

SOCIOECOLOGICAL FACTORS ASSOCIATED WITH WEIGHT STATUS IN COLLEGE  
EDUCATED BLACK WOMEN

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Ashley Joi Cooper

*Dedicated to my grandparents- Willie Mae and Joe Fred Alexander, and Rose and Oswald  
Cooper; and to my uncles- Vivian Theodore Cooper, Herbie Cooper, and Charles Alexander. I  
hope I've made you proud.*

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## ABSTRACT

### SOCIOECOLOGICAL FACTORS ASSOCIATED WITH WEIGHT STATUS IN COLLEGE EDUCATED BLACK WOMEN

Ashley J. Cooper

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Black US women are disproportionately impacted by obesity at all levels of income and education. Persistent disparities in obesity underscore the need to better understand specific obesogenic determinants in this population. It is unclear why traditional protective factors, such as high socioeconomic status (SES), do not attenuate the risk of obesity in Black US women. Using a socioecological framework with an intersectional lens, this dissertation will examine the interactions of place and stigma and their associations with weight status among college educated Black US women via two mechanisms: eating behaviors and weight/shape and body image perceptions. The study examines the workplace environment as a space of socioecological significance for high-SES Black US women, presenting social, cultural, and structural tensions that shape social standing and may influence weight status for this population. This dissertation has three aims: (i) Investigate influences of sociocultural and socioeconomic status in sex and gender differences on obesity prevalence, comorbidities, and treatment; (ii) Explore the relationships between psychosocial stress, stigma, and workplace environment, including workplace racial composition, and their potential influence on obesity-related eating behaviors; (iii) Understand weight and shape perceptions in college educated Black US women who work in predominantly White environments and examine the influence of the work environment in these perceptions. Aim 1 is accomplished in part, through a published review of sex/gender differences in obesity prevalence, comorbidities, and treatment. Aim 2 is addressed using a cross-sectional observational web-based survey. Aim 3 is addressed through

a qualitative descriptive study of 20 semi-structured interviews. Results of the survey study (Aim 2) revealed that perceived stress and workplace stress, and contextualized stress were associated with obesogenic eating behaviors. Exploratory findings suggest that workplace racial composition may play a role in these associations. Results from the qualitative study (Aim 3) indicated hypervisibility and impression management in predominantly White work environments influenced perceptions of body perceptions of college educated Black US women. However, participants' personal perceptions differed outside of the context of the work environment. Overall, the findings of this dissertation contribute to a growing body of research that seeks to acknowledge and address the persistent disparities in obesity for Black US women using an intersectional lens. Our findings demonstrate that there are multifactorial, but addressable ways in which the work environment influences weight status for college educated Black US women.

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## CHAPTER 1: INTRODUCTION TO THE PROBLEM

### Introduction

Obesity, defined as a body mass index (BMI)  $\geq 30$  kg/m<sup>2</sup> in adults, is a complex and multifactorial condition influenced not only by energy balance related mechanisms such as eating behaviors and physical activity, but also social and cultural factors such as body image and weight perception. Non-Hispanic Black women in the United States (Black US women) are disproportionately impacted by obesity at all levels of income and education (Ogden et al., 2017a). Persistent disparities in obesity underscore the need to better understand specific obesogenic determinants in this population (CDC, 2022b; Fryar et al., 2020). It is unclear why traditional protective factors, such as high socioeconomic status (high-SES), most commonly measured by education level and income, do not attenuate the risk of obesity in Black US women (Ball & Crawford, 2005; Bell et al., 2018; Ciciurkaite, 2021; Cozier et al., 2009). Stress may play an important role in understanding this disparity (Assari, 2014; Bell et al., 2018; Boen, 2020; Ciciurkaite, 2021; Hudson et al., 2016). A critical dialogue that bridges theory and empirical research, as well as bridges gaps between theory, clinical, and policy practice, is necessary to eliminate the inequities that drive persistent disparities in health. Factors such as physical environment, social environment, and related stressors must be explored to better understand the complex relationships between sex/gender, race, socioeconomic status, and weight status.

Resource-based causal mechanisms for obesity, such as food deserts, poor neighborhood quality, and poor nutritional knowledge and education, are commonly cited to explain disparities in obesity prevalence (Coogan et al., 2010; Gordon-Larsen et al., 2003; Hawes et al., 2019; Jones-Smith et al., 2013; Kershaw et al., 2013; Kershaw & Pender, 2016; Krueger & Reither, 2015; Kwate, 2008). However, they may not be applicable to high-SES Black women, whose

higher levels of income and educational attainment may ostensibly preclude them from resource-deficit based mechanisms. Socioeconomic diminishing returns, such as those observed with obesity, may be due in part to hypotheses that attaining higher markers of SES and prestige is a source of chronic stress, as the prestige hierarchy is embedded in educational and occupational opportunities (Gilbert et al., 2022; Higginbotham & Weber, 1992; Holmes & Zajacova, 2014). Structural racism, its manifestations, and ideological components, including the devaluation of minoritized people, produces inequalities that are specific to Black US individuals even as they attain higher SES and prestige (Assari & Moghani Lankarani, 2018; Bonilla-Silva, 1997). Due not only to structural racism, but also to interactions of sexism and structural racism (Homan et al., 2021; Laster Pirtle & Wright, 2021), it is likely that Black women of higher levels of SES have had to overcome significant barriers to attain higher levels of education and attain higher levels of prestige (Hudson et al., 2020; Hudson et al., 2016). The stress of social disadvantage may trigger chronic and repeated activation of physiological stress responses leading to systemic dysregulation associated with weight gain (Goosby et al., 2018). Intergenerational transmission of disparities in health and stress mediated responses lead to systemic dysregulation and chronic illnesses as well (Browne et al., 2022; Jones et al., 2019). High SES Black US women may contend with many stressors throughout the life course, as they navigate and attempt to gain access to prestigious institutions and occupations (Bell et al., 2021; Dickens & Chavez, 2018; Hudson et al., 2020; Hudson et al., 2016; Walton & Boone, 2019). High-SES Black US women may encounter, not only gendered, but racialized glass ceilings, also referred to as “concrete ceilings” (Dickens et al., 2019; Holder & Vaux, 1998). The stress of upward mobility is not limited to individual level instances of interpersonal discrimination. Impression management, in the form of stereotype threat (the risk of confirming negative stereotypes about one’s group) (Steele & Aronson, 1995), or high-effort coping (sustained, cognitive and emotional engagement to overcome obstacles) (Geronimus &

Thompson, 2004; Hudson et al., 2016), as examples, influences the ways that Black US women present themselves, even in the absence of a specific instance or act of discrimination. As stigmatized individuals, Black US women may be motivated to engage in behavior that reduces their distinctiveness and signals belonging (Dickens et al., 2019). A large body of literature names “code switching” and “identity shifting” as forms of impression management. Code switching refers to a type of “identity shifting” in which an individual shifts between languages and dialects (Cumberbatch, 2021; Dickens & Chavez, 2018; Dickens et al., 2019; Hall et al., 2012). Code switching and identity switching may be implemented by Black women in predominantly White work environments to appeal and assimilate to the “professional” White middle class ideal in an attempt to avoid discrimination and unfair treatment and achieve occupational success (Dickens et al., 2019; McCluney & Rabelo, 2019). The threat of stigmatizations influences an individual’s decision to engage in these and other forms of impression management. More broadly, engaging in these and other methods of impression management reflect an awareness of a broader set of societal norms that Black US women contend with as relative outsiders (Rabelo et al., 2021).

