 in 210 for men and 1 in 124 for women; for those in the 35.0-39.9 BMI category, those odds were 1 in 801 for men and 1 in 430 for women; and for those in the 40.0-44.9 BMI category, those odds were 1 in 1290 for men and 1 in 677 for women (Fildes, et al, 2015). A review of scientific literature on the effectiveness of weight loss interventions found that weight loss achieved was limited to an average of 5-10% of initial bodyweight; over time most people not only regained that 5-10%, they actually regained more weight than they lost (Mann, et al., 2007).

A 2014 “Patient Page” article in *JAMA*, written in the voice of a doctor speaking to a patient, suggests a “reasonable” weight loss regimen based on a daily reduction of 500-1000 calories (Guth, 2014), a program the author claims will lead to a loss of 1-2 pounds per week. Exercise merits one short paragraph, its benefits limited to exercise's ability to “tone your muscles and help to limit flabby skin”. The author follows the CDCs lead and suggest that “walking, even slowly for 10 minutes” can achieve benefits, and advises dieters to aim for 30 minutes of activity per day.

If significantly improved health and reduced disease risk is the ultimate goal, an intervention model based on calorie restriction and minimal exercise may not be the optimal approach. An in-depth review of the efficacy of calorie restriction protocols yielded

two conclusions: that diets lead to short-term weight loss, and that these loses are not maintained over time (Mann, et al., 2007). More significantly, those who approach weight loss with dietary interventions only may succeed in losing some weight, but do not gain the same improvements in their cardiometabolic profile as those who incorporate exercise into their regimen.

Weight loss interventions combining calorie restriction with exercise induced have been shown to induce positive changes in diastolic blood pressure, total, cholesterol, LDL cholesterol, HDL cholesterol, and insulin sensitivity; the benefits induced by weight loss interventions utilizing caloric restriction only were limited to improvements in HDL cholesterol only (Larson-Meyer, Redman, Heilbronn, Martin & Ravussin, 2010). High levels of physical activity and cardiorespiratory fitness have an inverse correlation to cardiovascular disease, type 2 diabetes, and all-cause mortality (Fogelholm 2010; Swift, et al. 2013). People who undertake a program of exercise intervention show improved cardiometabolic profiles, regardless of the amount of weight lost (or not lost) (Gaesser, Angadi, & Sawyer, 2011).

A person need-not go from “obese” to a “normal” BMI to obtain health benefits. Studies show that weight loss of 5-10% can induce positive changes in metabolic function and may improve cardiometabolic outcomes (Magkos, et al., 2016) and improvements in cardiovascular disease risk factors in people with type 2 diabetes (Wing, et al., 2011). And in contrast to the poor odds of moving from an obese BMI to a “normal” BMI, odds of dropping 5% body mass are pretty good: 1 in 12 for men and 1 in 10 for women with grade 1 obesity. Those odds improve with increasing weight, topping out at 1 in 8 for men and 1

in 7 for women with morbid obesity (Fildes, et al, 2015). It is worth nothing however, the weight lost may not stay off over the long term (Mann, et al., 2007). Which is probably fine, given that the benefits obtained from the small weight losses may stem from the lifestyle interventions that induce the weight loss (better eating and increased physical activity) rather than from the weight loss itself. "In overweight/obese individuals, either with (or who are at risk for) type 2 diabetes and/or cardiovascular disease (CVD), cardiometabolic risk markers can be improved, if not entirely ameliorated, through lifestyle intervention, independent of weight loss. This non–weight loss-centered approach may provide physicians with a strong rationale for prescribing exercise and a healthier diet to overweight/obese patients, for whom sustained weight loss has often proved unattainable" (Gaesser, et al., 2011).

Steven Blair, Professor in the Departments of Exercise Science and Epidemiology and Biostatistics at the Arnold School of Public Health, University of South Carolina, argues that it is primarily cardiorespiratory fitness, not weight status, that influences an individual's risk for metabolic and cardiovascular disease. "I believe that evidence supports the conclusion that physical inactivity is one of the most important public health problems of the 21st century, and may even be the most important...My overriding concern is that the crucial importance of physical activity is undervalued and underappreciated by many individuals in public health and clinical medicine" (Blair, 2009). Blair advocates that along with blood lipid profiles, BMI calculations, and cardiovascular assessments, doctors take a physical activity history and make incorporation of regular physical activity part of the patient's health program. (Archer & Blair, 2011).

In a social and medical environment where negative metabolic profiles are often attributed to, simply, “obesity”, and where weight loss, by any means necessary, is the standard antidote to the obesity problem, study results linking physical activity (rather than weight loss alone) to improved health outcomes are significant. While caloric restriction may be “successful” in that it results in reduced body fat and improved HDL cholesterol levels, losing weight by dieting alone may not induce the positive cardiometabolic changes experienced by those who incorporate exercise into their life style. Given the difficulty of sustaining significant weight loss over the long term, changing the endpoint from BMI measures to establishment of healthy exercise and dietary habits seems a laudable goal.

SURVEY

Methods

I conducted an anonymous, online "Physical Activity Survey" between March 21 and April 21, 2016. The survey and survey process was approved by the Portland State University Institutional Review Board. Survey recruitment was carried out via social media outlets, and resulted in 152 completed responses (outside of the consent page, all questions were optional, so a "complete" survey may contain some unanswered questions; for that reason, not all talleys add up to 152).

My original intent was to distribute the survey to online forums and social networks populated by people seeking support for issues around weight, body image, and stigma. I enlisted the help of "gatekeepers", members of these communities who were supportive of this project and were eager to see my survey shared. Despite the advocacy of these community members, administrators of the groups declined to distribute the survey, out of an understandable concern that it would invoke feelings of shame in an already stigmatized community.

