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Distribution of and relationship between medically classified weight and self-perceived body size across sexual orientation: An Add Health analysis

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DISTRIBUTION OF AND RELATIONSHIP BETWEEN MEDICALLY CLASSIFIED WEIGHT AND SELF-PERCEIVED BODY SIZE ACROSS SEXUAL ORIENTATION: AN ADD HEALTH ANALYSIS

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ABSTRACT

DISTRIBUTION OF AND RELATIONSHIP BETWEEN MEDICALLY CLASSIFIED WEIGHT AND SELF-PERCEIVED BODY SIZE ACROSS SEXUAL ORIENTATION: AN ADD HEALTH ANALYSIS

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Rates of overweight and obesity have reached epidemic status in the United States and better understanding and treatment of obesity is vital to our success in ending this national trend. Current understanding of special populations informs us sexual minority women are at a higher risk of overweight and obesity. This study sets out to verify this using a nationally representative sample population in a fixed factor blocked ANOVA, controlling for common confounding variables shown to be strong influences of overweight and obesity. Next, the relationship between self-perceived body size and medically classified body size will be compared across sexual orientation to see if sexual minority women tend to under-assess their body size when compared with medical classification using a Chi-Square analysis. Some results were unexpected; sexual minority women are not significantly more overweight or obese than their heterosexual peers, but they do have a greater tendency to under-assess their body size according to medical standards. Furthering our understanding of the complexities of overweight and obesity will aide in the approaches taken by interdisciplinary healthcare providers in addressing this epidemic for sexual minority women and all other special population groups. This study serves to begin a thoughtful conversation about sexual minority women's health but more

research is needed to further this conversation. This dissertation is available in open access at AURA, http://aura.antioch.edu/ and Ohio Link ETD Center, https://etd.ohiolink.edu/etd

This dissertation is dedicated to every woman who has been told how to feel about her body without pause and without regard for how she herself feels, that is, every woman.

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Chapter I: Introduction and Literature Review

Over the past three decades, the United States has seen dramatic increases in overweight and obesity across the nation. The medical community and governing agencies have declared this a national epidemic. Overweight and obesity are the culmination of a diversity of factors. For any one individual, body weight is determined by a unique combination of genetic, metabolic, behavioral, environmental, cultural, and socioeconomic influences (Malnick & Knobler, 2006; U. S. Department of Health and Human Services [HHS], 2001). "The causes, prevention and outcomes associated with obesity are complex and incompletely understood, and there is recognition from leading obesity experts of the need for more interdisciplinary research into the condition" (Howard, Hugo, Taylor, & Wilson, 2008, p. 126). The more we understand all these various influences, and their interactions, the better prepared we will be as a community to combat this condition and its devastating impact on health and longevity of life.

Obesity

Between 1960 and 1980, the prevalence of overweight and obesity among adults and of overweight among children in the United States were relatively stable (Flegal, 2005; Ogden, Yanovski, Carroll, & Flegal, 2007). During the 1980s national surveys started to reveal a sudden and striking increase in rates of overweight and obesity amongst adults and youth, alike. As of 2002, the prevalence of obesity among adults has doubled, and the prevalence of overweight among children and adolescents has tripled over a relatively short time period. According to the Centers for Disease Control and Prevention (CDC, 2013), an estimated 35% of Americans today are obese.

In 2001, the U. S. Department of Health and Human Services released the Surgeon General's Vision for a Healthy and Fit Nation Report in which they addressed the United State's

obesity epidemic. It is widely reported that obesity causes about 300,000 deaths each year in the United States (Flegal, Williamson, Pamuk, & Rosenberg, 2004; HHS, 2001). Nearly two thirds of adults and one third of children are overweight or obese, contributing to growing numbers in diabetes, heart disease, and other chronic medical conditions. In addition to serious health risks, overweight and obese individuals may also experience social stigmatization, discrimination, and mental health problems. At present trajectory, overweight and obesity will soon surpass tobacco as the leading contributor to preventable morbidity, disability, and mortality (Wang & Beydoun, 2007).

Obesity is defined as abnormal or excessive accumulation of body fat (Prentice & Jebb, 2001; World Health Organization [WHO], 2014). It is believed it is the amount of this excess fat that correlates with poor health (Prentice & Jebb, 2001). The rapid increases in overweight and obesity over the past few decades seem to point towards the predominance of behavioral and environmental influences, rather than biological changes (Canetti, Bachar, & Berry, 2002; Malnick & Knobler, 2006). Additionally, weight appears to vary considerably more by socioeconomic status, race/ethnicity, and nationality for women than for men. This further supports the influence of environmental and cultural factors, specifically social and cultural roles for women, on the prevalence of overweight and obesity (Ogden et al., 2007). As such, strictly scientific, a-contextual approaches to preventing or treating overweight and/or obesity often fall short.

In a dimensional analysis study by Davidson and Knafl (2006), eight dimensions of obesity were identified from the analysis of 20 papers from 18 research studies. These dimensions were: objective measure, attractiveness, sexual desirability, health, body image, strength or goodness, self-esteem, and social acceptability. The findings of the analysis revealed

substantial differences in the assumptions, uses, and meanings of the concept of obesity amongst women of diverse backgrounds. These differences were most prevalent across racial and ethnic identities. Although the analysis only covered a small subset of the American population, and should therefore be cautiously applied broadly, important questions and ideas were raised regarding the use and understanding of obesity. Although the predominant method of defining obesity in studies is through objective biometric measure, this does not inherently reflect the concept as seen through the eyes of the participants. For example, Davidson and Knafl found that Black American participants define obesity in more positive terms related to attractiveness, sexual desirability, body image, strength or goodness, self-esteem and social acceptability, and did not view obesity as cause for concern about health. While Caucasian American participants defined obesity in negative terms describing it as unattractive, not sexually desirable, associated with negative body image, decreased self-esteem, and socially unacceptable. Davidson and Knafl (2006) stress the importance of researchers and healthcare providers understanding the creation, the meaning, and the use of the concept of obesity across cultural and sub-cultural contexts, to allow for the development of culturally appropriate prevention and intervention strategies.

Body Mass Index (BMI)

Body Mass Index (BMI), also known as the Quetelet index, is a measure calculated by dividing the weight (kg) by the square of the height (m), to classify individuals into weight categories, regardless of sex (CDC, 2014; National Heart, Lung, and Blood Institute [NHLBI], 2000; Tan, 2008). Invented in the mid-1800s by Belgian Adolphe Quetelet, BMI is currently used as a simple and inexpensive clinical tool for healthcare professionals to determine a patient's potential risk for disease and call for intervention (CDC, 2014; Tan, 2008). BMI is correlated with body fat and is the measure recommended by a National Heart, Lung, and Blood

Institute expert committee for use in clinical practice and epidemiological studies (Flegal et al., 2004; NHLBI, 2000). According to criteria put forth by the WHO (2014) and the NHLBI (1998), overweight is defined as a BMI from 25 up to 29.9 and obesity as a BMI of 30 or greater. Studies have shown that as one's BMI increases above 25 so do the risk factors for illness (WHO, 2014). For persons with a BMI of ≥ 30, mortality rates from all causes, and especially from cardiovascular disease, are generally increased by 50 to 100 percent above that of persons with BMIs in the range of 20 to 25 (NHLBI, 1998).

Although BMI is often considered the cornerstone of the current classification system for obesity, it is only an estimation tool of body fatness (Prentice & Jebb, 2001). In studies exploring the accuracy of BMI of body fat percentage, BMI is often found to be significantly correlated with other methods of measuring or estimating body fat. In the National Health and Nutrition Examination Survey (NHANES), BMI was highly correlated with percentage body fat as measured by dual x-ray absorptiometry (Flegal, Carroll, Kit, & Ogden, 2012). Flegal et al. (2012) also reported that for women the correlation between BMI and body fat percentage ranges from 0.72 to 0.84.

BMI has several limitations (NHLBI, 2000); the relationship between BMI and body fat appears to be age-dependent, as such, BMI becomes increasingly problematic and less accurate in the elderly. BMI gives a poorer representation of body fat in people with well developed physique arising from extensive physical training or from a genetic predisposition for a more muscular build (Prentice & Jebb, 2001). Researchers speculate that differences in genetically inherited musculature are one of the reasons ethnic groups vary in relationship between BMI and body fat percentage when compared with Caucasians (Prentice & Jebb, 2001). For instance, at a given BMI, black men and women tend to have higher lean mass and lower fat mass than white

men and women, while Asian men and women tend to have higher fat mass at any given BMI (Flegal et al., 2012).

There are sex disparities in BMI. First and foremost, it is generally accepted that BMI is not considered to be an appropriate measure of overweight and obesity in women who are pregnant or under the age of 20 (Boehmer, Bowen, & Bauer, 2007). Interestingly, although the same medical cutoffs are used for both men and women in determining categories of overweight and obesity, as supported by the CDC and WHO, some researchers have argued there should instead be two sets of cutoffs (Halls, 2008). Part of the rationale for this is that women naturally carry more body fat than men, and men tend to be more muscular than women. In a review of various studies and methodologies, Halls (2008) determines there is an average BMI gap value of 2.0 kg/m^2 between men and women. For the purposes of this study, nationally accepted cutoffs will be used to classify subjects into weight categories.

Health Risks of Obesity

Obesity is a well-known risk factor for numerous serious health conditions, including hypertension, dyslipidemia, type-2 diabetes mellitus, coronary artery disease as well as other cardiovascular diseases, gall bladder disease, kidney disease, sleep apnea, osteoarthritis, and several forms of cancer, among other health conditions (CDC, 2013; Flegal, 2005; Garaulet, Ordovás, & Madrid, 2010; Marcus & Wildes, 2009; Porth, 2007). Some of these conditions are due to the strain placed on the body and its organs in sustaining extra weight, while others are due to metabolic changes that occur due to the presence of excess fat. Studies have shown that excess adipose, or fat tissue, functions as part of the endocrine system, secreting several major hormones and signaling factors that include inflammatory mediators and free fatty acids into the

body (Spruijt-Metz, 2011). The life-long risk of developing obesity-related complications appears higher in early-onset compared with late-onset obesity (Malnick & Knobler, 2006).