Occupational impression management may influence weight status in several ways. For example, the chronic stress of anticipated discrimination and high-effort coping (Hudson et al., 2016) may cause Hypothalamic-Pituitary-Adrenal (HPA) axis dysfunction, leading to hormonal shifts that influence body weight or, in this same example, Black US women may engage in obesogenic behaviors as maladaptive coping mechanisms in response to chronic stress, such as binge eating and emotional eating (Hatzenbuehler et al., 2013). Conversely, high-SES Black US women may encounter different cultural norms and expectations that influence their perceptions of body weight and body size, compared to the overall population, or Black US women of lower SES. Examinations of the work environment as a domain specific stressor, and

cultural domain are an underexplored, but key potential contributing factor that may influence weight status in high-SES Black women.

### **Current Study**

Using a socioecological framework and intersectional lens (Collins, 2002, 2019), the purpose of this dissertation is to examine the interactions of place and stigma and their associations with weight status among college educated Black US women via two mechanisms: eating behaviors and body perceptions. In three articles, this study seeks to examine the work environment as a space of socioecological significance for high-SES (as measured by educational attainment) Black US women, presenting social, cultural, and structural tensions that shape social standing and may influence weight status for this population. Knowledge gained from this study will contribute to the literature in addressing the persistent disparity in obesity and related comorbidities in Black US women by examining social and environmental factors that may be specific to this segment of the population. In three articles, we seek to answer the question: How does the workplace environment influence weight status in college educated Black US women?

### **Specific aims**

To address the research question, this dissertation has the following specific aims:

Aim 1: Investigate influences of sociocultural and socioeconomic status in sex and gender differences on obesity prevalence, comorbidities, and treatment;

Aim 2: Given the paucity of research related to sociocultural and socioecological influences on weight status for this population, explore the relationships between psychosocial stress, stigma, and workplace environment, including workplace racial

composition, and their potential influence on obesity-related eating behaviors in college educated Black US women who are employed full-time;

Aim 3: Understand weight and shape perceptions in college educated Black US women who work in predominantly White environments and examine the influence of the work environment in these perceptions.

The aims of this dissertation study are accomplished, in part, through a published review of sex/gender difference in obesity prevalence, comorbidities, and treatment. We then address aims two and three through a multi-method series of studies examining the potential impact of the workplace on weight status in college educated Black women as it relates to eating behaviors and body perceptions.

## **Organization**

This dissertation begins with an introductory chapter with an overview of the theoretical frameworks and rationale. We continue with the background and significance of obesity prevalence in the United States, the significance of socioeconomic status in obesity prevalence, and the prevalence of obesity among Black US women of high socioeconomic status. Population definition, setting, and key terms will be reviewed. We review relevant elements of the current literature on Black women with obesity with attention to sociocultural and socioecological factors identified overall, and for high SES Black women. We then interrogate the workplace as a site of cultural contention and identity formation, reviewing the existing literature on the psychosocial impact of the predominantly White work environment on Black women. We conclude with a summary of key concepts and terms, and the connections between them that are important to understanding the context of the studies. Chapter two includes a summary of paper one, a published review of sex/gender differences in obesity within a global



and national context. In chapters three and four, we present a quantitative survey study addressing aim two, and a qualitative interview study addressing aim three.

In Chapter 5, we conclude with a summary of findings for the three studies and discuss their implications for disparities in obesity in Black US women. We outline research, policy, and practice implications, and implications for future research.

Background and Significance

### **Theoretical Frameworks**

Bronfenbrenner's socioecological framework posits that there are multiple levels of influence on human development that are related to one's environment, including micro-, meso-, and exo-systems (Bronfenbrenner, 1977). The model has been adapted for use in public health, including studies of obesity. Adaptations of the model, often represented by nested circles, primarily consists of four levels: individual, relationship, community, and societal (CDC, 2015). The first level identifies individual correlates contributing to disease risk, while the second level includes close relationships such as social peers, partners, and family members. Level three examines community settings such as schools, neighborhoods, and workplaces where social relationships occur. The fourth level identifies broader societal factors such as economic, educational, health and social policies (CDC, 2015). Variations of the socioecological model include intrapersonal, interpersonal, community, organizational, government, societal, and structural domains as separate levels (Ohri-Vachaspati et al., 2015).

### **Intersectionality: Gender/race/class**

In addition to, and as an extension of the socioecological model, this dissertation uses intersectionality in the form of gender/race/class dynamics as a theoretical lens. As the socioecological model posits interactions of place, structure, society, and social relationships are interconnected vehicles that shape health, intersectionality provides a framework to assess health status as it incorporates historical and social-structural factors, providing more comprehensive insight into the ways in which multiple assigned identities intersect, to evince social inequalities at multiple levels (Bowleg, 2012; Hankivsky et al., 2017). At the micro level, individuals experience the intersection of multiple social identities such as race, gender, sexual orientation, socioeconomic status, and disability. This personal experience mirrors and is influenced by macro-level social structures, where interlocking systems of privilege and oppression (like racism, sexism, heterosexism, and classism) operate on a broader societal scale (Bowleg, 2012), evincing not only the socioecological, but also, the *socio-structural* context of health (Bowleg, 2012).

The emphasis on “assigned” identities is to highlight the direction of gendered racialized social status. Bonilla-Silva (1997) frames the United States as a “racialized social system,” where racism patterns life chances and health outcomes across all levels and domains (Bonilla-Silva, 1997). This is an important concept, as it underscores that it is not the individual identity that puts a person at risk for poor outcomes, but the differential treatment the individual receives in all aspects of life within a racialized social system, subject to power structures and dynamics of the dominant group. To this end, this dissertation refers to “*gendered racialized social status*” when discussing the ways in which social disadvantage shapes health outcomes for Black US women. In concert with Bonilla-Silva, gendered racialized social status and the intersectionality framework can be understood within the Matrix of Domination. The Matrix of Domination, conceptualized by Collins (2002), refers to the organization of hierarchical power in a society. A matrix of domination has intersecting systems of oppression, including, but not limited to, race,

gender, social class, sexuality, and citizenship; and multiple domains of power including interpersonal, disciplinary, hegemonic, and structural (Collins, 2002). The interlocking systems of oppression of sexism and racism, combined with class dynamics construct a distinctive and unique experience for Black US women.

In concert with Bronfenbrenner's socioecological model, intersectionality simultaneously utilizes multiple levels of analysis, examining systems of power and their role in perpetuating inequities (Hankivsky et al., 2017). Taken together, this dissertation uses these theories to interrogate place and power, identifying the workplace as a space of simultaneously imposed power structures that shape health.

### **US Adult Obesity and Severe Obesity Prevalence by Race/ethnicity, Gender, and SES**

Obesity is caused by and associated with a multitude of biological, behavioral, and environmental factors that contribute to weight status over time (Schwartz et al., 2017). There are several anthropometric methods to assess the status of obesity, including waist circumference (WC), waist to hip ratio (WHR), and most commonly body mass index (BMI). The BMI is a widely used measure of obesity. While BMI does not directly measure body fatness, it does show a moderate correlation with more precise body fat measurement methods (CDC, 2022a). Obesity is defined as a BMI  $\geq 30$  kg/m<sup>2</sup>. Severe obesity is defined as a BMI of  $\geq 40$  kg/m<sup>2</sup>, or  $\geq 35$  kg/m<sup>2</sup> in the presence of comorbidities such as hypertension or diabetes. The condition is considered a risk factor for several comorbid chronic conditions, including type 2 diabetes, hypertension, and some types of cancer (CDC, 2022a; Cooper et al., 2021). Severe obesity increases the risk of comorbid complications such as coronary artery disease and end stage renal disease (Ogden et al., 2007). Globally, there are more women with obesity than men (Cooper et al., 2021; Ogden et al., 2007). The most recent prevalence estimates from the National Health and Nutrition Examination Survey (NHANES) 2017–March 2020 pre-pandemic