I additionally attempted to post the survey on general wellness forums attached to well-known health and fitness websites, only to have my postings immediately deleted, with warnings that such actions are not allowed and further postings would result in my being banned from the sites.

I moved on to social media, which turned out to be an effective recruitment tool. The survey was cross-posted multiple times, meaning it reached far beyond my social circle, resulting in a diverse sample set. In hindsight, the final sample is possibly more

generalizable than if I had succeeded in my initial attempt to distribute the survey to weight-related support groups, as my current sample is likely less subject to sampling bias.

As I allowed participants to skip questions they preferred not to answer, each question potentially drew responses from a slightly different pool of participants. This somewhat limits my ability to compare responses from question to question. However, the option of skipping questions may have also increased overall participation, as respondents were not disqualified if they preferred not to answer a particular question. On a related note, the consent form did not specify that written responses may be quoted. For that reason, I have paraphrased rather than quoted written comments. In some ways this reduces the impact of the written replies; on the flip side, the very honest and personal comments I received may not have been shared if the participants had concern that they could be quoted directly.

Results

Demographics

Out of 152 respondents, 133 were female, 14 were male, 1 person identified outside the gender binaries, and 3 people did not supply gender information. Age breakdown was as follows: 18-20 yrs, 0.68%; 21-29 yrs, 14.86%; 30-39 yrs, 17.57%; 40-49 yrs, 29.05%; 50-59 yrs, 26.35%, 60+ yrs, 11.49%. Respondents were asked to self-identify their race/ethnicity (rather than checking predetermined categories). Of the 142 people who provided information, the majority identified as white or Caucasian (85.2%); the next largest group identified as “mixed” or multi-ethnic (6.34%); then Latin/Hispanic (3.52%);

Asian (2.11%); black, Native American, human, and "prefer not to answer" each came in it at 0.7%.

Of the 148 people who reported height and weight data, 2.02% meet the criteria for underweight, 31.75% were classified as "normal" (BMI 18.5-24.9), 35.13% were overweight, and 31.08% were classified as obese. In the later group, 54.34% were grade 1 obese (BMI 30-34.9), 15.21% were grade 2 obese (BMI 35-29.9), and 30.43% were grade 3 obese (BMI ≥ 40) (16.89%, 4.73%, and 9.46% of the total survey population, respectively) (see Appendix C for table of BMI classifications of survey participants). This closely matches national data trends:

- More than one-third (35.7%) of adults are considered to be obese.
- More than two-thirds (68.8%) of adults are considered to be overweight or obese
- More than 1 in 20 (6.3%) have extreme obesity.

(National Institute of Diabetes and Digestive and Kidney Diseases, retrieved May 14, 2016)

Exercise Habits and Health Status

The majority of participants (80%) reported exercising at least 2 days per week; 19.74% reported exercising 5-7 days per week. 87.5% reported exercise bouts averaging at least 20 minutes, 54.6% reported average bouts of at least 40 minutes. Exercise was most commonly performed outside (77.12%), at home (48.37%), or at the gym (41.83%). In response to the question "Do you feel you get too much exercise, too little exercise, or about the right amount of exercise?", 0.65% answered "too much"; 17.65% answered "about right"; 40.06% said "slightly/somewhat too little"; 33.99% said "much too little"; and 0.65% chose "no answer/not applicable". The most popular exercise activities were

walking/hiking (80.54%); resistance training (38.26%); cardio machines (32.89%); yoga/pilates (32.21%); jogging/biking (26.85%); group exercise classes (20.13%); and dancing (18.79%) (respondents could select multiple activities).

Primary motivations for exercise were health benefits (80.39%); weight management (72.55%); stress management/relaxation (58.82%); functional/therapeutic (44.44%); aesthetics (43.14%); "I just enjoy being active" (38.56%); and "spend time with family/friends" (24.84%).

Based on perceptions of *appearance*, 70.39% described themselves as "too heavy"; based on perceptions of *health*, 63.40% rated themselves "too heavy". Overall, 68.13% of respondents reported that they were trying to lose weight. Dietary interventions were utilized by 81.67% of those trying to lose weight, exercise by 74.17% (respondents could pick more than one intervention if applicable). 1.97% reported wanting to gain weight, and rating themselves as "too light" by both health and appearance criteria. Despite the majority wanting to lose weight, 79.08% characterized their overall health as "good" to "excellent". Only 3.92% described their health as "poor". This would indicate that the majority of survey respondents believe that one can be heavy and healthy at the same time, and that aesthetics, rather than health, are behind some of the motivation to lose weight.

Respondents were asked their opinions regarding obesity's disease designation. Only 17.11% reported paying attention to media reports characterizing obesity as a disease; 57.89% said they were aware of these reports, but that they didn't follow them. Asked if they agree with reports characterizing obesity as a disease, 34.64 % replied "yes"; 16.99 % replied "no"; 37.91% replied "don't know/not sure"; and 10.46% replied "no

answer" or "other". Of those replying "other", the most common explanation for their response was a sense that "disease" is a "loaded" word, subject to interpretation; they also observed that the "disease" of obesity may in fact be a lifestyle and/or societal issue (rather than a weight issue). When asked how media reports characterizing obesity as a disease impact their satisfaction with their current body weight, 12.58% reported feeling very or somewhat satisfied; 14.57% reported neutral feelings; 35.76% reported feeling somewhat to very dissatisfied; 24.50% said that media reports to not effect their feelings about their weight; and 12.58% responded "no answer/not applicable" or "other".