Malnick and Knobler (2006) conducted a review of nearly 200 studies evaluating the impact of obesity on mortality and morbidity. A high degree of obesity (BMI $\geq$ 35) appears to be linked to higher mortality rates, although the relationship between overweight and lower levels of obesity (BMI = 25–34.9) with mortality rates is more uncertain (Malnick & Knobler, 2006). Improved standards of medical care may attenuate the effect of obesity on life expectancy and requires further analysis (Malnick & Knobler, 2006). Authors found evidence to suggest that obesity is not only related to conditions such as diabetes, hypertension, heart disease, obstructive sleep apnea, asthma, non-alcoholic fatty liver disease, osteoarthritis and polycystic ovary syndrome, but also that "weight reduction has beneficial effects and therefore is an integral part of treating these morbidities" (Malnick & Knobler, 2006, p. 573). A prime example of this can be seen in diabetes treatment.

Of these obesity-related conditions, diabetes may be most closely linked to obesity, and the increasing incidence of diabetes is of considerable concern worldwide (Flegal, Carroll, Ogden, & Curtin, 2010). Additionally, studies have shown this strong association between obesity and diabetes across all ethnic groups (Malnick & Knobler, 2006). The treatment for diabetes includes weight loss, diet, exercise and medication management. Proper daily management of diabetes reduces patients' risk of serious complications such as heart disease and stroke, neuropathy, and nephropathy (Franks et al., 2012).

Obesity is not the only risk factor for the medical conditions listed above. Obesity, as a risk factor, varies across individuals among different populations, due to other strong influential factors (NHLBI, 2000). Although research has demonstrated increases in prevalence of obesity

over the past few decades, the trends in obesity-related diseases do not always parallel this trend. For instance, rates of cardiovascular disease have declined as of late. Inverse changes such as these may be due to improved societal awareness of other risk factors for cardiovascular disease, as well as improvement in standards of medical care (Malnick & Knobler, 2006).

Socio-Demographics Associated With Obesity

According to the American Psychological Association Task Force on Socioeconomic Status (2007), socioeconomic status (SES) is commonly conceptualized as the social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation. SES is closely related to issues of power, privilege, and control. Examination of SES has revealed inequalities in access to and distribution of resources. SES and race/ethnicity are intimately intertwined. Racial minorities are more likely to have lower socioeconomic status compared with whites (LaVeist, 2005). The discrimination and marginalization ethnic and racial minorities face often function as barriers to escaping poverty (Corcoran & Nichols-Casebolt, 2004). The degree to which race and socioeconomic status are confounded depends on the measure of socioeconomic status that is used, however it is clear that both variables are independent predictors of health status (LaVeist, 2005).

In 1989, Sobal and Stunkard published a groundbreaking and influential integrative review of literature exploring the relationship between socioeconomic status (SES) and obesity. Scouring publications of the 1960s through the 1980s, these authors identified 144 studies from developing and developed parts of the world exploring this relationship. Interestingly, most of these studies did not set out to address this relationship, but rather did so through the examining of other topics. Sobal and Stunkard (1989) reported, “In developed societies . . . increasing SES is associated with a decreasing prevalence of obesity among women” (p. 269).

McLaren (2007) not only updated but also expanded the work first started by Sobal and Stunkard (1989). McLaren built on this earlier work by looking more closely at different indicators of SES in addition to using a three-category, rather than dichotomous, definition of development status of countries. McLaren's work revealed the inverse association between SES and obesity amongst women in developed countries remains intact. However, results also indicated that although some demographic variations in obesity rates are evident, nearly all social groups are increasingly affected by obesity to some extent, indicating the "existence of large-scale social drivers at work" (McLaren, 2007, p. 33).

In a study by Zhang and Wang (2004), researchers found a stronger inverse association between SES and obesity in women compared with men, also echoing the findings of Sobal and Stunkard (1989), as well as remarkable ethnic differences in the relationship between SES and obesity. In an examination of obesity trends amongst U. S. adults, Flegal et al. (2010) found that relative to non-Hispanic white women, the likelihood of being obese was significantly greater for non-Hispanic black and Mexican American women. Consistent with previous studies, systematic analysis by Wang and Beydoun (2007) showed large racial/ethnic disparities in obesity among women in the United States. Some minority and low-SES groups such as non-Hispanic Black women, Mexican-American women, White women, Native Americans, and Pacific Islanders are disproportionally affected by overweight and obesity. While some minority groups, such as Asian Americans, have a lower prevalence of obesity. Wang and Beydoun (2007) also reported that persons with less than a high school education have a higher prevalence of obesity than their counterparts, with the exception of black women. Put simply, "it is easier to be overweight if you have a small income or less education" (Townsend, 2006, p. 34).

The directionality of the relationship between obesity and SES is unclear. Wang and Beydoun (2007) suggest the possibility of a bidirectional causal relationship between SES and obesity. Obesity may adversely affect one's opportunities for education, occupation, and marriage, while lower education and income (markers of SES) contribute to environmental conditions increasing occurrence of overweight and obesity.

Psychological Impact of Obesity

Decades of research have demonstrated an empirical relationship between food and emotions (Canetti et al., 2002). This relationship can be positively reinforced and strengthened through external factors, such as social conventions, religious rituals, and current knowledge and trends in healthy eating (Connor & Armitage, 2002; Patel & Schlundt, 2001; Porth, 2007). Most attention has been paid to individual and internal factors (Canetti et al., 2002). Obese individuals, particularly women, engage in significantly more emotional eating than non-obese individuals (Canetti et al., 2002; Ganley, 1989). A major determinant of emotional eating is its ability to reduce negative affect such as anger, depression, boredom, loneliness, and anxiety (Canetti et al., 2002; Ganley, 1989), although positive emotions also appear to increase food intake (Patel & Schlundt, 2001). There are many theories about the nature or mechanism of the relationship between food and emotion from psychophysiological changes (Canetti et al., 2002) to early childhood experiences (Bruch, 1973) to minority stress coping (Mason & Lewis, 2015).

Obesity is associated with significant clinical psychosocial impairment (Marcus & Wildes, 2009). Research has shown that obesity is highly correlated, particularly in women, with mood disorders, anxiety disorders, eating disorders and personality disorders (Marcus & Wildes, 2009). The frequency of overweight and obese people is higher among depressed and bipolar patients than in the general population (Garaulet et al., 2010).

Neurological studies have begun exploring possible variances in brain function in individuals who are obese versus their more lean peers. Marcus and Wildes (2009) suggest that obesity may result from food addiction. They present some research that has revealed that obese individuals may experience diminished reward from eating, relative to lean peers. Additionally, there is accumulating evidence that obese individuals differ from lean controls with respect to neural correlates of anticipated food reward and food consumption. "These findings may suggest that mental mechanisms related to reward processing play a role in the onset and maintenance of obesity" (Marcus and Wildes, 2009, p. 746). However, "no research to date has provided conclusive evidence that these differences represent dysfunction" (p. 748), dysfunction that could lead to a mental health diagnosis, such as addiction.

Economics of Obesity

"Obesity is not only a health but also an economic phenomenon . . . several economic factors affect our food consumption . . . and ultimately our weight" (Finkelstein, Ruhm, & Kosa, 2005, p. 240). Marcus and Wildes (2009) discuss "profound economic consequences associated with obesity in the form of direct medical costs and indirect costs" (p. 741). These costs and economic burdens occur on the individual as well as societal level.

According to Finkelstein et al. (2005), adults with obesity have 38% more annual visits to primary care physicians and incur annual medical expenditures that are 36% higher than expenditures of normal-weight individuals. Obesity is responsible for between 5% and 7% of the total annual medical expenditures in the United States, roughly $75 billion per year, with some placing the estimate as high as $100 billion per year (Townsend, 2006). As rates of obesity have continued to increase over the last eight years since the article was written, we can extrapolate that corresponding medical expenses have also increased. The economic burden of providing this

medical care to increasing numbers of obese subjects cannot be dismissed (Malnick & Knobler, 2006).

Increase in medical expenditures is not the only cost incurred with obesity. Although there is variance in research, many studies have shown that obese individuals, particularly females, are more likely to be absent from work than are their normal-weight coworkers, directly impacting income. Additionally, obese women work predominantly in relatively low-paying occupations and are largely excluded from high-paying managerial/professional and technical occupations.

Large corporations, responsible for producing, advertising, and distributing ready-made and other high caloric foods, also see obesity as an economic phenomenon; a multi-billion dollar phenomenon. Part of the reason that obesity rates continue to rise is the food culture we have constructed in our country, which includes fast food and other low cost, high calorie, high sugar foods. As Finkelstein et al. (2005) explain:

> Economists' first law of demand implies that a decrease in the price of food will cause consumption to increase . . . moreover, if the price of calorie-dense, prepackaged, and/or prepared foods (e.g., fast food) falls faster than for less calorie-dense foods (e.g., vegetables), then individuals will shift their consumption toward these cheaper alternatives. (p. 244)

Reductions in the relative price of calorie-dense foods and an increased occurrence of "marginal cost pricing (i.e., "supersizing")" (Finkelstein et al., 2005, p. 244) have resulted not only in an increase in food consumption between meals, but also in an increase in the amount of food consumed at each meal (i.e., larger portion sizes). Both of which positively correlate with the occurrence of obesity.

Social Stigma of Obesity

Puhl and Heuer (2010) explore the stigmatization of obesity and its impact on public health. They report, "numerous studies have documented harmful weight-based stereotypes that overweight and obese individuals are lazy, weak-willed, unsuccessful, unintelligent, lack self-discipline, have poor willpower, and are noncompliant with weight-loss treatment" (p. 1019). These misconceptions often lead to prejudice and discrimination against people who are obese. Each of these has the potential of being psychologically distressing, even more so because they are recurrently experienced across a variety of contexts, "including the workplace, health care facilities, educational institutions, the mass media, and even in close interpersonal relationships" (p. 1019). It would appear that this weight stigma remains a socially acceptable form of bias as evidenced by frequently self-reported negative attitudes and stereotypes toward obese persons by "employers, coworkers, teachers, physicians, nurses, medical students, dietitians, psychologists, peers, friends, family members, and even among children aged as young as three years" (p. 1019).