data indicate that obesity prevalence (BMI  $\geq 30$  kg/m<sup>2</sup>) among non-pregnant US adults aged 20 years and older is 41.9%, with no significant differences observed by age or sex/gender overall (Stierman et al., 2021). Severe obesity prevalence (BMI  $\geq 40$  kg/m<sup>2</sup>) was 9.2% overall. However, further examination of this data demonstrates that disparities exist for certain racial-ethnic gender groups. Obesity and severe obesity were most prevalent among Black non-Hispanic adults at 49.9% and 14.0%, compared with 41.4% and 9.5% among White non-Hispanic adults, respectively. At 57.9% and 19.1%, obesity and severe obesity prevalence are highest for Black non-Hispanic women, the only population with statistically significant difference by both sex/gender and race (Stierman et al., 2021). Obesity prevalence was lowest among US men and women living in higher-income households and those with college degrees. Socioeconomic status was measured by family income relative to the federal poverty level (FPL) and level of education. FPL was measured in the following categories:  $\leq 130\%$  FPL,  $>130\%$ - $350\%$  FPL, and  $>350\%$  FPL. Education was measured as less than a high school diploma, high school diploma or some college, and college degree or above. Of note, the 2017- March 2020 was not further stratified by the three-way interaction of race/ethnicity, sex/gender and socioeconomic status. This is important because further stratification facilitates more nuanced analyses of the structural determinants that influence overweight and obesity.

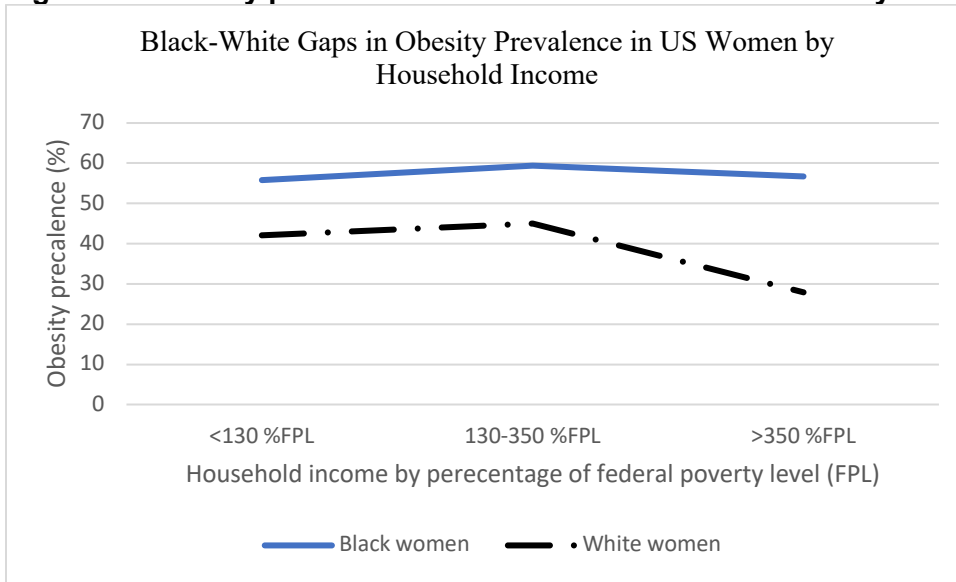
The most recently published prevalence data by race/ethnicity, sex/gender, and socioeconomic status comes from the 2011-2014 NHANES (Ogden et al., 2017b). Obesity prevalence for Black non-Hispanic women with a household income of less than 130% of the federal poverty level (FPL) is 55.8% compared, with 42.0% for White non-Hispanic women. At greater than 350% FPL, obesity prevalence for White non-Hispanic women falls to 27.9%, whereas prevalence is 56.7% for Black non-Hispanic women. Similar patterns are observed with education levels (Ogden et al., 2017). This three-way interaction demonstrates that there are socially constructed differences.

There is some evidence that BMI may not be equally associated with cardiovascular risk at the same levels across populations. Studies have shown that non-Hispanic Black women may have smaller waist to hip ratios, indicating lower central adiposity (Carroll et al., 2008), and more muscle mass (Heymsfield et al., 2016). The practical relevance of these and similar findings is unclear, however, it is suggested that Black women may experience cardiovascular risk at higher BMIs than White women. This dissertation urges the interpretation of these and similar findings with caution, as race is not a biological fact (Roberts, 2023). Race is, instead, a social and political category. It is subjective, fluid in its definitions, and it is a socially constructed tool. Further, race corrections in evaluation and treatment, such as the previously studied correction in estimated glomerular filtration rate (eGFR) have resulted in under treatment and exclusion of resources for Black US patients based on theories of biological differences (Roberts, 2023). Since obesity was categorized as a disease by the American Medical Association in 2013 (Kyle et al., 2016), policy changes have emerged that lead to access to resources based on the association of obesity with cardiometabolic diseases. These resources include providing coverage for additional screening, nutrition services, and treatment (Mylona et al., 2020). While it is arguable, and preferable, that all patients, regardless of BMI have access to such resources, we urge caution in endorsing findings that may result in the exclusion of Black women from receiving these services within the current payer policies. While there are debates regarding BMI thresholds for disease risk in Black US women, a recent study found the association of cardiovascular mortality with obesity is strongest in Black US women, underscoring a critical need for understanding and addressing mechanisms for persistent disparities in obesity for this population (Shockley & Burrell, 2024).

## **Socioeconomic Status**

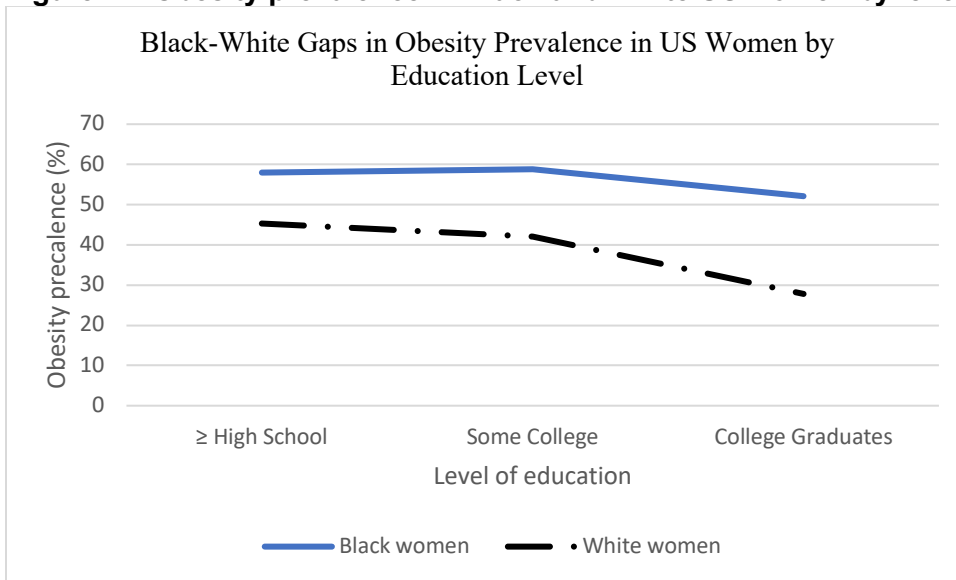
Socioeconomic status (SES) is typically assessed in three ways: income (individual and household), education level, and occupational prestige (APA, 2018). As previously mentioned, available data regarding obesity prevalence by race/ethnicity, gender, and various measures of SES reveal the largest gap at higher levels of SES (See Figures 1.1 and 1.2, adapted from (Ogden et al., 2017). In Figure 1.1, both Black and White women have higher prevalence of obesity at lower levels of family income, measured by percent relative to the federal poverty level (FPL). However, at 350% FPL and greater, White women experience a steep decline in obesity prevalence, as expected, whereas Black women's prevalence remains relatively constant, and is similar to Black women with household incomes less than 130% of the FPL. Figure 1.1 demonstrates Black-White gaps in US women by level of education. While both Black and White women experience a decline in obesity prevalence at higher levels of education, Black college educated women demonstrated less of a decline in BMI than their White peers. As with family income in Figure 1.2, the widest gaps are at the highest levels of education. Global trends for obesity in high-income countries such as the United States suggest that BMI is negatively associated with socioeconomic status in women (Cooper et al 2021).