Given that only 17.11% of respondents reported paying attention to media stories characterizing obesity as a disease, it's not surprising that the question "After exposure to a media report characterizing obesity as a disease, how motivated do you feel to exercise?" yielded 46.71% saying that such stories have no effect on their motivation to exercise. Another 16.45% replied "not applicable". Highly to slightly increased motivation was reported by 28.94%; highly to slightly decreased motivation was reported by only 5.26%; 2.63% replied "other". Commenters from this last group said that these reports inspire irritation, guilt, and avoidance of exercise; one person said that she already exercises to control her weight, so the reports have no effect.

As there were the same number of people in both the highly motivated group and the slightly to highly demotivated group (5.26%, n=8), they make an interesting case for comparison. Of those who characterized their motivation as slightly to highly decreased, 2 were in the "overweight" BMI category; 5 were in the "obese" BMI category; 1 did not provide weight data (however she did describe herself as "too heavy" previously in the

survey). Of those reporting feeling highly motivated, 1 person was in the “normal” BMI category; 5 were in the “overweight” BMI category; and 2 were in the “obese” BMI category. The samples in both groups are too small for generalization, however is it apparent that those who felt motivated by “obesity is a disease” media reports skewed to lower BMI categories than did those who were demotivated by such media reports. Overall, for my survey population, framing obesity as a disease does not appear to be a particularly potent motivator or demotivator of exercise, most likely because my population simply doesn't pay attention to those reports.

In answer to the question “Do you feel that your bodyweight creates a barrier to your engaging in fitness activities?”, 41.45% of the total sample population answered “yes”. Stratified by BMI, percentages answering “yes” were 19.14% of the “normal” BMI group; 38.36% of the BMI 25-29.9 group; 68% of the BMI 30-34.9 group; 85.71% of the BMI ≥ 40 group. Three categories (no BMI data, <18.5, and 35-29.9) had very small samples (n= 4, 3, and 7, respectively), so their percentages (25%, 33.33%, and 42.85%, respectively) may not be representative.

When asked to describe the nature of the barrier, 55.26% of those answering “yes” reported feeling uncomfortable exercising in public at their current weight. Of those selecting that option, 66.66% were in the obese BMI range; 23.80% were in the overweight range; 4.76% were in the “normal” range; and 4.76% did not supply height and weight data. Other reasons cited included feeling physically uncomfortable exercising at their current weight (34.21%); concern that they might injure themselves (22.37%); not knowing what exercise is appropriate for their current weight (15.79%), and concern for their heart,

blood pressure, joints, etc (14.47%) (respondents could select more than one area of concern).

When asked “Have you ever thought "I will start an exercise routine once I lose x pounds?”, 17.81% replied “yes”. Of those wanting to lose weight before starting an exercise routine, the amount they wished to lose ranged from 7-50 pounds, with 20 pounds being the most frequently listed amount. Some gave descriptive rather than quantitative goals, writing that they want to feel comfortable about how they look in workout clothes, feel ease of movement in their body, and/or not feel self-conscious exercising in front of others.

Stigma experiences and shame

In answer to the question “When working out in a public setting (the gym, an exercise studio, etc), have you ever felt judged about your weight?” 52.63% replied “no”, 40.13% replied “yes”, and 7.24% replied “not applicable/no answer”. Of those who reported feeling judged about their weight, 34.62% reported feeling judged by the facility staff, 75.64% felt judged by other facility users, and 7.69% replied “other”. When asked to specify the “other”, all but one of these people identified themselves as the person doing the judging; the remaining person felt judged by non-facility users observing from outside.

When responses to the above question were broken down by BMI category, a pattern emerged showing increased experiences of feeling judged corresponding with increases in bodyweight: BMI <18.5, 0%; BMI 18.5-24.9, 23.40%; BMI 25-29.9, 44.23%; BMI 30-34.9, 52%; BMI 35-29.9, 33.33%; BMI ≥ 40, 78.57%. For the BMI 35-29.9 category, relatively small sample size (n=6) who answered the question may have distorted the data.

Respondents were given the opportunity to describe their experiences with feeling

judged based on their weight; 40 people provided answers. Many were short, along the lines of *I feel people are staring at me; I might not be able to do all of the exercises.* One person reported feeling that people judged her to have an eating disorder based on her thin body.

Fear of being made fun of was frequent theme. Accounts included sensing that other gym users were laughing and staring at the "fat" girl who "doesn't know what she's doing at the gym", and men displaying amusement at the "novelty" of a heavy person using the workout equipment. Subjects expressed discomfort working out in public in a social media environment wherein a heavy person's photo may be taken without their knowledge and posted without their consent, to be held up as a source of ridicule.

When exercising in a public setting, respondents reported overhearing negative comments from strangers regarding both their weight and the shape of their body, and assumptions about their dietary habits (along the lines of *if she would just eat some salad she would look so much better*). There were also reports of being ignored by staff (treated "as if I were invisible"), and treated as an outsider, unworthy, and unwelcome by staff and/or other gym members.

Another question asked about feeling nervous or anxious about exercising in a variety of public settings. 134 people responded to this question. The highest rated settings for provoking feelings of nervousness or anxiety were exercise classes (68.66%) and gyms/exercise studios (63.43%); recreational sports was cited by 34.33% (respondents could select more than one option).

Following this question was a prompt to share their experiences with feeling

nervous or anxious; 91 people wrote in responses. The most commonly expressed anxiety was that of "being bad" at the activity or "doing it wrong" and incurring the judgment or ridicule of other patrons in the exercise environment; some people were afraid of holding the group back or ruining the game or activity for the other participants. Respondents were anxious about "looking stupid", and the word "inadequate" appeared several times. Concerns around "lack of fitness", "lack of skill" and fear of making mistakes were frequently expressed. Other common themes were discomfort with working out alone, being watched by men, and not feeling comfortable wearing gym attire, swimming suits, or other body revealing clothing. Many attributed their discomfort to simply being "self-conscious" in a public exercise setting.