Puhl and Heuer (2010) composed a compelling article elucidating the rampant stigma and prejudice towards overweight and obese people. In a thorough and well-laid argument, researchers demonstrate that the common perception that weight stigmatization is justifiable and may motivate individuals to adopt healthier behaviors is false and ineffective. They argue that the complex societal and environmental conditions that have created obesity necessitate that society move beyond the narrow focus that targets the individual as both the culprit and the solution for obesity. With a tone of social justice, researchers argue for the advancement of research and psycho-education for the public on this complicated condition.

Sexual Orientation

Vrangalova and Savin-Williams (2012), consistent with prevailing literature (LeVay & Baldwin, 2012), define sexual orientation as "the sexual attraction, identity, arousals, fantasies, and behaviors individuals have for one sex, the other sex, or both sexes" (p. 85). Many researchers in the field of sexuality are pushing for a more continuum model of attraction and sexuality rather than the more traditional categorical classifications of heterosexual, homosexual, and bisexual (Thompson & Morgan, 2008; Vrangalova & Savin-Williams, 2012). Savin-Williams (2005) discusses the changing sexual identities of today's youth and argues current sexual identities vary from earlier generations due to having more options, which has led to a greater diversity of experiences impacting sexual identity. However, most research utilizes a discrete three-category classification of sexual orientation (heterosexual, bisexual, homosexual), and even when research data incorporates additional identifiers, these categories are either collapsed or discarded for the purposes of analysis (Vrangalova & Savin-Williams, 2012). These three categories "have become so culturally and politically entrenched in contemporary societies that they have achieved the status of 'natural kinds,' that is, naturally occurring rather than socially constructed distinctions" (Vrangalova & Savin-Williams, 2012, p. 85).

Research suggests, if given the opportunity, individuals self select more nuanced categories of sexual orientation (Morgan & Thompson, 2011; Thompson & Morgan, 2008; Vrangalova & Savin-Williams, 2010, 2012), as allowed for in the 5-category sexual orientation measure used in this study (heterosexual, mostly heterosexual but somewhat attracted to people of the same sex, bisexual, mostly homosexual but somewhat attracted to people of the opposite sex, and homosexual). Although not extensively studied, in the research that is available, "mostly heterosexual" is consistently the largest non-heterosexual identity group (Thompson & Morgan,

2008; Vrangalova & Savin-Williams, 2012), and about the same number of female participants identified as "mostly homosexual" as did exclusively "homosexual" (Vrangalova & Savin-Williams, 2012).

According to Vrangalova and Savin-Williams (2012), whose study utilized the same expanded classification of sexual orientation used in the Add Health study, individuals who identify with these in-between categories demonstrate unique sexual and psychological profiles, including sexual experiences, sexual attitudes, knowledge of sexual minorities, and overall liberal outlook in society, distinct from those who identity with more traditional categories. As such, these authors suggest that this expanded sexual orientation classification is a more personally meaningful and relatively accurate alternative to the traditional system.

Obesity and Sexuality

Determining the demographic and cultural variables of obesity is an important step in identifying the causes of obesity and potential interventions for preventing and reducing obesity (Bowen, Balsam, & Ender, 2008). In line with the Surgeon General's call to action, more research is needed to identify subgroups most at risk for obesity. Determining whether sexual orientation disparities exist across race/ethnicity groups will better inform and effectively tailor intervention and prevention efforts for these groups (Katz-Wise et al., 2014). A number of special populations have already been identified among the larger population of obese individuals, but many of these special populations are understudied. Therefore, the effectiveness of standard approaches for weight reduction for special populations is largely unknown, as is whether these strategies adequately respond to the specific needs of these people (Annunziato, Calogero, & Sysko, 2014).

It is also important to understand the historical context of LGBT healthcare when attempting to address any particular health concerns, such as overweight and obesity. Makadon, Mayer, Potter, and Goldhammer (2015) highlight the significance of this history in *The Fenway Guide to Lesbian, Gay, Bisexual, and Transgender Health* (2015). Members of the LGBT community have faced historical stigma and discrimination in the healthcare setting; not only was homosexuality considered a mental health disorder, some medical providers have refused to treat or even touch LGBT patients, and some mental health clinicians continue in present day to practice therapies aimed at reorienting sexual minority individuals to the more mainstream heterosexual identity. Many LGBT individuals feel so unwelcome in healthcare settings that medical care is avoided altogether in attempts to escape uncomfortable and stigmatizing experiences.

Several studies have found that lesbians and bisexual women have far higher rates of overweight and obesity than heterosexual women of similar demographics, even within higher risk groups (Bowen et al., 2008; Katz-Wise et al., 2014; Yancey, Cochran, Corliss, & Mays, 2003). The intersection of female gender and minority sexual orientation appears to not only increase risk of overweight and obesity, but may also call for different strategies in outreach to and intervention within this community (Yancey et al., 2003). Whether this need for outreach and interventions that specifically target sexual-minority women exists depends on confirmation that lesbians in fact have a higher prevalence of overweight and obesity compared with other sexual orientation groups (Boehmer et al., 2007). This study sets out to do just that.

In 2008, Bowen et al. conducted a comprehensive review of 24 studies exploring obesity issues in sexual minority women, which began to reveal differences in obesity prevalence across sexual orientation. Although findings are not yet conclusive, much of the research seems to be

indicating an increased prevalence of overweight and obesity in sexual minority women (women identifying as lesbian or bisexual). “Of 19 studies, nine found higher weight or obesity rates among lesbians than control heterosexual samples, five found no differences in obesity or overweight levels, and four studies did not report comparisons” (Bowen et al., 2008, p. 226). However:

> None of the samples recruited were population based and, as such, cannot claim to represent the population from which they were drawn . . . Other methodological flaws include an almost exclusive reliance on cross-sectional data, the lack of consistent and thoughtfully recruited heterosexual control groups in five of the studies, and lack of consistent measures of sexual orientation. (p. 226)

In what appears to be a first of its kind study, Boehmer et al. (2007) used national population-based data to test the hypothesis that lesbians have higher rates of overweight and obesity compared with their heterosexual and bisexual peers. Their results indicate that lesbian sexual identity in women age 20–44 years is linked to higher rates of overweight and obesity, even after adjusting for covariates that are shown in the literature to be risk factors for overweight and obesity. These covariates included: age, race/ethnicity, education, percent of federal poverty level, insurance status, place of residence (urban/suburban/rural), nativity, and parity. Although Boehmer et al. (2007) were able to utilize a large national sample, analysis was done using self-reported height and weight, which some research has shown to be inaccurate. According to Ogden et al. (2007), inaccurate estimates may result because respondents tend to overestimate their height and underestimate their weight.

In a study by Cochran et al. (2001), data collected via anonymous, self-administered questionnaires were used to explore health behaviors and risk factors in lesbian and bisexual

women. Data were combined from seven large community convenience based-samples of sexual minority women including ~12,000 participants ranging in age from 18 to 50. The racial/ethnic diversity of the sample was lacking, with 85.9% of subjects identifying themselves as non-Hispanic white. Initial results seemed to indicate that prevalence of obesity amongst sexual minority women echoed that of the general population (28%). However, after controlling for demographic differences between the samples, it was revealed that a greater proportion of sexual minority women were obese ($p < 0.05$), and less likely to report that they consider themselves overweight ($p < 0.05$) when compared with the general population.

Weight Perception

Accurate perception of body weight is important for the success of obesity prevention and weight loss programs (Kuchler & Variyam, 2003; Rahman & Berenson, 2010). Information interventions educating on the health risks associated with overweight and obesity might fail to motivate individuals to make necessary diet and lifestyle changes when those individuals fail to recognize they are overweight or obese (Kuchler & Variyam, 2003). "Self-perceived weight is likely a multi-dimensional concept that captures several elements" (Lemon, Rosal, Zapka, Borg, & Andersen, 2009, p. 95). Limited studies have been conducted on perception of weight within a general, randomly selected, representative population (Howard et al., 2008). The studies that have explored weight (mis)perception in adults often focus on the socio-demographic factors of sex and race/ethnicity (Klos & Sobal, 2013), and research on sexual minority adult populations appears sparse.

There are numerous studies examining weight perception accuracy and impact amongst adolescents within the United States (Brener, Eaton, Lowry, & McManus, 2004; Jay et al., 2013; Park, 2011; Wang, Liang, & Chen, 2009; Yost, Krainovich-Miller, Budin, & Norman, 2010). In

a unique study of Massachusetts's youth (n = 12,984) exploring sexual orientation impact on weight perceptions, Hadland, Austin, Goodenow, and Calzo (2014) found that sexual minority females were more likely to demonstrate weight misperception by under assessing their weight status. Lesbian and bisexual identifying females perceived themselves as healthy weight or even underweight despite elevated BMI.

It is possible to misclassify perceived weight by either under assessing or over assessing one's weight status relative to medical standards (Chang & Christakis, 2001; Kuchler & Variyam, 2003). Under assessing one's weight typically happens when someone who is medically classified as overweight or obese reports themselves to be at a healthy weight, while over assessing one's weight means reporting a larger size than is medically accurate. The studies reviewed below either explore both of these phenomena together or look exclusively at the occurrence of under assessing. Independent of the focus, there appears to be consensus on trends relating to sex, education, and ethnicity and its relationship to over/under assessing perceived weight.

Research by Chang and Christakis (2001), using a nationally representative sample of adults 18 years of age or older (n = 41,676), examined the relationship between self-perceived and medically classified weight status. Additionally, researchers evaluated independent effects of a broad range of sociodemographic factors on the misclassification of weight status. Overall, 27.4% of overweight persons judged their weight to be "just about right," while 23.9% of participants judged themselves to be overweight but were in fact in a normal weight range. Data also revealed that sex, age, race, income, education, and occupation influenced the misclassification of weight status, suggesting that there are norms of acceptable range for body size that depend on these sociodemographic factors. For instance, compared to men, women

were almost five times more likely to over assess their body size. Younger, white participants of higher income, or of higher educational level were more likely to over assess their weight status relative to medical categories, describing themselves as heavier than they in fact were.