**Figure 1.1 Obesity prevalence in Black and White US women by household income**



**Note.** FPL = Federal Poverty Level

**Figure 1.2 Obesity prevalence in Black and White US women by level of education**



It is important to note, that while socioeconomic status is a widely used measure, there are limitations in its scope as an indicator of resource allocation among minoritized individuals related to income, education, and wealth (Boen, 2016). This is due to the deeply rooted systems

of marginalization that present obstacles to obtaining wealth for Black and other minoritized individuals (Bell et al., 2018; Gilbert et al., 2022). In some ways, this may complicate resource-based arguments. However, only 14% of the Black US population has a college degree (Nichols & Schak, 2018). Therefore, Black individuals with a college level education or higher can be considered of high-socioeconomic status relative to the general Black population. Racial disparities within similar SES groups, such as Black and White women with the same level of education, warrant investigation. Significant interaction effects between race and educational attainment were observed in a recent analysis of National Health and Nutrition Examination Survey (NHANES) data. Higher educational attainment was associated with a decrease in BMI among White adults, but not among Black or Mexican American adults. The same study observed that Black adults with a college degree or higher were estimated to have higher BMIs than White adults with a high school education or lower. Consistent with previous analyses, the largest Black-White gap in BMI was observed at the highest level of education (Ciciurkaite, 2021).

A 2019 study on Black-White differences in associations of educational attainment and exercise frequency found that higher educational attainment was associated with higher exercise frequency for White women, but not Black women. However, the underlying mechanisms behind the differential effects were not investigated (Assari, 2019). Understanding social, cultural, and ecological factors unique to high SES women will generate important insight and data on the underlying mechanisms producing differential returns of education in Black and White US women on weight status.

### **Population: College Educated Black US Women**

In our exploration of socioeconomic status as a protective or not protective factor, our population of interest is college-educated Black women. Acknowledging the complexities of



socioeconomic status described in the previous section, we selected this population for several reasons.

First, the Black middle class has long been considered an “intersectional paradox” when it comes to social advantage and, specifically, health (Schulz & Mullings, 2006, p. 138; Jackson & Williams). It is important to note that the definition and composition of this group has changed over time, in conjunction with social and political movements in the United States. The Black middle class emerged during the pre-Reconstruction era, as a small group of predominantly city dwelling professionals who provided services to the Black working class. During the great migration from southern farms to northern cities, the Black middle class expanded, as the number of Black owned business grew. In the 1960s and 1970s, in concert with government intervention policies, the number of college-educated Black US individuals increased, and representation in professional and managerial positions grew, further solidifying class differentiation (Schulz & Mulling, 2006; Jackson & Williams). Still, the racialized social system that underlies the American meritocracy system limits the returns that successful Black US individuals can receive via educational and occupational opportunities. While it is useful to analyze differences in health outcomes by individual social characteristics, it is also important to understand how differences in social class intersect with race and gender. General patterns of income indicate that household income rises with each level of higher education. However, Black US women tend to reside in households with lower median incomes than their similarly educated, and lower educated White counterparts. This is in addition to evidence that women of all racial and ethnic groups earn less at every level of education than their male counterparts. Additionally, there are varied returns in social support as upwardly mobile Black US women are more than twice as likely as White women to provide resources to their family and close personal contacts than they are to receive it (Bell et al., 2021; Higginbotham & Weber, 1992;

Hudson et al., 2020; Schulz & Mullings, 2006). Extending this to the current study on weight status, in a recent study of 451 Black US college graduates with a BA or higher, Bell et al. (2021) explored associations of “uplift stress,” a phenomenon where minoritized individuals experience psychosocial stress from upward social mobility and responsibilities to assist their families and communities, with BMI. The findings indicated that Black women who reported giving and receiving familial financial assistance also had higher BMI than those who neither gave nor received familial financial assistance ( $\beta = 6.20$ , s.e. = 1.76,  $p \leq .05$ ). The authors concluded that their finding contributed to the literature that supports diminishing returns hypotheses by examining one of the mechanisms that contributes to the Black-White gap at higher levels of SES. Authors also noted that structural racism is implicated in “uplift stress,” as Black college graduates are less likely to come from families with wealth, and therefore are tasked to provide familial assistance.

The multifaceted and fluid nature of class definition may, in some ways, complicate population definition. This is to say that high-SES could refer to individuals who are college educated, earn a high income, are in prestigious occupations, possess wealth, or are considered upper or middle class. This is often illustrated by Black-White differences in infant mortality by income and education level, but the same continues to hold true for Black-White differences in obesity and related comorbidities, such as hypertension. Also of note related to population definition, we specifically include US born individuals. Similar to literature that asserts that foreign-born Black women in the US have better maternal health outcomes than US born Black women (DeSisto et al., 2018), recent studies also found that foreign born Black individuals have significantly lower odds of obesity which were not explained by income, education, or smoking status. The adjusted odds ratios of obesity relative to US born Black individuals were 0.51 and 0.41 for Caribbean/South American born, and African born participants, respectively (Mehta et al., 2015).

This study selected college education as the measure of high socioeconomic status for multiple reasons. First, contemporaneous individual and household income are generally unstable measures, particularly in Black US populations due in part to a lack of generational wealth, and job instability related to structural discrimination as examples of a complex constellation of factors. Second, income measures vary across US regions. For example, the 2022 FPL is \$13,590 for an individual. 400% of the FPL is \$54,360, indicating a high-earning individual. However, it is arguable that \$54,360 serves individuals living in various US regions differently based on cost of living. This may complicate resource-based discussions based on individual income. Third, while Black US women earn less than their similarly educated counterparts by race/ethnicity and gender, there is a positive association between education level, occupational prestige, and income.

In this study, college education is defined as an Associate's degree or higher. This definition was selected because the Black-White gaps referenced in the study from NHANES (Ogden et al., 2017a) stratify by education level using the categories of less than high school, some college, and college graduate, with the latter including participants with Associate's degrees. In designing our study, we acknowledged that those with a bachelor's or graduate degree have different results than those with an Associate's degree. However, based on the maternal-child health literature indicating that Black women with graduate degrees have the worst health outcomes (DeSisto et al., 2018), we do not expect that a higher college degree will provide any protection related to BMI, stress, or eating behaviors. In paper three, we engage college educated Black professionals in predominantly White work environments. This population was selected due to the existing literature on image formation in the predominantly White professional environment, as well as the evidence demonstrating that Black US individuals of higher educational attainment and income are more likely work in predominantly White work environments, discussed in following section.

Finally, sex and gender are often conflated in the literature. Conventional reporting often excludes transgender and gender non-conforming individuals. This dissertation acknowledges this, and makes the following distinctions: sex is biological, and gender is a social construct. When referring to studies that use sex, we use the term sex/gender unless otherwise specified with rationale by the author. This is because even nationally representative datasets, such as NHANES use the two terms interchangeable in reporting. When referring to gender, we use the term gender and woman/women. As such, our study population of Black US women was intended to be inclusive of cisgender and transgendered women. The eligibility surveys for papers two and three included transgender and gender-nonconforming as categories.

### **Setting: The Work Environment**

The workplace is an underexplored social determinant of health (Silver et al., 2024). The social determinants of health are the places and conditions under which we live, work, play, worship, age and learn that affect a range of health-related outcomes and disease risks (Prevention & Promotion, 2020). While underexplored, stress in the workplace has been linked to poor health outcomes. Many people view work as a major stressor in their lives (NIOSH, 2014). Research demonstrates that women generally report more stress at work than men, owing to a myriad of factors (Holmgren et al., 2009). The work environment may play an important role in obesity outcomes for college educated Black US women, particularly in the context of workplace racial composition.