Bodyweight was a recurrent theme throughout the comments. Of the 91 people who responded to the writing prompt, 25 specifically mentioned (large) body size or weight being a source of anxiety. These 25 include those who made direct mentions of weight only, and do not include those who implied weight-related anxieties (for example, expressing self-consciousness at wearing a bathing suit in public). If implied weight-related mentions are included, the number increases to 34; additionally, one person wrote that at the gym they felt judged as not strong enough based on their "skinny" body. Several respondents wrote that they needed to lose weight or get into shape *before* they could consider exercising in a public setting; the words "embarrassed" and "terrified" both appeared re: the notion of public exercise. Some chose to forgo traditional exercise settings altogether, opting to work out at home, walk/jog when it's dark outside, or exercise in other removed areas (hiking in nature, dancing in crowded nightclubs where they can feel inconspicuous).

The survey results make clear that a significant barrier to greater engagement in fitness activities is fear of judgment and ridicule. The words of one respondent—that she's "too embarrassed to go to the gym"—summarize the feelings of many who wrote in to explain their experiences. Some of this fear and embarrassment was rooted in perceived lack of athletic ability and/or unfamiliarity with the exercise environment. But the overwhelming theme was a concern of having a body perceived as not welcome in fitness settings. While respondents in every BMI category reported self-consciousness and fear of judgment around exercising in public, those in the highest weight categories were most likely to express this concern, and the most likely to share specific incidents of stigma. In their various comments, participants consistently expressed fears around weight-based social identity threat: "a situationally triggered psychological state in which an individual is concerned that they have been or will be devalued, discriminated against, rejected, or negatively stereotyped because of their weight" (Hunger, et al., 2015). Respondents reported a sense that fit people look at fat people with "derision", "disgust", and "pity". Some reported quitting gyms based on their negative experiences; others noted the irony of being negatively judged as even as they were actively engaging in a health promoting activity (working out at the gym). In a particularly poignant response, one person wrote that while she is currently successfully engaged in a challenging exercise program, her weight has not changed. Despite her fitness success, stepping on a scale brings feelings of depression, along with concern that her doctor will view her weight negatively at her next physical. This narrative encapsulates the challenge faced by heavy people living in a weight obsessed culture—no matter how much they exercise and how healthy their diet, if they

live in a larger body, they are at risk for weight-based stigma and the attendant negative health outcomes that stigma brings.

Conclusion

If Callahan's pro-stigma approach is counter-productive, and current dietary recommendations are likely to fail, what alternative is available to health care providers, fitness professionals, and public health officials who are concerned about the nation's weight? Obesity researchers Traci Mann, A. Janet Tomiyama, and Andrew Ward offer a three-pronged approach. First, recognize that restrictive diets fail most people. Rather than investing research funds in restrictive dietary programs, that money should be spent to promote increased consumption of whole foods and vegetables and reduced consumption of high-sugar, processed foods (Mann, Tomiyama, & Ward, 2015). Second, recognize that stigma is not an effective tool in the battle against obesity. Mann, et al. advocate making weight a protected class (similar to race, gender, and sexual orientation). They also suggest that public health anti-obesity campaigns be scientifically evaluated to ensure that they are not stigmatizing, and that these messages contain actionable steps rather than simply being "anti-obesity". Finally, they note that outside of morbid obesity (BMI ≥ 40), weight is not an accurate measure of health. The authors suggest dropping weight and BMI as health measures, replacing them with more concrete indicators including blood pressure, heart rate, and cholesterol blood glucose levels. Citing the work of Linda Bacon and Lucy Aphramor (2011), Mann, et al. note that many of the health outcomes attributed to overweight/obesity may in fact derive from low socioeconomic status, lack of adequate health care, and a sedentary lifestyle. This last point contains an essential nuance missed in

so many discussions about the “obesity epidemic”. Perhaps, as Steven Blair suggested, the “epidemic” we face is not one of weight, but of inactivity. If that is the case, increased physical activity, rather than weight loss, may be a more effective and appropriate goal of public health interventions.

Given that a “normal” BMI individual may be at risk for metabolic disease if they are inactive and have central adiposity, while an overweight/obese individual can be healthy if they are active, eat well, and have low central adiposity or an even distribution of body fat, the focus on what people weigh is misguided at best. At worst, it is psychologically damaging and stress inducing, lulling some people into a dangerous sense of complacency while causing others unnecessary fear, shame, and distress. Knowing the benefits of regular physical activity (regardless of weight loss), and that weight loss derived from calorie restriction alone confers primarily aesthetic benefits, public health efforts would be better directed away from discussions of weight and towards ways to get people moving.

The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. In terms of how we as a society conceptualize and respond to the “obesity epidemic”, this definition occupies a complex space, caught between the pervasive messaging that obesity is unequivocally an unhealthy and diseased state, and the belief that mental and social well-being are necessary components of complete health.

References

Ahima, R., & Lazar, M. (2013). Physiology. The health risk of obesity--better metrics imperative. *Science (New York, N.Y.), 341*(6148), 856-8.

Allison, D., Fontaine, K., Manson, J., Stevens, J., & Vanitallie, T. (1999). Annual deaths attributable to obesity in the United States. *JAMA, 282*(16), 1530-8.