Duncan et al. (2006) analyzed data from the 2003–2004 (n = 10,122) and the 2005–2006 (n = 10,348) National Health and Nutrition Examination Survey (NHANES) to assess weight misperceptions relation to weight-related behaviors among overweight and obese male and female adults. NHANES is an on-going annual survey of health and nutritional status collected from a stratified, multi-stage probability sample of the civilian non-institutionalized U. S. population, with an oversampling of targeted groups. All participants were 20 years of age or older, not currently pregnant, and had a BMI of $\geq$ 25. Analysis revealed weight misperception among participants varied by gender and race/ethnicity was associated with less likelihood of interest in or attempts at weight loss and less physical activity. Nearly one quarter of participants (23%) misperceived their weight as either "underweight" or "about the right weight."

Kuchler and Variyam (2003) utilized data from an earlier sampling from the NHANES study, 1988–1994, to explore weight status agreement between self-report data and calculated BMI. The sample included 7,758 males and 8,451 females all over the age of 20. The authors concluded, "misperceiving weight status is commonplace" (Kuchler & Variyam, 2003, p. 858). Of the female subjects sampled, 50.49% were either overweight or obese, yet 60.09% perceived their weight as overweight, meaning women were more likely to report themselves as being overweight even at medically healthy weights. The opposite was reported for male participants. An interesting trend was noted in regards to education and income; increased education/income was associated with less error in perceived weight for those who are overweight or obese, while increased education/income was correlated with higher rates of over reporting weight for those

of normal weight category. These differences in education were statistically significant for both males and females. Overweight and obese ethnic minority subjects (non-Hispanic black subjects and Hispanic subjects) had higher rates of under assessing weight when compared with non-Hispanic white subjects. Additionally, healthy weight ethnic minority subjects less frequently over assessed weight when compared to non-Hispanic white subjects.

Findings from a study by Lemon et al. (2009) of a demographically diverse health care system employee sample (n =899) support that gender-differences in self-perception of weight status and dieting occur in adulthood and is consistent across BMI categories (p. 93). Women were more likely than men to perceive themselves as moderately or very over weight. The majority of overweight and obese women (86%) perceived themselves to be overweight. Interestingly, more than half of normal weight women (52%) also perceived themselves to be overweight. Men however, were much less likely to identify themselves as overweight regardless of their BMI category. This discrepancy highlights the sociocultural expectations on females in the United States to conform to a body standard, to which men are not expected to conform.

Rahman and Berenson (2010) conducted a survey of over two thousand women ages 16 to 25 (n = 2,224) attending one of five publicly funded reproductive health clinics from 2008 to 2010. Self report surveys assessed weight perceptions and weight loss efforts over the previous 30 days. Results indicated 23% of overweight women and 16% of normal weight women do not accurately perceive their weight when compared with medical definitions of weight status. Additionally, underassessment of weight was more common amongst African American women and women with lower education levels, while over assessment of weight was more common amongst Caucasian and Hispanic women.

In a smaller study by Truesdale and Stevens (2008), a purposeful sample was recruited from and near the University of North Carolina, Chapel Hill. Researchers acquired 104 participants, 26 in each group, evenly distributed between White–African American and male–female categories. Data suggests that women and men reported their height and weight with reasonable accuracy, but categorical definitions of weight status were much more askew. For instance, 33.3% of normal weight women considered themselves to be overweight and 10.5% of overweight women considered themselves to be normal weight, yet only 22.2% of obese women considered themselves to be obese. Seventy-two percent of obese women considered themselves to be overweight and 5.6% perceived themselves as normal weight.

These results were echoed in a study by Dorsey, Eberhardt, and Ogden (2009), who explored ethnic differences in weight misperception in a nationally representative sample using data from the NHANES 1999–2006 (n = 17,270). Overweight and obese Mexican American and non-Hispanic black women were more likely to misperceive their weight as "about right" than non-Hispanic white women. Education also had a significant impact on weight misperceptions, as overweight and obese women with less than high school education were more likely to misperceive their weight when compared to women with some college education. Overall, including men and women of all weight categories, racial/ethnic minorities were more likely to misperceive weight status. Independent of racial/ethnicity variations, 20% of healthy weight adults considered themselves overweight and close to 40% of overweight adults and ~8% of obese adults considered themselves to be "about the right weight," indicating a significant prevalence of weight misperception and potential barrier to interventions.

Weight Loss Interventions

The role of health care providers (HCP) in correcting weight (mis)perception and influencing attitudes and behaviors towards weight loss is not well studied. Yaemsiri, Slining, and Agarwal (2011) demonstrated "overweight self-perception was the most important predictor of desire to weigh less and pursuit of weight control" (p. 1066), as well as being positively correlated with an HCP diagnosis of overweight and obesity. Although positively correlated, overweight self-perception does not guarantee a desire to lose weight, attempts to maintain weight, or even current attempts lose weight.

According to Yaemsiri et al. (2011), due to the inherent lack of time and adequate training in our current primary model, HCPs face many barriers to providing weight maintenance/loss counseling, including a predominant focus on treating acute illnesses rather than providing preventive care. However, health care settings are perfectly positioned to impact the motivation of a patient to lose weight by addressing weight misperceptions and providing supportive counseling. HCPs also have an opportunity to educate overweight or obese patients about healthy weight loss strategies combating the plethora of diet fads and misinformation rampant in pop culture. A multidisciplinary team consisting of a primary-care physician, behavioral psychologist, registered dietitian and exercise psychologist may best address these complex needs of overweight and obese patients.

Objectives

- To explore the prevalence and distribution of medical classifications of weight, as defined by the body mass index, across self identified sexual orientation, while controlling for well-documented covariates of overweight and obesity (ethnicity, education level, and socioeconomic status).

- 2) To examine the type and discordance between self-evaluated and medically classified weight status, and to examine the influence of sexual orientation on the misclassification of weight status amongst young adult women.

Research Questions

1. Is there a discrepancy of BMI distribution across sexual orientation?
2. Is there a significant difference of self-perceived weight across sexual orientation?
3. What is the concordance between self-perceived weight (as measured by question H4GH7) and medical standards of weight (as measure by the BMI) in a nationally representative sample of women age 25–34; and does this vary across sexual orientation?

Hypotheses

1. There will be a higher prevalence of overweight and obesity for women self-identifying as *100% homosexual* and *mostly homosexual* when compared to peers of other sexual orientations.
2. There will be a higher prevalence of *slightly overweight* and *very overweight* self-report in *heterosexual* and *mostly heterosexual* women, due to the tendency of sexual minority women to under-assess their own weight and the tendency of heterosexual women to over assess their weight.
3. Women who identify as *100% homosexual* and *mostly homosexual* will have a greater tendency to under-assess self-perceived weight compared to their heterosexual peers.

Chapter II: Methods

Subjects

Subjects were participants in Wave IV of the National Longitudinal Study of Adolescent Health (Add Health). At the time of collection, 2008–2009, respondents lived across all 50 states and were 24–32* years of age (Add Health, n.d.). The Wave IV response rate was 80.3%, totaling 15,701 original Add Health respondents re-interviewed. Only participants identified in Wave IV as biologically female (n = 8,352) are included for analysis. Of these participants, analyses are restricted to participants who provided racial and ethnic identity information in Wave I in addition to anthropometric, sexual orientation, and socio-demographic information in Wave IV. If a participant selected "don't know" or "refused" to answer any of the questions of analyses, these subjects were omitted from analysis. Additional information on the specifics of this process can be found in the Data Analysis section below.

There was differential attrition by gender, race, and immigrant status, with response rates higher for female, white, and native-born respondents at Wave IV, when compared to Wave I. To investigate the effect of non-response on study estimates at Wave IV, Brownstein et al. (n.d.) used demographic, behavioral, health and attitudinal variables from Wave I to measure the extent that differences between respondents and non-respondents introduce bias at Wave IV. Results indicated that total and relative bias is small in magnitude for nearly all measures after study estimates were adjusted with final sampling weights (Harris, 2013). Overall, Wave IV non-response bias is negligible and the Wave IV sample adequately represents the same population surveyed at Wave I when final sampling weights are used to compute population estimates (Brownstein et al., n.d.).

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* 52 respondents were 33-34 years old at the time of the interview.

Procedure

Survey data was collected with a computer-assisted personal interview (CAPI) for less sensitive questionnaire sections, while more sensitive questionnaire sections were administered using computer-assisted self-interview (CASI) technology. The interview was completed in approximated 90 minutes. Immediately following the interview, interviewers took physical measurements and collected biological specimens, which averaged about 30 minutes. The methods used to collect biological data that were noninvasive, innovative, cost-efficient, and practical for population-level research.

Materials

Data previously collected by Add Health, a project run out of the University of North Carolina, will be used (see Appendix A). This project began in the mid 1990s collecting data on a nationally representative sample of adolescents. Three subsequent waves of data have been collected with about 15,000 of the original participants. My focus will be on the fourth wave of data collected in 2008 of young adult women aged 24–32.

Anthropometric measures. Trained and certified field interviewers (FIs) collected anthropometric measures of height and weight using standardized procedures (Entzel et al., 2009). Height was measured in centimeters to the nearest 0.5cm. Weight was measured in kilograms to the nearest 0.1kg using a digital scale. Data was collected for all respondents capable of standing without assistance. FIs were instructed not to share anthropometric measures with respondents unless they specifically asked for the information.

Body mass index (H4BMI and H4BMICLS). Using obtained measurements of height and weight BMI was calculated for each subject. Additionally, all respondents were assigned a BMI classification according to the categorization scheme recommended by the National

Institutes of Health Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults (1998):

Table 1

Body Mass Index Response and Coding

Response	**Code**
underweight (16.5 – < 18.5 kg/m2)	1
normal (18.5 – < 25 kg/m2)	2
overweight (25 – < 30 kg/m2)	3
obese I (30 – < 35 kg/m2)	4
obese II (35 – < 40 kg/m2)	5
obese III (≥ 40 kg/m2)	6

Self-perceived weight (H4GH7). Using the following selection, respondents were asked to respond to the survey question: "How do you think of yourself in terms of weight?"