Predominantly White workplaces are spaces in which Whiteness is privileged in many ways (Wingfield & Alston, 2014). Previous research has described the majority of professional work environments as “normatively White” and middle-class, where “professionalism” is understood as synonymous with Whiteness (Anderson, 2011; Wingfield & Alston, 2014). Perceptions of Black women’s “visible identities” influence and inform the ways in which they are perceived and

treated at work (McCluney et al., 2021). For example, Black women's hairstyles influence their perceived professionalism, job stability, and their likelihood of being hired (Opie & Phillips, 2015). Black women may engage in identity negotiation as it relates to career opportunities and trajectories related to upward mobility. Upward mobility is broadly defined as the degree to which an individual is able to achieve status that is higher than their parents. More specifically, it is defined as one's ability to overcome barriers of race, gender, and class (Robinson & Mullins Nelson, 2010) (p. 1170). The intersection of the gender, race, class power structures present additional obstacles for Black women in their pursuit of upward mobility due to their marginal status within these power dynamics (Collins, 2002; Higginbotham, 2001; Higginbotham & Weber, 1992). Education and occupational prestige are considered primary strategies for upward mobility for Black women (Robinson & Mullins Nelson, 2010).

Black professionals in White work environments ultimately engage in impression management at both the personal and organizational level. Wingfield & Alston (2014) and others (Collins, 1997). describe these as "racialized tasks," wherein Black professionals find themselves in the position of upholding the organization's image as an equitable and diverse environment. To this end, Black professionals can experience a "triple jeopardy" in predominantly White work environments. This refers to stress related to minority status, tokenism, and individual behaviors (Pettigrew & Martin, 1987). In a study of 167 Black leaders and professionals assessing the effects of tokenism and workplace racial composition on psychological wellbeing, there was a significant positive association with racial tokenism and depression, whereas high opposite gender representation was associated with higher levels of anxiety (Jackson et al., 1995). A recent study of 528 college-educated Black Americans revealed that there was a "cost" to upward social mobility such that the experiences of racism and unfair treatment had deleterious mental health effects among this population, therefore diminishing the returns of socioeconomic status on health (Hudson et al., 2023).

A recent qualitative study of college educated Black women (bachelor's degree or higher, majority with master's degrees) with natural hairstyles revealed that early-career Black women perceived natural hair bias and discrimination in the workplace as a threat to their career opportunities. Appearance and professionalism were prominent themes as participants expressed experiencing a "double standard" compared to their White counterparts related to clothing and hair color, and being especially mindful of their appearance and behavior in the workplace, described by some as a "uniform," even in ostensibly business casual environments (Summers et al., 2022).

The literature related to predominantly White institutions that extends the examination between institution and stress to weight status and related concepts is largely limited to educational settings. For example, a study of 609 Black women enrolled in a predominantly White university revealed that awareness of gendered racial stereotypes held by others predicted negative mental health outcomes, low self-care, and greater use of alcohol as a coping mechanism (Jerald et al., 2017). This is an important distinction, as Black women ages 35-64 have the highest allostatic load scores (Geronimus et al., 2006) and are of full-time employment age (Statistics, 2022). Research in this area is limited, but across populations, discrimination in the workplace has been linked to psychological distress (Keller et al., 2023).

In a study of 1775 Black US adults examining associations between SES, workplace racial composition and perceived discrimination, results demonstrated that high education and household income were positively associated with working in a predominantly White work setting, which was then positively associated with higher perceived discrimination. No sex/gender differences were found in the association between SES, workplace racial composition, and perceived discrimination. These results indicated that workplace racial

composition may be a mechanism by which high SES increases discriminatory experiences for Black men and women (Assari & Moghani Lankarani, 2018).

## Stigma

Stigma is a multifaceted construct that includes concepts of discrimination, stereotypes, and bias (Link & Phelan, 2001; Phelan et al., 2014). Stigma is an important line of inquiry in discourse relating to obesity because it can be consequential to both producing risk factors for obesity as well as in treatment for other potential comorbidities. This includes but is not limited to discussions of weight bias and of gendered racism. Stigma refers to the social degradation of individuals who have been deemed abnormal by the dominant social norms of their context and environment (Goffman 2009). Indeed, Phelan and Link (2001) argue that stigma exists when its interrelated components converge: (1) distinguishing and labeling human differences; (2) dominant group associates labeled persons or people with undesirable characteristics and, often, negative stereotypes; (3) the labeled persons are placed into distinct categories to accomplish a degree of separation from the dominant group, creating an “us” from “them” dynamic; (4) Labeled persons experience status loss, unequal treatment, and discrimination that leads to disparate and unequal outcomes. Further stigmatization is contingent upon access to social, political, and economic power that allows the dominant group the authority to identify, construct, and assign differences, to construct stereotypes, to separate the labeled persons into categories, and to exercise the full extent of rejection, exclusion, discrimination, and disapproval (Link & Phelan, 2001).

Unlike other stigmatized conditions such as HIV and sexually transmitted diseases, obesity discourse contends with elements of visual stigma, which translate into a stigmatization of health status in both the public and medical spheres (Clair et al., 2016). Acknowledging this, consideration of stigma is important in conversations of obesity in Black populations. Positioning

Black bodies as deviant, particularly Black female bodies, is compounded by the “deviant” and burdensome discourse of obesity at baseline (Collins, 2002; Strings, 2015, 2019). With this history of, arguably, deep-rooted, multifaceted stigma, it is important to pay careful attention to the social, cultural, and historical context when researching obesity in Black US women. Lastly, despite problematic framings of obesity, and questions regarding its classification as a health condition (Campos et al., 2006; Saguy, 2013; Strings, 2015), rising rates of obesity both globally and nationally warrant investigation. This is especially true, as prevalence is more prominent in certain sociodemographic groups, evincing larger structural and societal issues.

Stigma can affect health through numerous pathways on macro and micro levels, and through upstream and downstream effects (Clair et al., 2016; Hatzenbuehler et al., 2013). In this way, the definition of stigma transcends the inter and intrapersonal pathways, and becomes a dimension of social stratification (Hatzenbuehler et al., 2013; Phelan et al., 2014). For example, downstream micro-level mechanisms such as perceived discrimination and stigmatization can affect health both directly and indirectly through chronic stress that leads to hormonal dysregulation due to cumulative stress burden. Additionally stigmatized individuals may cope with experiences by engaging in maladaptive coping mechanisms such as binge eating or excessive alcohol use (Hatzenbuehler et al., 2013). Operating in a range of settings, upstream mechanisms involve unequal distribution of resources. These are not limited to material resources. For example, stigma can lead to differential treatment in healthcare settings through formal and informal interactions, contributing to disparate outcomes (Phelan et al., 2014). In housing, education, and employment, stigma can create unequal access to knowledge and wealth, diminishing life chances for stigmatized individuals and groups, and contributing to health disparities (Goffman, 2009; Hatzenbuehler et al., 2013); (Clair, 2018; Clair et al., 2016; Link & Phelan, 2001). Self-stigmatization refers to internalized negative stereotypes and social



perceptions of an individual's stigmatized status. Knowledge of stigmatized status may result in efforts to manage their devalued identity (Hatzenbuehler et al., 2013).