Archer, E., & Blair, S. (2011). Physical Activity and the Prevention of Cardiovascular Disease: From Evolution to Epidemiology. *Progress in Cardiovascular Diseases, 53*(6), 387-396.

Bacon, L., & Aphramor, L. (2011). Weight Science: Evaluating the evidence for a paradigm shift. *Nutrition Journal, 10*, 69.

Blair, S. (2009). Physical inactivity: The biggest public health problem of the 21st century. *British Journal of Sports Medicine, 43*(1), 1.

Brewis, A. (2014). Stigma and the perpetuation of obesity. *Social Science & Medicine, 118*, 152.

Brown, H. (2015). *Body of Truth*. Da Capo Press.

Campos, P. (2004). *The obesity myth: Why America's obsession with weight is hazardous to your health*. New York: Gotham Books.

Campos, Saguy, Ernsberger, Oliver, & Gaesser. (2006). The epidemiology of overweight and obesity: Public health crisis or moral panic? *International Journal of Epidemiology, 35*(1), 55-60.

Callahan, D. (2013a). Children, stigma, and obesity. (Editorial). *JAMA Pediatrics, 167*(9), 791.

Callahan, D. (2013b). Obesity: Chasing an Elusive Epidemic. *Hastings Center Report, 43*(1), 34-40.

Centers for Disease Control and Prevention. (2010). *CDC Vital Signs: Adult Obesity.* Retrieved from: http://www.cdc.gov/VitalSigns/pdf/2010-08-vitalsigns.pdf

Cooper, C. (2007). Headless Fatties. Retrieved from: http://charlottecooper.net/publishing/digital/headless-fatties-01-07

Critser, G. (2000). Let Them Eat Fat. *Harper's, 300*(1798), 41.

Eknoyan, G. (2008). Adolphe Quetelet (1796-1874) - the average man and indices of obesity. *Nephrology Dialysis Transplantation, 23*(1), 47-51.

Farrell, A. (2011). *Fat Shame: Stigma and the Fat Body in American Culture*. New York: NYU Press.

Fildes, A., Charlton, J., Rudisill, C., Littlejohns, P., Prevost, A., & Gulliford, M. (2015). Probability of an obese person attaining normal body weight: Cohort study using electronic health records. *105*(9), E54.

Flegal, K., Ogden, C., Yanovski, J., Freedman, D., Shepherd, J., Graubard, B., & Borrud, L. (2010). High adiposity and high body mass index-for-age in US children and adolescents overall and by race-ethnic group. *The American Journal of Clinical Nutrition, 91*(4), 1020-6.

Flegal, K., Graubard, B., Kit, B., & Orpana, H. (2013). Association of all-cause mortality with overweight and obesity using standard body mass index categories.(Report). *JAMA, The Journal of the American Medical Association, 309*(1), 71.

Fogelholm, M. (2010). Physical activity, fitness and fatness: Relations to mortality, morbidity and disease risk factors. A systematic review. *Obesity Reviews, 11*(3), 202-221.

Fontaine, K., Redden, D., Wang, C., Westfall, A., & Allison, D. (2003). Years of life lost due to obesity. *JAMA, The Journal of the American Medical Association, 289*(2), 187.

Friedman, K., Reichmann, S., Costanzo, P., Zelli, A., Ashmore, J., & Musante, G. (2005). Weight stigmatization and ideological beliefs: Relation to psychological functioning in obese adults. *Obesity Research, 13*(5), 907-16.

Fryar, C., Ervin, R. (2013). *Caloric intake from fast food among adults: United States, 2007-2010* (NCHS data brief (Series) ; no. 114).

Gee, K. (2015). School-Based Body Mass Index (BMI) Screening and Parental Notification in Late Adolescence: Evidence from Arkansas's Act 1220. *Journal of Adolescent Health,* Journal of Adolescent Health.

Gómez-Ambrosi, J., Silva, C., Galofré, J., Escalada, J., Santos, S., Millán, D., . . . Frühbeck, G. (2011). Body mass index classification misses subjects with increased cardiometabolic risk factors related to elevated adiposity. *International Journal of Obesity, 36*(2), 286.

Guth, E. (2014). JAMA patient page. Healthy weight loss. *JAMA, 312*(9), 974.

Heinberg, L., Thompson, K., & Matzon, J. (2001). Body Image Dissatisfaction as a Motivator for Healthy Lifestyle Change: Is some Distress Beneficial? Striegel-Moore, R., & Smolak, L. (eds). *Eating disorders: Innovative directions in research and practice* (1st ed.), (pp 212-232). Washington, DC: American Psychological Association.

Himmelstein, M., Incollingo Belsky, A., & Tomiyama, A. (2015). The weight of stigma: Cortisol reactivity to manipulated weight stigma. *Obesity, 23*(2), 368-374.

Hoyt, C., Burnette, J., & Auster-Gussman, L. (2013). "Obesity Is a Disease": Examining the Self-Regulatory Impact of this Public-Health Message. *Psychological Science, 25*(4), 997-1002.

Hughes, V. (2013). The big fat truth. *Nature, 497*(7450), 428.

Hunger, J., Major, B., Blodorn, A., & Miller, C. (2015). Weighed Down by Stigma: How Weight-Based Social Identity Threat Contributes to Weight Gain and Poor Health. *Social and Personality Psychology Compass, 9*(6), 255-268

Hunger, J., & Tomiyama, A. (2014). Weight labeling and obesity: A longitudinal study of girls aged 10 to 19 years. *JAMA Pediatrics, 168*(6), 579-80.