Table 2

Self-Perceived Weight Response and Coding

Response	**Code**
very underweight	1
slightly underweight	2
about the right weight	3
slightly overweight	4
very overweight	5

Sexual orientation (H4SE31). Subjects identified sexual orientation, using the CASI technology, as prompted by the statement: "Please choose the description that best fits how you think about yourself."

Table 3

Sexual Orientation Response and Coding

Response	Code
100% heterosexual (straight)	1
Mostly heterosexual (straight), but somewhat attracted to people of your own sex	2
Bisexual that is, attracted to men and women equally	3
Mostly homosexual (gay), but somewhat attracted to people of the opposite sex	4
100% homosexual (gay)	5

Socio-demographics. The following variables were selected as potential confounding variables to the relationship between sexual orientation, BMI, and perceived body size, and will therefore be used in analyses.

Biological sex (BIO_SEX4). Participants were asked to identify their gender as either male or female, with 53% (n = 8352) of respondents identifying as female.

Racial identity (H1G14 and H1G16A-E). Racial identity information was collected in Wave I of the study, when participants were asked to provide racial and ethnic identity information, which were condensed into the following categories:

Table 4

Race and Ethnicity Response and Coding

Response	Code
Hispanic or Latino origin	1
white	2
black or African American	3
American Indian or Native American	4
Asian or Pacific Islander	5
Mixed	6
Other	7

Participants were categorized within one of the above racial/ethnic identifiers according to the National Center for Education Statistics (NCES) guidelines for defining race and ethnicity, which appear to mirror the U. S. government standards (Seastrom, 2002). Thus, any participant reporting Hispanic or Latino origin was coded as such regardless of additional racial identifiers selected. Participants who did not identify with *Hispanic or Latino origin* were categorized based upon their selected race. Participants were allowed to select more than one racial/ethnic identifier, so any participant indicating two or more racial identifiers, other than *Hispanic or Latino* were coded as *mixed*. Participants who self-identified as *other* were kept in this category.

Income (H4EC1). Income was assessed with the following questions and response options: "Thinking about your income and the income of everyone who lives in your household and contributes to the household budget, what was the total household income before taxes and deductions in {2006/2007/2008}? Include all sources of income, including non-legal sources."

Table 5

Annual Household Income Response and Coding

Response	Code
less than $5,000	1
$5,000 to $9,999	2
10,000 to 14,999	3
15,000 to 19,999	4
20,000 to 24,999	5
25,000 to 29,999	6
30,000 to 39,999	7
40,000 to 49,999	8
50,000 to 74,999	9
75,000 to 99,999	10
100,00 to 149,999	11
150,000 or more	12

Education (H4ED2). Participants were asked "what is the highest level of education that you have achieved to date?" Response options with coding scheme appear below.

Table 6

Highest Level of Education Response and Coding

Response	**Code**
8th grade or less	1
some high school	2
high school graduate	3
some vocational/technical training (after high school)	4
completed vocational/technical training (after high school)	5
some college	6
completed college (bachelor's degree)	7
some graduate school	8
completed master's degree	9
some graduate training beyond a master's degree	10
completed a doctoral degree	11
some post baccalaureate professional education (e.g. law school, med school, nurse)	12
completed post baccalaureate professional education (e.g. law school, med school, nurse)	13

Data Analysis

Data analysis was done using IBM SPSS Statistics software version 24 for Macintosh. Data were prepared for statistical analysis by first pulling out variables of interest from the Add Health data set, predominantly from Wave IV of data collection. Race and ethnicity were not re-assessed at this wave of collection so this variable was retrieved from the initial wave of data collection. All male participants were removed from the sample (n = 7349, 46.8%). Any participants who responded with "refused," "don't know," and "not sexually attracted to either males or females" for the sexual orientation variable (H4SE31) were removed from the sample (n = 74, 0.89%). Next, participants who selected "refused" or "don't know" in regards to the self-perceived weight variable (H4GH7) were removed from the sample (n = 3, 0.04%). Responses of "over limit," "weight inconsistent with height, waist and sex," "refused," "legitimate skip," and "invalid data" on the BMI variable (H4BMI), led to the removal of these participants (n = 129,

1.54%) from the study. Responses of "refused" and "don't know" (n = 492, 5.9%) on the income variable (H4EC1) question disqualified participants from remaining in study sample. No further deletions were required for the highest level of education variable (H4ED2), as all participants who had responded with "refused" or "don't know" were already deleted. Any participants who responded with "refused" or "don't know" on all questions pertaining to race and ethnicity were removed from the study (n = 27, 0.32%).

A fixed variable block design analysis of variance (ANOVA) was run to assess significant difference of BMI across sexual orientation. Race/Ethnicity, level of education, and annual household income were used as block factors in the ANOVA to control for variance of BMI attributable to these variables independent of sexual orientation. The demographic variables selected (race/ethnicity, income, education level) have previously been shown to be associated with BMI, overweight, and/or obesity. Age and gender are also common confounding variables selected for analysis, but due to the restricted cohort age range (24–32) and the use of only female-identified participants, these variables have already been sufficiently contained.

Spearman's rho was used to look at the correlations between block variables and dependent variable of BMI. Block design ANOVA assumes the block variables are independent of one another. If block variables are too highly correlated, data may be skewed and not as reliable. It is expected that there will be a positive correlation between household income and education level, as these two factors are commonly used to comprise one socioeconomic variable. It is also expected to see positive correlations between BMI and block variables, as these variables have been identified as the most common influential variables on rates of BMI.

To address the second research question, a Kruskal-Wallis H test (the non-parametric equivalent of an ANOVA) was run with sexual orientation as the independent variable, and self-

perceived body size as the dependent variable. Perceived body size was assessed with an ordered scale (as shown above in Materials section), and we can therefore interpret this to be an ordinal variable, suitable for this analysis.

Analysis for the third question of the study involved the creation of a composite variable, which categorized participants into one of three assessor categories. Respondents' self-perceived body size was compared with the medical communities' definition of participants' body size (based on BMI). These variables were recoded collapsing some options, for ease of comparison (see Table 1). For the self-perceived body size variable, responses "very underweight" and "slightly underweight" were collapsed into one category of "underweight." The medical community differentiates between multiple levels of obesity that is not necessary for the purposes of the current study; therefore the three categories of obesity as defined by BMI were collapsed into one broad category of "obesity." These changes made for simpler comparisons without a significant loss in the quality of the data.

Each subject was assigned to an "assessor" group (over, under, or accurate), which identifies any discrepancy between self-perceived and medically classified body size (see Table 2). Participants were categorized as either: an accurate-assessor, reporting their weight to be the equivalent of the medical community; an under-assessor, reporting a lower weight than the medical community; or an over-assessor, reporting a higher weight than the medical community. Accuracy between perceived body size and medical standards of body size were matched such that: reports of very underweight and slightly underweight will be considered accurate if the respondent's BMI is classified as 'underweight' (BMI of less than 18.5); 'about the right weight' will be considered accurate if the respondent's BMI is classified as 'normal weight' (BMI of 18.5–24.9); 'slightly overweight' will be considered accurate if participant's

BMI is classified as ‘overweight’ (BMI of 25–29.9); and ‘very overweight’ will be considered accurate if participant’s BMI is classified as ‘obese’ (BMI of 30+).

Once participants have been sorted into groups, a chi square analysis of the assessor groups and sexual orientation was performed to determine significant differences between groups.

Table 7

Comparisons of Self-Perceived and Medical Classification of Weight

Self-Perceived Weight	**Medical Classification of Weight (BMI)**	
Very underweight / Slightly underweight	underweight	Underweight (16.5 - < 18.5)
About the right weight		Normal (18.5 - < 25)
Slightly overweight		Overweight (25 - < 30)
Very overweight	Obese (30 +)	obese I (30 - <35)
		obese II (35 - <40)
		obese III (≥40)

Note. Collapsed categories are shown to simplify comparisons of labels across self-perceived and medical definitions of weight.

Table 8

Determination of Assessor Style

Self-Perceived Weight in Relation to Medical Classification of Weight	**Assessor Variable**
Less than BMI	under assessor
Same as BMI	accurate assessor
Heavier than BMI	over assessor

Chapter III: Results

Demographic Information

A total of 7,627 female participants were included in analysis. All participants were born between 1974 and 1983, with a mode of 1978, making most participants age 30 at the time of data collection.

Race/ethnicity demographics mirrored national levels of diversity. Participants identified as 53.2 % *white*, 15.2% *Hispanic or Latino*, 21.4% *black or African American*, 5.1% *Asian or Pacific Islander*, 0.4% *American Indian or Native American*, 0.7% *other*, and 4% *mixed*. The majority of respondents (80.7%) selected only one racial/ethnic identifier while 19.3% of respondents selected two or more.

Highest level of education completed ranged from *8th grade or less* (0.3%) to *completion of a doctoral degree* (0.9%) and *completion of a post-BA professional degree* (1.3%). The mode response, accounting for 35.2% or participants, was *completed some college* education. 56.2% of participants reported *completing college* or *some college*. For complete breakdown of the education variable see Table 3. Total household income ranged from *less than $5,000* (3.1%) to *$150,000 or more* (4.7%), with a mode of *$50,000 to $74,999* (24.4%). About half of participants (46.7%) reported household income levels below the mode. For a complete breakdown of total household income refer to Table 4.

The clear majority of the sample population identified as *100% heterosexual* (80.1%), while only 0.9% identified as *100% homosexual*. Participants who identified as *mostly heterosexual, but somewhat attracted to people of the same sex* comprised 15.8% of the sample. *Bisexual* identifying participants comprised 2.3% of the sample population and those identifying at *mostly homosexual, but somewhat attracted to people of the opposite sex* comprised 0.8%.