### *Gendered Racial Stereotypes: "Controlling images"*

Gendered racial stereotypes for US Black women extend throughout US history, beginning with slavery, and "permeate the social structure to such a degree that they become hegemonic, namely, seen as natural, normal, and inevitable. In this context, certain assumed qualities that are attached to Black women are used to justify oppression" (Collins, 2000, p. 5). Collins (2000) conceptualizes gendered racial stereotypes as "controlling images." Prominent gendered-racial stereotypes include the jezebel (hypersexual and objectified), the welfare queen (hyper-reproductive, irresponsible, a strain on the system), the angry black woman (militant, angry, unapproachable), the Black lady (highly educated, too assertive, asexual, too dedicated to work, taking jobs of white men), and the mammy (asexual, unfeminine, caretaker), the matriarch (unfeminine mother figure who is strong, independent, aggressive, and exists in relation to her children) (Collins, 2000; Rosenthal et al, 2016; Taylor, 1999). Taylor (1999) asserts that by framing this latter character as strong and in control, she is seen as responsible for the successes and failures of her children.

### *Gendered Racial Microaggressions*

Lewis et al. (2013) defines gendered racial microaggressions as "subtle and everyday verbal, behavioral, and environmental expressions of oppression based on the intersection of race and gender" (p. 51). Microaggressions in this context are common daily indignities, which may or may not be intentional, reflexive of gendered racial stereotypes. Microaggressions often occur as brief interactions. Microaggressions are significant because their occurrence represents small, but frequent contributions to the cumulative stress burden.

## **Impression management**

According to Lee & Hicken (2016), across all socioeconomic status Black individuals express the need to engage in “impression management,” also referred to as respectability politics. Respectability politics is a phenomenon in which Black individuals adjust their appearance and behavior to conform to dominant White norms in order to dispel dominant stereotypes and avoid discrimination (Lee & Hicken, 2016) p. 422). It is an effort to present oneself as worthy of respect, good service, and opportunities. This was especially true among Black individuals in prestigious, White-dominated spaces such as colleges and universities and professional work environments. Engaging in respectability politics is a form of vigilance, which is associated with negative health outcomes. Vigilance refers to chronic anticipatory and ruminative stress as a response to living in a racialized society as a minoritized individual (Hicken et al., 2018). Vigilance activates the physiological stress response causing cumulative wear and tear on the body, potentially causing hormonal dysregulation that contributes to obesity, as well as maladaptive obesogenic coping behaviors. In this context, vigilance is the constant anticipation that one will be discriminated against or treated unfairly. Research demonstrates that chronic vigilance is associated with depressive symptoms, poor self-rated health, sleep disturbance, and hypertension (Hicken et al., 2018).

In their 2018 study examining the role of vigilance on weight status using a cultural racism lens, Hicken et al. found that Black women had the highest mean BMI and WC compared with all other groups, as well as the highest levels of vigilance. Among Black women participants, there was an association between vigilance and WC, but not between discrimination and WC. Conversely, among White women there was no association between vigilance and WC, but there was an association between discrimination and BMI. Interestingly, these associations of

vigilance, discrimination and weight status occurred for women but not men. These findings may support previous assertions of intersectional appraisals of discrimination and health.

## **Obesity overview and mechanisms**

### *Stress pathway*

Stress, broadly, is experienced when the demands exceed an organism's ability to cope.

McEwen states there are three types of stress, broadly—good stress, tolerable stress, and toxic stress (McEwen, 2017). I offer that these three types of stress can be understood in the context of job acquisition and loss. As an example in the context of our population and setting, the stress of starting a new job can be considered good stress, as the situation may be stressful, but the outcome is good, the stress associated with beginning a new job is temporary, and there are presumably resources (such as training and orientation) to ameliorate the stress (McEwen, 2017). An example of tolerable stress may be job loss. Stress is considered tolerable when the outcome is negative, but there are resources to ameliorate or mitigate the stressor (McEwen, 2017). Such resources may be financial, such as savings, a second income in the household, and network support—including financial support from family members and other close contacts outside of the immediate household. They may also be social, such as network connections to acquire a new job. Conversely, job loss may also be an example of toxic stress. Toxic stress occurs when one is exposed to a negative stressor but does not have the resources to recover. Toxic stress may also occur with repeated, constant exposure to tolerable stress.

Regarding the physiological pathway, it is toxic stress that causes the hormonal dysregulation referred to as allostatic load. Per McEwen (2017), the brain and body respond to changing social and physical environments via physiological response. The sympathetic and parasympathetic nervous systems, the hypothalamic- pituitary- adrenal (HPA) axis, immune system, metabolic hormones and “molecular processes within all organs, including the brain,

operate non-linearly” to promote adaptation. Activation of these systems achieves stability, or “allostasis” as a response to a stressor. However, these mediators can also promote *pathophysiology* when repeatedly activated and overused, causing allostatic load/overload (McEwen, 2017, p.2). Put simply, allostatic load is the physiologic “wear and tear,” the accumulation of physiological disturbances that result from repeated, chronic stress exposure.

Allostatic load leads to elevations in cortisol, inflammatory markers, and blood sugar, all of which may contribute to metabolic syndrome and obesity (McEwen, 2017). It is measured using allostatic load scores, a composite measure of cardiovascular, metabolic, immune, and inflammatory measures and biomarkers. The physiological effects of stress exposure accumulate over time, throughout the life course.

Life course perspectives, such as the weathering hypothesis (Geronimus et al., 2006) assert that Black individuals experience early health deterioration as a result of the cumulative impact of chronic, repeated stressful experiences associated with social, economic, and political adversity and marginalization (Geronimus et al., 2006) over time, beginning as early as in utero (Goosby et al., 2018). This is to say that the stress inherent with living in a racialized, racist society that systematically stigmatizes and disadvantages Black women may “disproportionate physiological deterioration, such that a Black individual may show the morbidity and mortality typical of a White individual who is significantly older” (Geronimus et al., 2006, p. 826). Further, Geronimus posits that the physiological deterioration accumulates, producing a greater Black-White gap in health with age, which begins starkly widening in adulthood. Racial differences in allostatic load are present in adolescence but are the largest between 35 and 64 years of age. Geronimus’ research demonstrates that Black women within the 35-64 year old age group have the highest allostatic load scores compared with Black men, White women, and White men. Higher allostatic load scores were found in both poor and non-poor Black women and had the

highest “excess scores” compared with their male or White counterparts of comparable socioeconomic status. Therefore, the Black-White gaps were not explained by racism associated poverty status. Geronimus’ weathering hypothesis has important implications on the impact of chronic stress and social relationships on health. In a two-way interaction analysis of multi-dimensional stressors and gender on BMI, greater relationship stress, financial stress, and cumulative stress burden were associated with higher BMI among women, but not men (Cuevas et al., 2020).

In addition to the physiological pathway of systemic dysregulation, toxic stress contributes to obesity via the behavioral pathway, related to maladaptive coping behaviors (Goosby et al., 2018; McEwen, 2017). There is a known relationship between stress, coping, and obesogenic behaviors. Possible mechanisms contributing to this relationship include decreases in physical activity, changes in stress-related hormones, and changes in eating patterns such as emotional eating and binge eating (Chao et al., 2016; Goosby et al., 2018; McEwen, 2017; Sinha & Jastreboff, 2013).

### *Eating Behaviors and Phenotypes*

A mechanism for the association between psychosocial stress and weight status may be the impact of stress on eating behaviors, and in turn, energy balance. Black US women may be more likely to engage in stress-related eating than Black US men (Fowler-Brown et al., 2009; Sims et al., 2008).

Emotional eating is characterized by eating behavior that occurs as a response to negative emotions such as stress, anxiety, anger, depression, and loneliness (Chao et al., 2016). Binge eating is characterized by consumption of a large amount of food within a specific amount of time, as well as the feeling of loss of control overeating within the episode (Association, 2014;

Berkman et al., 2016). Binge eating disorder (BED), is defined as recurrent binge eating, with episodes occurring at least once a week for 3 months. Approximately 5% to 10% of adults in community samples report binge eating (Abraham et al., 2014; Mitchison et al., 2014). These eating phenotypes are related, but distinct. Emotional eating is positively associated with binge eating. However, emotional eaters may not be binge eaters as they eat in response to a negative emotion but may not feel a loss of control or overeat (Chao et al., 2016).