Jackson, K, (2006). Retrieved from: http://archive.boston.com/yourlife/health/diseases/articles/2006/03/01/surgeon_general_obesity_terror_within/

Keys, A., Fidanza, F., Karvonen, M., Kimura, N., & Taylor, H. (2014). Indices of relative weight and obesity. *International Journal of Epidemiology, 43*(3), 655-665.

Kim, D., & Leigh, J. (2011). Are meals at full-service and fast-food restaurants "normal" or "inferior"? *Population Health Management, 14*(6), 307-15.

Klaperski, S., Von Dawans, B., Heinrichs, M., & Fuchs, R. (2012). Does the level of physical exercise affect physiological and psychological responses to psychosocial stress in women? Psychology of Sport & Exercise, 14(2), 266-274.

Kyrou, Ioannis, & Tsigos, Constantine. (2009). Stress hormones: Physiological stress and regulation of metabolism. *Current Opinion in Pharmacology, 9*(6), 787-793.

Larson-Meyer, D., Redman, L., Heilbronn, L., Martin, C., & Ravussin, E. (2010). Caloric restriction with or without exercise: The fitness versus fatness debate. *Medicine and Science in Sports and Exercise, 42*(1), 152-9.

Latner, J., Wilson, G., Jackson, M., & Stunkard, A. (2009). Greater History of Weight-related Stigmatizing Experience is Associated with Greater Weight Loss in Obesity Treatment. *Journal of Health Psychology, 14*(2), 190-199.

Lebesco, K. (2010). Fat Panic and the New Morality. In J. Metzl & A. Kirkland, (Eds). *Against health how health became the new morality (*pp. 72-82). New York: New York University Press.

Lewis, S., Thomas, S., Blood, R., Castle, D., Hyde, J., & Komesaroff, P. (2011). How do obese individuals perceive and respond to the different types of obesity stigma that they encounter in their daily lives? A qualitative study. *Social Science & Medicine,73*(9), 1349-1356.

Maddox, G., Back, K., & Liederman, V. (1968). Overweight as Social Deviance and Disability. *Journal of Health and Social Behavior, 9*(4), 287-298.

Magkos F., Fraterrigo G., Yoshino J., Luecking C., Kirbach K., Kelly S., de las Fuentes L., He S., Okunade A., Patterson B., Klein S. Effects of moderate and subsequent progressive weight loss on metabolic function and adipose tissue biology in humans with obesity. Cell Metabolism, published online Feb. 22, 2016.http://dx.doi.org/10.1016/j.cmet.2016.02.005

Major, B., Hunger, J., Bunyan, D., & Miller, C. (2014). The ironic effects of weight stigma. *Journal of Experimental Social Psychology, 51*, 74-80.

Mann, T., Tomiyama, A., & Ward, A. (2015). Promoting Public Health in the Context of the "Obesity Epidemic". *10*(6), 706-710.

Mann, T., Tomiyama, A., Westling, E., Lew, A., Samuels, B., & Chatman, J. (2007). Medicare's search for effective obesity treatments - Diets are not the answer. *American Psychologist, 62*(3), 220-233.

Manolopoulos, K., Karpe, F., & Frayn, K. (2010). Gluteofemoral body fat as a determinant of metabolic health. International Journal of Obesity, 34(6), 949.

Masters, R., Powers, D., & Link, B. (2013). Obesity and US Mortality Risk Over the Adult Life Course. *American Journal of Epidemiology, 177*(5), 431-442.

Mctiernan, A., Sorensen, B., Morgan, A., Irwin, M., Yasui, Y., Lampe, J., . . . Potter, J. (2005). Exercise Effect On Weight And Body Fat In Men And Women. *Medicine And Science In Sports And Exercise, 37*, S287.

Mokdad, A., Marks, J., Stroup, D., & Gerberding, J. (2004). Actual causes of death in the United States, 2000. *JAMA, 291*(10), 1238-45.

National Public Radio. (2013). *Research: A Little Extra Fat May Help You Live Longer.* (Audio file)(Broadcast transcript).

Ogden, C., Kit, B., Carroll, M., & Flegal, K. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA, The Journal of the American Medical Association, 311*(8), 806.

Olshansky, S., Passaro, D., Hershow, R., Layden, J., Carnes, B., Brody, J., Hayflick, L., Butler, R., Allison, D., & Ludwig, D. (2005). A potential decline in life expectancy in the United States in the 21st century. *New England Journal Of Medicine*, 352(11), 1138-1145.

Ortega, F., Lee, D., Katzmarzyk, P., Ruiz, J., Sui, X., Church, T., & Blair, S. (2013). The intriguing metabolically healthy but obese phenotype: Cardiovascular prognosis and role of fitness. *European Heart Journal, 34*(5), 389-397.

Puhl, R., & Brownell, K. (2001). Bias, discrimination, and obesity. *Obesity Research, 9*(12), 788-805.

Puhl, R., & Heuer, C. (2009). The Stigma of Obesity: A Review and Update. *Obesity, 17*(5), 941-964.

Puhl, R., & Heuer, C. (2010). Obesity Stigma: Important Considerations for Public Health. *American Journal Of Public Health, 100*(6), 1019-1028.

Puhl, R., Moss-Racusin, C., Schwartz, M., & Brownell, K. (2007). Weight stigmatization and bias reduction: Perspectives of overweight and obese adults. *Health Education Research, 23*(2), 347-358.

Rice, C. (2007). Becoming “the fat girl”: Acquisition of an unfit identity. *Women's Studies International Forum, 30*(2), 158-174.

Rimmele, U., Seiler, R., Marti, B., Wirtz, P., Ehlert, M., & Heinrichs, U. (2009). The level of physical activity affects adrenal and cardiovascular reactivity to psychosocial stress. Psychoneuroendocrinology, 34(2), 190-198.