Table 9

Distribution by Highest Level of Education Completed

Highest Level of Education Completed	Frequency	Percent	Cumulative Percent
8th grade or less	22	.3	.3
some high school	432	5.7	6.0
high school grad	987	12.9	18.9
some vocational/tech training (post HS)	234	3.1	22.0
completed vocational/tech training (post HS)	505	6.6	28.6
some college	2683	35.2	63.8
completed college (BA)	1603	21.0	84.8
some grad school	346	4.5	89.3
completed a master's degree	490	6.4	95.7
some graduate training beyond MA	92	1.2	96.9
completed a doctoral degree	69	.9	97.8
some post-BA professional education (law school, med school, nurse)	64	.8	98.7
completed post-BA professional training (law school, med school, nurse)	100	1.3	100.0
Total	7627	100.0	

Table 10

Distribution by Total Household Income

Total Household Income	Frequency	Percent	Cumulative Percent
less than $5,000	239	3.1	3.1
$5,000 to $9,999	202	2.6	5.8
$10,000 to $14,999	286	3.7	9.5
$15,000 to $19,999	285	3.7	13.3
$20,000 to $24,999	392	5.1	18.4
$25,000 to $29,999	414	5.4	23.8
$30,000 to $39,999	837	11.0	34.8
$40,000 to $49,999	903	11.8	46.7
$50,000 to $74,999	1858	24.4	71.0
$75,000 to $99,999	1082	14.2	85.2
$100,000 to $149,999	767	10.1	95.3
$150,000 or more	362	4.7	100.0
Total	7627	100.0	

Research Question 1

As expected, there were significant correlations between block variables as well as with BMI, confirming the need to block these variables. Some of these variables were positively correlated, such as education level and household income, while others were negatively correlated, such as BMI and household income (see Table 5 for all correlations). There was a significant and moderately strong correlation between education level and household income. Although this presents a potential assumption violation for the ANOVA, the correlation was not strong enough to change the proposed analysis. For the present study, both variables were kept intact and blocked as separate variables.

There does appear to be a higher percentage of *100% homosexual* identified women who are obese (50.7%) when compared with women identified as *100% heterosexual* (37.3) and *mostly heterosexual* (36.9). See Figure 1 for complete results by sexual orientation. However, upon running the fixed factor 4-way block design ANOVA, no main effect or significant difference of BMI distribution across sexual orientation was found after controlling for common confounding variables ($F(4) = 1.015$, $p = 0.398$). See Table 6 for all results of the fixed factor block design ANOVA. Without a significant difference between independent groups, no further post-hoc analyses were warranted.

Table 11

Spearman's rho Correlations

	Household Income	Level of Education	Race/Ethnicity	BMI
Household Income	1.000	0.372*	-0.107*	-0.179*
Level of Education	-----	1.000	0.042*	-0.206*
Race/Ethnicity	-----	-----	1.000	0.042*
BMI	-----	-----	-----	1.000

* Correlation is significant at the 0.01 level (2-tailed).

Table 12

Fixed Factor Block Design ANOVA Results
Dependent Variable: BMI

Source	df	F	Sig.
Sexual Orientation	4	1.015	.398
Race and Ethnicity	6	35.575	.000
Education Level	12	16.389	.000
Household Income	11	5.831	.000
Error	7593		
Total	7627		

Note. The main effect of interest is sexual orientation, which is not significant at $p < 0.05$, while the fixed factor block variables are all significant at $p < 0.05$.

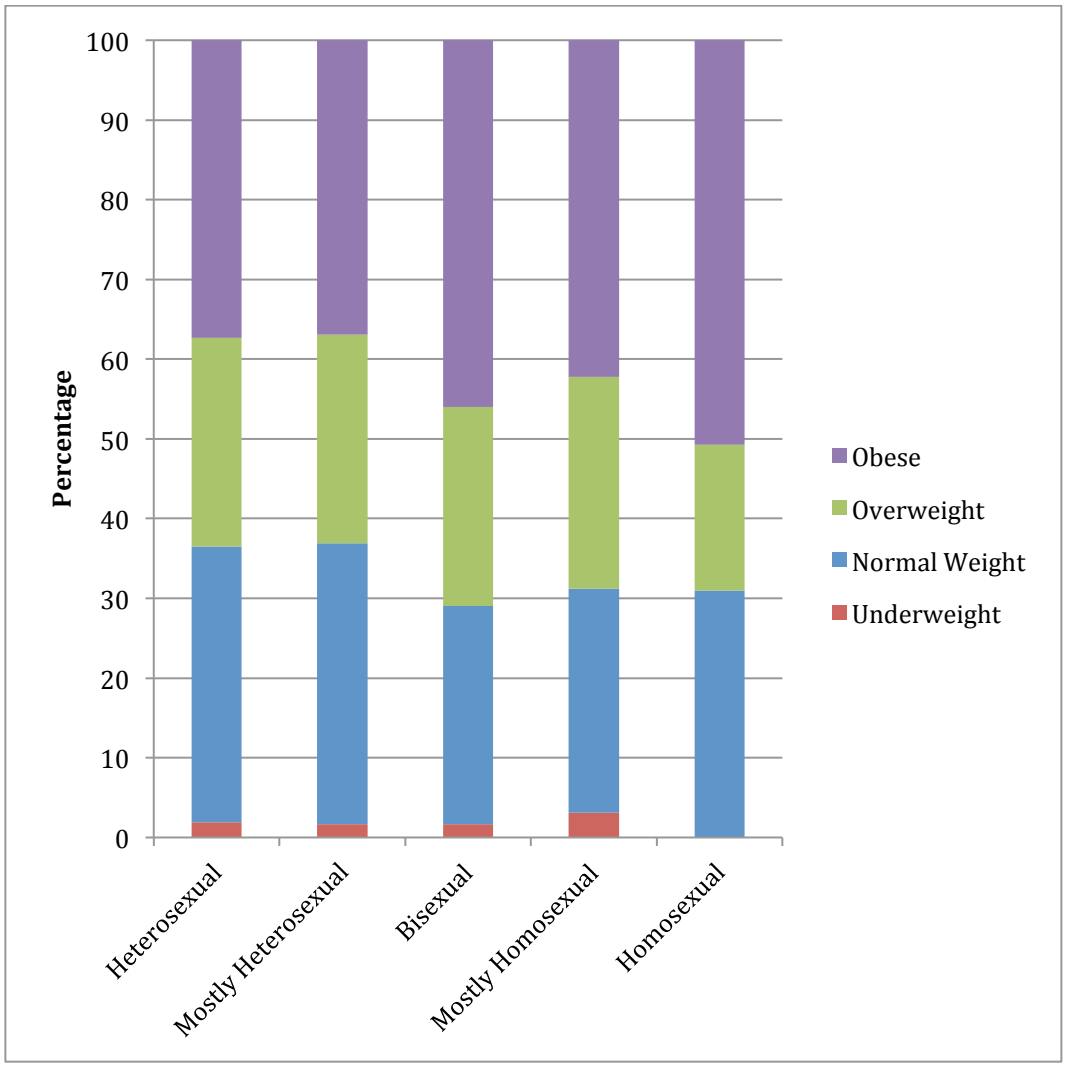

Figure 1. Medically classified body size rates by sexual orientation.

Research Question 2

The Kruskal-Wallis H test showed that there was no significant difference in self-perceived body size across sexual orientation, χ^2 (4) = 6.896, p = 0.141. Each sexual orientation category had similar percentages of respondents in each of the perceived body size categories (see Figure 2).

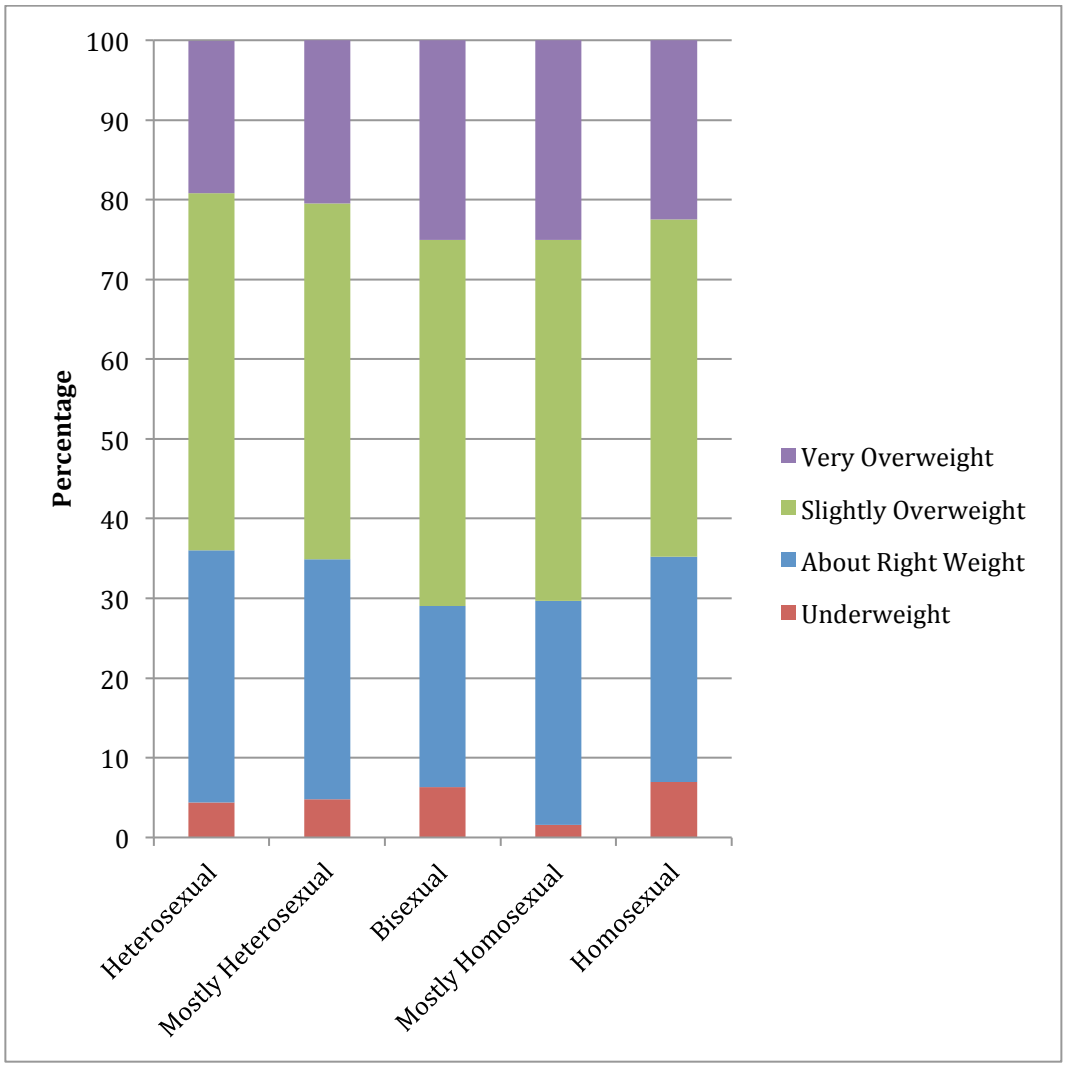

Figure 2. Self-perceived body size response rates by sexual orientation.