The social and physical environmental context in which individuals live may contribute to the stress/eating behaviors pathway. Previous studies have made this assertion, citing low SES associated factors such as food insecurity and food deserts. In studies of low-income Black women, participants with low food security had higher emotional eating and depression (Fowler & Giger, 2017; Sharpe et al., 2016). Food insecurity was also associated with binge eating in a sample of Black Americans, two-thirds of which were female (Goode et al., 2021). However, Black women of high SES may experience social and environmental stressors that precipitate symptoms of psychological distress (i.e.: psychosocial stress, depression and anxiety symptoms) that contribute to the stress/eating behavior pathways as well, independent of issues relating to food insecurity and food deserts. This dissertation hypothesizes that the work environment may be one of the social and environmental stressors for this population.

### *Emotional Eating*

Multiple studies have demonstrated that perceived stress is positively associated with emotional eating in Black women (Diggins et al., 2015; Fowler-Brown et al., 2009; Longmire-Avital & McQueen, 2019; Risica et al., 2021; Volpe et al., 2024). In a weight management randomized trial of 331 Black women with a mean BMI of 36 kg/m<sup>2</sup>, measures of emotional eating were associated with BMI and WC at baseline, as well as change in BMI at follow-up. While women

reporting frequent emotional eating experienced an initial weight loss with the intervention, they experienced weight regain above baseline by the end of the study (Risica et al., 2021).

A cross-sectional study assessing associations of racism related stress and emotional eating in Black US female college students found that race-related stress was correlated with emotional eating (Longmire-Avital & McQueen, 2019). Similarly, a study of Black female college students found that experiences of “contextualized stress,” interacted with emotional eating to influence BMI (Diggins et al., 2015). Researchers refer to this phenomenon as Minority Status Stress (MSS). MSS is described as a “net stress engagement,” which includes cumulative stressors including racism and discrimination, microaggressions, and questions of belonging to the college community, challenging well-being and psychosocial identity (McClain et al., 2016).

### *Binge Eating*

Black women may experience higher rates of binge eating compared to White women (Goode et al., 2018; Lydecker & Grilo, 2016; Marques et al., 2011). Studies suggest that  $\geq 30\%$  of Black women with obesity report binge eating behaviors (Goode et al., 2020; Wilson et al., 2012). Binge eating is associated with increased risk for metabolic disorders (Abraham et al., 2014; Succurro et al., 2015). It is important to distinguish binge eating behaviors from the diagnosis of binge eating disorder (BED). BED is a new diagnosis in Diagnostic and Statistical Manual of Mental Disorders- 5<sup>th</sup> edition (DSM-5). Binge eating behaviors have been associated with higher BMI (Goode et al., 2018; Goode et al., 2021; Hudson et al., 2007), and are a risk factor for susceptibility to BED. While binge eating behaviors may be common, the diagnosis of BED is far less common. It is estimated that the lifetime and 12-month prevalence of BED is 2.8% and 1.2%, respectively (Udo & Grilo, 2022). However, the prevalence of BED in individuals with obesity seeking weight reduction is higher, reported as high as 50% (Hudson et al., 2007). Additionally, because a formal diagnosis of BED requires psychiatric evaluation, the

term “objective binge eating” (OBE) has been used to describe individuals who meet the behavioral criteria for BED, without formal diagnosis, and “subjective binge eating” (SBE) has been used to describe a manifestation of binge eating in which individuals experience loss of control without objective overeating (Abraham et al., 2014). For the purpose of this study, we refer to binge eating (BE) inclusive of the concepts of binge eating behaviors, binge eating disorder, subjective binge eating, and objective binge eating.

### *Weight and Shape Perceptions*

Perception, albeit weight, shape, or size perception, is an aspect of the multidimensional concept of body image. How a person perceives their weight and shape influences their engagement in weight related behaviors (Hendley et al., 2011). For example, individuals who perceive themselves as overweight are more likely to attempt weight loss. Differences in weight perception between Black and White women have been well documented (Hendley et al., 2011; Paeratakul et al., 2002; Yancey et al., 2006), with some studies suggesting that Black women are more likely to underestimate their weight than their White counterparts. Overestimations of height and underestimations of weight may be a contributing factor to weight misperception (Johnson et al., 2009). Additionally, health literacy has been posited as a contributing factor. Researchers suggest that cultural differences in self-perceived versus ideal body weight may play a role in influencing individual level perceptions and behaviors (Bennett & Wolin, 2006; Chithambo & Huey, 2013; Pickett & Peters, 2017; Powell & Kahn, 1995; Sa et al., 2020).

In their analysis, Lee et al. (2018) found that non-Hispanic Black women had the highest underestimation of bodyweight than any other gender/racial group. In their discussion, authors concluded that underestimation of bodyweight contributed to higher prevalence of obesity in this population. Additionally, non-Hispanic Black women’s underestimate of bodyweight may be explained by racial differences in body image perception, in which Black women have more



body positivity that precludes them from the pressure to lose weight. Sa et al (2020) found that Black women attending Historically Black Colleges and Universities (HBCUs) were more likely to underestimate their bodyweight than Black women attending non-HBCUs. Similar findings were observed among White women attending HBCUs (Sa et al., 2020). Bell and Blackman Carr (2020) found that race differences in underassessment of weight were only observed among non-college graduate women ( $z$  score = 0.43, SE = 0.05,  $p \leq .05$ ). There was no association between college graduate status and weight underassessment in Black women. Findings indicate that more context is necessary to understand the associations of weight perception and socioeconomic status in this population.

Boutte (2022) examined associations of BMI, ethnic identity, body appreciation, and disordered eating behaviors and attitudes in a sample of 191 Black college women. In contrast to other studies in this review, specifically Lee et al., authors concluded that body appreciation partially mediated the relation between BMI and disordered eating behaviors, indicating that participants with higher BMIs also reported lower body appreciation, which, in turn was associated higher reports of disordered eating symptoms. Additionally, ethnic identity, defined by the authors as the ascription or lack of ascription to Eurocentric beauty ideals, was not a significant moderator of the association between body appreciation and BMI. In their discussion, the authors noted that contrary to previous hypotheses in the literature, study results suggest that Black women experience body dissatisfaction and disordered eating (Pickett & Peters, 2017). Despite prevailing notions present in the literature that Black women are protected from body image concerns because they find a larger body size acceptable (Roberts et al., 2006), the study results demonstrate that Black women are not immune to weight and body image concerns. Further qualitative investigation is needed in this population to determine how social context influences weight and shape perceptions. These findings are similar to previous studies that demonstrate that Black women college students report varying degrees of body satisfaction

depending on their degree of acculturation to White norms and social environments, such that higher acculturation is associated with greater reports of body dissatisfaction (Awad et al., 2020; Hesse-Biber et al., 2010).

## Summary

Black US women are disproportionately impacted by obesity. The largest gaps in this disparity are present at the highest levels of income and education. Due to their gendered racialized social status, a key concept that may influence weight status in college educated Black women is upward mobility. For Black US women, educational attainment and occupational success are the pathways for upward mobility. But in navigating these opportunities, college educated Black US women may encounter challenges and stressors, including discrimination. Many of these challenges may be met in the workplace- an underexplored social determinant of health.

This dissertation uses a socioecological framework with an intersectional lens to examine the influence of the workplace environment on weight status in college educated Black women.

These frameworks were selected because they facilitate understanding of how constituting and mutually enforcing power structures influence health for college educated Black US women in the context of the physical and social environment of the workplace. The concept of stigma is also central to this proposed dissertation, as we posit that Black US women's outsider status in predominantly White work environments may influence weight status in two ways: (1) psychosocial stress and maladaptive eating behaviors, and (2) impression management and body weight, shape, and size perceptions. In order to explore these concepts, we look at the work environment as a space of socioecological significance- first as a stressor that may influence eating behaviors, and second, as a space that may influence self-perception as it relates to body perceptions, particularly in terms workplace racial composition.