Romero-Corral, A., Somers, V., Sierra-Johnson, J., Korenfeld, Y., Boarin, S., Korinek, J., . . . Lopez-Jimenez, F. (2010). Normal weight obesity: A risk factor for cardiometabolic dysregulation and cardiovascular mortality. *European Heart Journal, 31*(6), 737-746.

Saladin, K. (2000). Anatomy & physiology: The unity of form and function (2nd ed.). Boston: McGraw-Hill.

Samsara clip retrieved from http://www.filmsforaction.org/watch/without_saying_a_word_this_6_minute_short_film_will_make_you_speechless/

Saguy, A. (2013). *What's wrong with fat?* New York: Oxford University Press.

Saguy, A., & Almeling, R. (2008). Fat in the Fire? Science, the News Media, and the "Obesity Epidemic" 2. *Sociological Forum, 23*(1), 53-83.

Sapolsky R. (1994). Why zebras don't get ulcers : A guide to stress, stress related diseases, and coping. New York: W.H. Freeman.

Schmalz, D. (2010). 'I Feel Fat': Weight-Related Stigma, Body Esteem, and BMI as Predictors of Perceived Competence in Physical Activity. *Obesity Facts, 3*(1), 15-21.

Schvey, N., Puhl, R., & Brownell, K. (2011). The impact of weight stigma on caloric consumption. *Obesity (Silver Spring, Md.), 19*(10), 1957-62.

Sothmann, M., Buckworth, J., Claytor, R., Cox, R., White-Welkley, J., & Dishman, R. (1996). Exercise training and the cross-stressor adaptation hypothesis. *Exercise and Sport Sciences Reviews, 24*, 267-87.

Spalding, T., Lyon, L., Steel, D., & Hatfield, B. (2004). Aerobic exercise training and

cardiovascular reactivity to psychological stress in sedentary young normotensive men and women. *Psychophysiology, 41*(4), 552-562.

Stevens, J. (2000). Obesity and Mortality in African-Americans. *Nutrition Reviews, 58*(11), 346-353.

Stevens, J., Plankey, M., Williamson, D., Thun, M., Rust, P., Palesch, Y., & O'Neil, P. (1998). The body mass index-mortality relationship in white and African American women. *Obesity Research, 6*(4), 268-77.

Tanamas, S., Ng, W., Backholer, K., Hodge, A., Zimmet, P., & Peeters, A. (2016). Quantifying the proportion of deaths due to body mass index- and waist circumference-defined obesity. *Obesity, 24*(3), 735-742.

Tomiyama, A. (2014). Weight stigma is stressful. A review of evidence for the Cyclic Obesity/Weight-Based Stigma model. *Appetite, 82*, 8-15.

Torres, S., & Nowson, C. (2007). Relationship between stress, eating behavior, and obesity. *Nutrition, 23*(11), 887-894.

The U.S. Weight Loss & Diet Control Market, 2015 retrieved from http://www.prweb.com/releases/2014/12/prweb12383477.htm

Vartanian, L., & Novak, S. (2011). Internalized societal attitudes moderate the impact of weight stigma on avoidance of exercise. *Obesity (Silver Spring, Md.), 19*(4), 757-62.

Vartanian, L., & Shaprow, J. (2008). Effects of weight stigma on exercise motivation and behavior: A preliminary investigation among college-aged females. *Journal of Health Psychology, 13*(1), 131-8.

Vartanian, L., & Smyth, R. (2013). Primum Non Nocere: Obesity Stigma and Public Health. *Journal of Bioethical Inquiry, 10*(1), 49-57.

Wildman, R., Muntner, P., Reynolds, K., Mcginn, A., Rajpathak, S., Wylie-Rosett, J., & Sowers, M. (2008). The obese without cardiometabolic risk factor clustering and the normal weight with cardiometabolic risk factor clustering: Prevalence and correlates of 2 phenotypes among the US population (NHANES 1999-2004). *Archives of Internal Medicine, 168*(15), 1617-24.

Wing, R., & Hill, J. (2001). Successful weight loss maintenance. *Annual Review of Nutrition, 21*, 323-41.

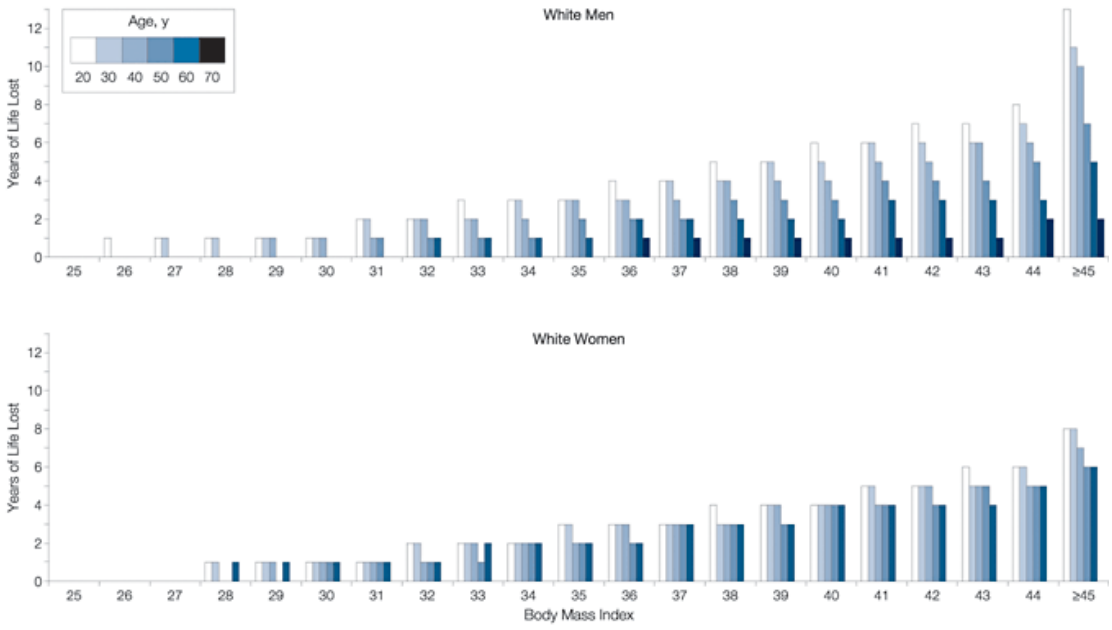
Wing, R., Lang, W., Wadden, T., Safford, M., Knowler, W., Bertoni, A., . . . Wagenknecht, L. (2011). Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. *Diabetes Care, 34*(7), 1481-6.