Research Question 3

A little over one quarter of study participants were under-assessors of their weight (28%), while nearly two thirds of participants were accurate-assessors (61%). A Chi-square test for independence indicated a significant, albeit weak, association between sexual orientation and body assessor style, χ^2 (8, n = 7627) = 16.67, p = 0.034, Cramer's V = 0.033 (Table 7). While 11% of *100% heterosexual women* were over-assessors of their weight, only 5.6% of *100% homosexual women* were over-assessors. On the other end of the spectrum, 28.2% of *100%*

heterosexual women were under-assessors of weight, while 40.8% of *100% homosexual women* were considered under-assessors. Women who identified as *bisexual* also had a higher occurrence of under assessing body size compared with their *100% heterosexual* identified peers, with 34.7% of *bisexual* respondents falling into the under assessor style (see Figure 3).

Table 13

Results of Chi-square Test and Descriptive Statistics for Sexual Orientation by Assessor Style

	Assessor Style		
Sexual Orientation	Over Assessor	Accurate Assessor	Under Assessor
100% Heterosexual	673 (11%)	3717 (60.8%)	1722 (28.2%)
Mostly Heterosexual	139 (11.5%)	760 (63.1%)	305 (25.3%)
Bisexual	21 (11.9%)	94 (53.4%)	61 (34.7%)
Mostly Homosexual	6 (9.4%)	43 (67.2%)	15 (23.4%)
100% Homosexual	4 (5.6%)	38 (53.5%)	29 (40.8%)

Note. $\chi^2 = 16.67$*, df = 8. Numbers in parentheses indicate column percentages.
*p < 0.05

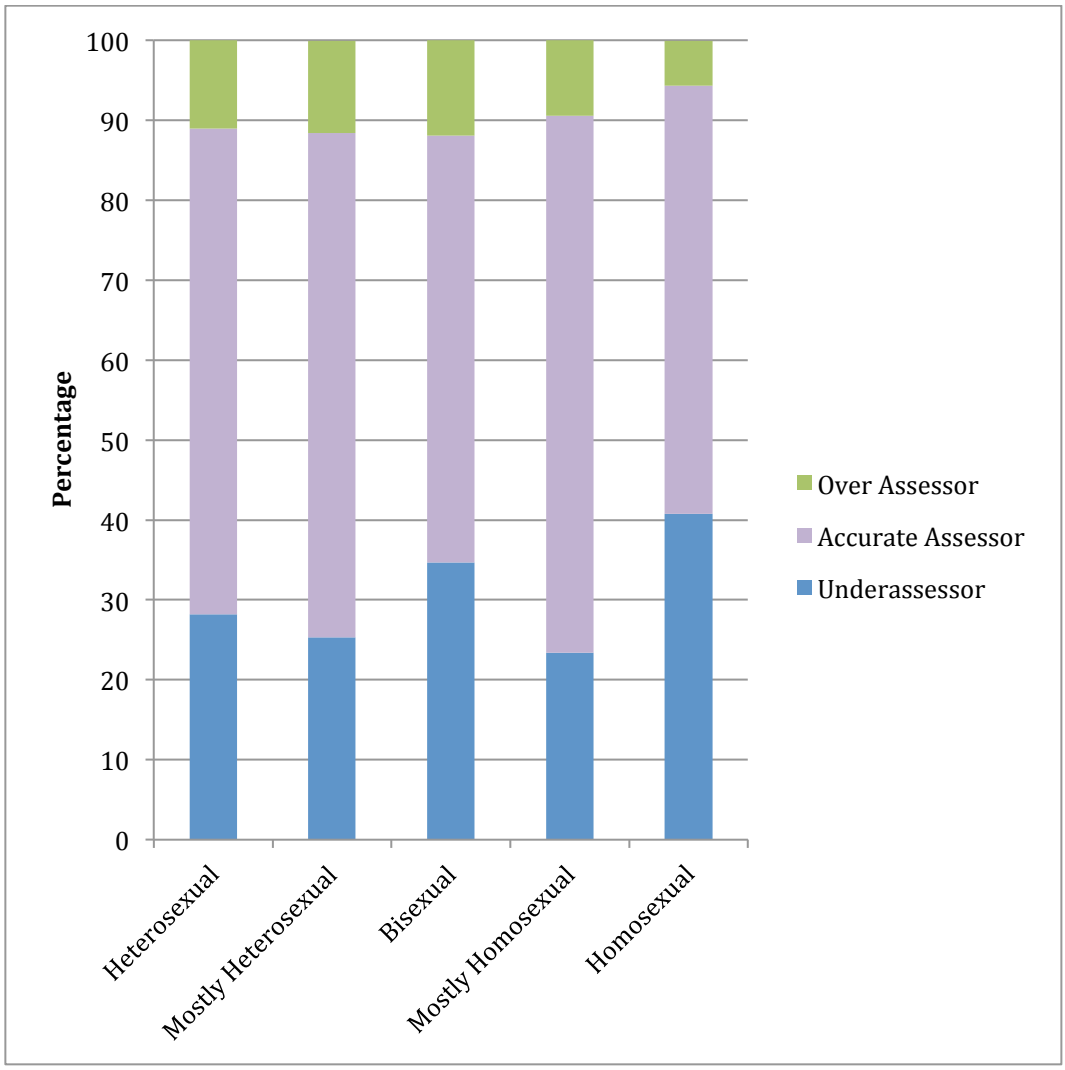

Figure 3. Assessor type rates by sexual orientation.

Chapter IV: Discussion

Research Hypothesis 1

Despite some unexpected results, the analyses of this study pose interesting implications. Previous research seemed to indicate a higher prevalence of overweight and obesity amongst sexual minority women, although only one study to date has been done using a nationally representative sample, as the present study utilized. Current evidence suggests there is not a higher prevalence of overweight and obesity amongst sexual minority women, as hypothesized. There has been a national call put forth to identify and research special populations in the fight against obesity in the US, and although current results do not support initial claims of increased rates of obesity, lesbian women still deserve special attention in the healthcare setting. This idea will be elaborated further below.

Only one study, by Boehmer et al. (2007), has been published exploring the distribution of BMI across sexual orientation with population-based data. This study differs from the present study in some clear ways. Boehmer et al. (2007) used a different classification of sexual orientation than the present study, having respondents self-identify as either heterosexual, homosexual, bi-sexual, or something else, whereas in the present study participants could select from five different categories, while *other* and *don't know* were not included in analysis. Researchers also used a wider age cohort of participants, ranging in age from 20 years old to 44 years old. Researchers took a different approach to data analysis that included correcting for sampling bias, and conducting multiple regression analyses that adjusted for all seven demographic variables, for which results were not shown in publication. These seven variables may perhaps play in a role in the differing results of the Boehmer et al. (2007) study and the present one. Researchers controlled for age, race/ethnicity, education, poverty levels, health

insurance status, place of residence, and nativity, capturing more complexity and variables that may significantly impact rates of obesity. Although the present study accounted for three of the most prominent covariates of overweight and obesity, it did not account for place of residence, health insurance status, and nativity. Researchers reported to confirm a higher prevalence of overweight and obesity for lesbian identified women, but results were only approaching significance ($p = 0.051$).

Results seem inconclusive. With one nationally representative study published with results approaching significance, it is somewhat surprising that the healthcare community so readily embraced this result. Most sources reviewed for the present study, cite the Boehmer et al. (2007) study as the source verifying this occurrence. One study is likely insufficient to verify such a supposition. Additionally, knowing there is an increase risk of overweight and obesity may not be enough to make meaningful healthcare changes. Regardless, additional research is needed to explore the relationship between sexual orientation and overweight and obesity to understand what this relationship is and why this relationship exists as it does. With better understanding of the intricacies of this relationship, whether there is a significant increase risk or not, we can better address the healthcare concerns of the overweight and obese sexual minority women.

The assumption of homogeneity of variance may have been violated in this analysis. Although ANOVA is considered a robust analysis that can compensate for small variances in homogeneity (Shaw & Mitchell-Olds, 1993), the data in the present study is significantly imbalanced. With 80% of participants falling into one sexual identity category, that of *100% heterosexual*, there are limited ways to compensate for this while maintaining the sample size and its nationally representative qualities. However, one possibility would be to take a random

sample of equal size from each sexual orientation group for comparison, but this would drastically reduce the breadth of the collected data and increase risk of error due to additional analyses.

This imbalance in distribution of participants across sexual orientation is expected, and as discussed above, rates of sexual minorities are on par with expected values based upon review of multiple national surveys (Gates, 2011). Researchers suggest when such an imbalance in data exists to interpret results with caution, with the biggest risk being of type II error, accepting the null hypothesis when in fact a significant effect exists.

Research Hypothesis 2

It was hypothesized that there will be a higher prevalence of *slightly overweight* and *very overweight* self-report in *heterosexual* and *mostly heterosexual* women, due to the tendency of sexual minority women to under-assess their own weight and the tendency of heterosexual women to over assess their weight. Analysis revealed no significant differences between self-reported body size across sexual orientation therefore this hypothesis is rejected.

According to research, race and ethnicity play a significant role in the perception of body size, which was not accounted for in this particular analysis. Future research would benefit from continued exploration in the role of sexual orientation and other demographic variables on the perception of body size, and perhaps most importantly on the complex interplay between all these variables.

Research Hypothesis 3

It was hypothesized that women who identify as *100% homosexual* and *mostly homosexual* will have a greater tendency to under assess self-perceived weight compared to their heterosexual peers. Data analysis supported this hypothesis, indicating there is a greater tendency

for sexual minority women who identify as *100% homosexual* to under assess body size compared with their heterosexual peers.

This is the most interesting result of all. Despite there not appearing to be a higher prevalence of overweight and obesity in sexual minority women, sexual minority women do appear to significantly under-assess their weight as compared with peers of varying sexual orientation.

Explanation of these results can only be speculated at this time. Some research would indicate that perhaps sexual orientation serves as a protective factor against the societal pressures to conform to a particular body ideal. Fredrickson and Roberts (1997) hypothesized that demographic variables, "may mitigate or protect certain subgroups of women against the negative psychological repercussions that we link to sexual objectification" (p. 197). Objectification theory posits, "girls and women are typically acculturated to internalize an observer's perspective as a primary view of their physical selves" (Frederickson & Roberts, 1997, p. 173). Beginning in early childhood, women receive complex messages from society that their appearance is an integral aspect in how they will be evaluated, valued, and treated by others, particularly men (Hill & Fischer, 2008; Martin, 1996).

According to Hill and Fischer (2008) despite having undergone a strikingly similar socialization process of female sexual objectification, lesbians may not have internalized these objectifying messages in the same ways as heterosexual women because (a) they are not trying to attract men, (b) the lesbian community may insulate its members by putting less emphasis on appearance, and/or (c) lesbians by their very nature challenge the hetero-patriarchy and are therefore in a better position to challenge cultural ideas of sexual objectification of women.

In the study by Hill and Fischer (2008) exploring the moderating effect of sexual orientation on women's experience of objectification found that lesbians reported similar levels of self-objectification but significantly less body surveillance than heterosexual participants did. In another study, Kozee and Tylka (2006) suggest that the inter-relationships among the objectification theory constructs were different and more complex for lesbian participants than for heterosexual participants. While supported by other research studies indicating, when compared to heterosexual women, lesbian women report less concern with physical appearance, less internalization of sociocultural beauty norms, and less self-objectification (Hill & Fischer, 2008), not all research agrees. Hill and Fischer (2008) acknowledge other studies have also found that "lesbians are just as susceptible to body dissatisfaction as heterosexual women" (p. 751).

It has been suggested that as sexual minority women become increasingly accepted into mainstream culture and media, the ways in which younger generations of sexual minority women will internalize messages of sexualization and objectification will shift, which may impact their perception of and relationship with their bodies (Roberts, Stuart-Shor, & Oppenheimer, 2010). Research should continue to explore women's relationships with their bodies and the ways in which sexual orientation and other identities may shape and moderate the impact of larger cultural messages. This understanding will serve to prepare clinicians in addressing the occurrence of overweight and obesity among other health concerns.

Sexual Orientation/Gender Identity

Sexual orientation percentages of the sample population fit conservative estimates of sexual minority numbers in the United States. In a research brief by Gates (2011) from the Williams Institute, numbers from several U.S. population-based surveys are reviewed and

revealed that an estimated 3.5% of adults in the United States identify as lesbian, gay, or bisexual. In the present study, 4% of women identified as 100% homosexual, mostly homosexual but somewhat attracted to men, or bisexual. Gates (2011) also demonstrated that women are substantially more likely than men to identify as bisexual, and therefore amongst women, bisexuals tend to comprise over half of the sexual minority population, which appears consistent with the current sample population.

Gates (2011) highlights an important constraint when doing research with the LGBT population: inconsistent definitions of who is included in the LGBT population, differences in research methodologies, and lack of consistency across surveys and over time. Sexual orientation is a complex construct that combines dimensions of personal identity, attraction, behavior, and relationships, all-of-which researchers struggle to ascertain as a cohesive identity. "Survey methods can affect the willingness of respondents to report stigmatizing identities and behaviors. Feelings of confidentiality and anonymity increase the likelihood that respondents will be more accurate in reporting sensitive information" (Gates, 2011, p. 2). The data gathered in the present study was done primarily through electronic self-report survey, where participants submitted responses directly to the computer, seemingly providing increase comfort for an accurate disclosure of sexual orientation.

Although separate, gender identity and expression can overlap with sexual orientation (American Psychological Association [APA], 2011) and thus presents an area for further study that was not sufficiently addressed in the present study. Participants were forced to pick between the common bi-gender identifiers of male and female, greatly limiting the self-expression of the participants and the understanding of how gender may play a role in the occurrence of overweight and obesity, but perhaps more significantly, how gender identity and expression

plays a role in the assessment of body size. Do lesbians of a particular gender expression tend to under-assess their body size more than lesbians of other gender expressions?

Race/Ethnicity

A significant limitation of the current analysis was having to use data collected in the first wave of study in 1994/95 to obtain race and ethnicity identifiers for the fourth wave of data participants, which was taken in 2008/09. It has been shown over and over again that race is not a valid indicator of distinct, genetically different population groups, and there is more variation within racial groups than there are between (Ford & Kelly, 2005). Race and ethnicity are distinct and often co-occurring social-political constructs, the first based upon phenotypic genetic expression and the second based upon more cultural behaviors and beliefs such as language and attitudes (Ford & Kelly, 2005). Due to their socio-political nature, race and ethnicity are fluid and may change over time (Ford & Kelly, 2005). Therefore, assessing one's racial and ethnic identity as a teenager and assuming it to be stable over the lifetime is a narrow way to incorporate a rich and meaningful identification system.

There is debate as to how racial and ethnic categories should be collected and assessed in research. Nothing seems to come close the complex nature of these constructs but unfortunately lines need to be drawn for the purposes of research. In the present study, the National Center for Education Statistics (NCES) definitions were utilized to categorize and stream line the racial and ethnic variables. Race and ethnicity are not the main focus of this study, but rather being used as a covariate in the analysis of the relationship between BMI and sexual orientation, the over generalization of bi-racial and multi-racial participants as "mixed" was done based upon previous research indicating that several racial and ethnic minority individuals have a higher prevalence of overweight and obesity than their Caucasian counterparts. Therefore multi-racial

individuals have a higher likelihood of falling into racial or ethnic categories that increase their risk of being overweight or obese. This seemed a more respectful solution to participants' identities than creating a minority hierarchy in which participants would be restricted to only one racial or ethnic identity, despite being given the option of selecting several.

In the current study, sexual orientation was considered independent of race/ethnic identity in analyzing rates of assessor style. With both identities leading to a statistically significant increase in tendency to under-assess body size, there appears to be a rich area of future research. Attempts to understand the potential interplay between racial and ethnic identities and sexual orientation may help clarify this tendency to under-assess body size and would be informative in the creation of culturally sensitive health interventions.

Additional Limitations

Although a small percentage of the sample, several participants' answers were not included for analysis due to responses of "refused" or "don't know" to any of the demographic questions. Additionally, responses of "asexual" were also omitted from analyses. Future research should continue to look for ways to meaningfully include these participants in studies and not dismiss them as seemingly insignificant outliers.

BMI is not an accurate measure of body size in pregnant women, as previously noted. In the present study, no screening was done in the process of data clean up and analysis for pregnancy during the time of interview. This may not have a significant impact on results, but important to note nonetheless.

There was no question assessing for intersex or any gender identity, thus participants were forced to put themselves into two oversimplified boxes of male or female. This type of data collection is a growing edge of research and society at large. Unless the data is specifically

focusing on transgender issues, studies are quick to assume a bi-gender classification most likely because it is easier and less messy. Decisions along these same lines led to the exclusion of participants who refused to identify themselves as female or as any sexual orientation that utilizes a bi-gender system. It is important for researchers everywhere to continue to push the boundaries of this work, challenging mainstream simplifications of complicated identities.

Conclusion

As discussed earlier, there are historical barriers to healthcare for the LGBT community. This work is an attempt to contribute to the development of meaningful conversations between providers and patients, particularly for sexual minority women, to put an end to remaining barriers. Primary care providers work tirelessly to address the health concerns of a diverse population. One of the most common ways in which health is assessed and addressed is through BMI. Providers throw around words like "obese" in attempt to, in a narrow window of time, catch the attention of the patient and help them make healthier lifestyle decisions. But what happens to the message, to the relationship, when a provider tells a patient they are obese and at risk of numerous health concerns, and the patient sitting across from them does not believe herself to be obese?

There are many researchers calling for a paradigm shift in the way we conceptualize health and wellness (Berg, 1999; Coogan, 1999; Ernsberger & Koletsky, 1999; Glovsky, 2014; McFarlane, Polivy, & McCabe, 1999; and Miller, 1999). These researchers push for the focus to be on wellness not weight, encouraging people to focus on healthy actions and choices not the number on the scale. Evidence shows that large losses and gains of weight throughout the lifespan may cause much of the detrimental health risks associated with obesity (Ernsberger & Koletsky, 1999). The current study fits well with this proposed paradigm shift. The intervention

is not in the numbers but in the relationship between patients and their bodies and in the dialogue around what it means to be healthy and what it means to respect and love one's body.

The most intriguing result of this study, lesbian women tending to under-assess their body size, suggests context is vital in healthcare to instill meaningful change. If medical providers do not recognize the prevalence of body misperception, particularly among lesbian women, then conversations around healthy lifestyle choices and weight will most likely fall short as individuals will not associate health risks with their own state of wellness. Conversations around health and wellness need to be interdisciplinary and consider women's perceptions of their own bodies, the culture of objectification and the pressure this puts on women to maintain a certain body ideal, in addition to medical knowledge of risks of excess weight and unhealthy lifestyle.

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Appendix

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