Wing, R., & Phelan, S. (2005). Long-term weight loss maintenance. *The American Journal of Clinical Nutrition, 82*(1 Suppl), 222S-225S.

World Health Organization. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

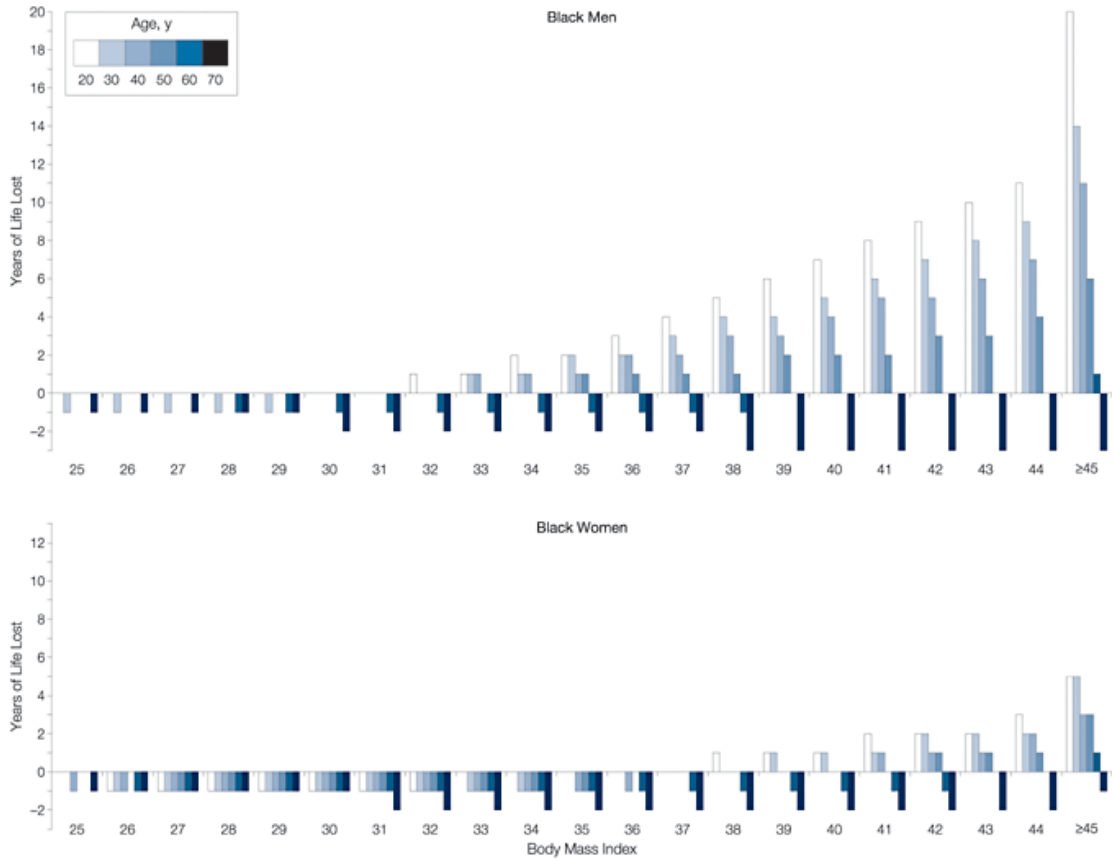
Wott, C., & Carels, R. (2010). Overt weight stigma, psychological distress and weight loss treatment outcomes. Journal of Health Psychology, 15(4), 608-14.

Appendix A—Years of Life Lost Due to Obesity Among White Men and Women



Fontaine, Kevin R., Redden, David T., Wang, Chenxi, Westfall, Andrew O., & Allison, David B. (2003). Years of life lost due to obesity. *JAMA, The Journal of the American Medical Association, 289*(2), 187.

Appendix B—Years of Life Lost Due to Obesity Among Black Men and Women



Fontaine, Kevin R., Redden, David T., Wang, Chenxi, Westfall, Andrew O., & Allison, David B. (2003). Years of life lost due to obesity. *JAMA, The Journal of the American Medical Association, 289*(2), 187.

Appendix C—BMI classifications of survey participants

Table 1
BMI classifications of survey subjects.

	<18.5	18.5-24.9	25-29.9	30-34.5	35-39.9	≥ 40	Totals
Women	2	45	46	21	6	13	133
Men	0	2	6	4	1	1	14
gender N/A	1	0	0	0	0	0	1
n	3	47	52	25	7	14	148
%	2.02	31.75	35.13	16.89	4.73	9.46	99.98

BMI was calculated from self-reported heights and weights.