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## CHAPTER 2: SEX/GENDER DIFFERENCES IN OBESITY PREVALENCE, COMORBIDITIES, AND TREATMENT

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Ashley Cooper conceptualized the study, curated the data, wrote the majority of the sections, reviewed and revised the contributions of the co-authors, with the support of Ariana Chao in an advisory role.

## Introduction

Clinicians, researchers, and policy makers have increasingly recognized the importance of sex and gender on health (Mauvais-Jarvis et al., 2020). Sex is the classification based on biological and physiological attributes including organs and functions that stem from the chromosomal complement (World Health Organization, 2021). Gender is a person's self-representation, or how that individual is responded to on the basis of social constructions. Sex and gender are distinct concepts but their influence on health outcomes is often linked (Springer et al., 2012). There are practical challenges of separating biological versus social causes of differences between men and women due to gendered socialization that begins at birth (Springer et al., 2012). In this paper we use the phrase sex/gender to reflect this overlap, sex to indicate primarily biological differences, and gender to describe predominantly psychosocial influences.

Consideration of sex/gender in research is essential for addressing knowledge gaps and producing more accurate and comprehensive information and clinical care. Guidelines from funding agencies such as the Canadian Institutes of Health Research (Canadian Institutes of Health Research), European Commission (European Commission), and US National Institutes of Health (Tannenbaum et al., 2019), require sex/gender to be considered in study designs, data collection, analyses, and reporting of findings. Some academic journals, such as *Nature* and the *Journal of the American Medical Association*, have included editorial policies that authors include sex and gender analyses when appropriate. Inclusion of sex/gender in research can help to increase transparency, promote inclusion, and foster insights into the role this factor may play in disease processes.

Obesity is a heterogeneous condition impacting 650 million adults globally, (World Health Organization, 2018) yet sex and gender are rarely considered in the clinical care of this

disease. Sex/gender differences in obesity have been reported in various aspects of the course of the disease including overall prevalence, co-morbidities, and treatment. A better understanding of sex and gender as modifiers of obesity is an important step towards improving the prevention and treatment of this disease. This review examines recent literature regarding the influence of sex and gender on obesity prevalence, comorbidities, and treatment.

### **Prevalence**

Globally, 11% of men and 15% of women have obesity (World Health Organization, 2018). Within certain regions, there are significant sex/gender differences in prevalence. Transitions over time in obesity prevalence within countries have been grouped as a relatively predictable set of four stages in an 'obesity transition' framework (Jaacks et al., 2019). The framework incorporates epidemiological differences in prevalence based on sex/gender, socioeconomic status, and age.

Stage 1 is characterized by a higher prevalence of obesity in women compared to men, in individuals with higher compared to lower socioeconomic status, and adults compared to children (Jaacks et al., 2019). Several countries in sub-Saharan Africa and South Asia are at this stage (Table 2.1). For example, in sub-Saharan Africa, there is a regional pattern of rapidly increasing obesity prevalence in women. The obesity prevalence is 1.9% in men and 9.0% in women in Uganda (Abarca-Gómez et al., 2017), and is 4.8% in men and 17.3% in women in Ghana (Abarca-Gómez et al., 2017). Lartey et al. (2019) found that in addition to female sex, urban residence and high household income were associated with higher odds of overweight/obesity.

In Stage 2, there is a large rise in the prevalence of obesity among adults, a lesser increase among children, and a narrowing of differences by sex/gender and socioeconomic

status. Several Latin American and Middle Eastern countries are at this stage (Table 2.1). High-income East Asian countries are also at this stage, though with a much lower overall prevalence of obesity. For example, when based on a BMI of  $\geq 30$  kg/m<sup>2</sup> for adults, the prevalence of obesity in Japan is 5.0% and 3.9% for men and women, respectively, and in China is 6.1% and 6.8% for men and women, respectively (Abarca-Gómez et al., 2017).

Stage 3 is defined when the prevalence of obesity among people with lower socioeconomic status surpasses those with higher socioeconomic status, and plateaus in obesity may be observed among women with high socioeconomic status and children. Most European countries and the US are at this stage (Table 2.1). In the US, the obesity prevalence overall is similar for men (43%) and women (42.1%), yet gender specific differences in prevalence occur when stratifying based on race and ethnicity (Hales et al., 2020). For example, the prevalence of obesity in non-Hispanic Black women is 56.9% (Hales et al., 2020). Aside from these overall disparities in obesity prevalence, in the US, there are also significant differences in the prevalence of severe obesity (BMI  $\geq 40$  kg/m<sup>2</sup>). In this category, the overall prevalence for women (11.5%) was statistically significantly higher than men (6.9%) (Hales et al., 2020). Stage 4 is defined as a declining of prevalence. No countries are at this stage.

**Mechanisms.** Several potential mechanisms related to psychosocial gender and/or physiological sex may explain differences in obesity prevalence between men and women.

***Sociocultural, environmental, and psychological.*** Sociocultural, environmental, and psychological mechanisms associated with gender norms and gender identity contribute to differences in obesity prevalence between men and women. There are region specific customs, norms, and beauty standards that influence eating and physical activity behaviors. Sex/gender differences in eating behaviors are evident beginning in school-age children, which may be related to sociocultural influences in appetite traits as well as parental feeding attitudes (Keller

et al., 2019). There are also gender-based food preferences shaped by the sociocultural environment such as women's greater preference for and consumption of foods high in sugars, which may be in part, related to gender-targeting of food advertisements and depictions of certain foods as masculine or feminine (Bennett et al., 2018; Vartanian et al., 2007). The pattern of gender discrepancies in obesity rates in sub-Saharan Africa is due in part to a combination of African social and cultural factors, including weight-gain signifying wealth and higher socioeconomic status (Ben-Yacov et al., 2020). In preparation for marriage, brides are discouraged from engaging in physical activity and encouraged to eat large amounts of food. Research suggests that cultural restrictions may limit leisure-time physical activity for women and girls, and that multiparity may play a role as well (Lemamsha et al., 2019).

There are also sex/gender differences in stress and social relationships that may contribute to differences in obesity prevalence between men and women. Perceived stress and stress-related eating have been correlated with weight gain in both men and women, though the association tends to be stronger in women (Cotter & Kelly, 2018; Udo et al., 2014). Social relationships and interactions may be associated with psychological well-being and lead to weight gain. A recent study found gender-specific associations between structural social ties and obesity measures (Hosseini et al., 2020). For women, obesity measures were mainly related to marital status and social participation while for men, relationships were strongest for social network size and living arrangements.

**Table 2.1 Prevalence of Obesity in Men and Women in Select Countries and Current Obesity Transition Stage**

Country	Current				1975		
	Obesity Transition Stage <sup>a</sup>	% Men with Obesity <sup>b,c</sup>	% Women with Obesity <sup>b,c</sup>	Sex/gender difference	% Men with Obesity <sup>b,c</sup>	% Women with Obesity <sup>b,c</sup>	Sex/gender difference
	Nigeria	1	4.82	13.65	M < W	0.29	1.53
Tanzania	1	4.16	13.22	M < W	0.31	1.49	M < W
Kenya	1	2.97	11.61	M < W	0.26	1.47	M < W
DR Congo	1	3.73	10.12	M < W	0.32	2.61	M < W
Ethiopia	1	1.98	7.25	M < W	0.18	0.86	M < W
India	1	2.87	5.31	M < W	0.17	0.56	M < W
Pakistan	1	6.26	11.75	M < W	0.52	1.63	M < W
Bangladesh	1	2.37	5.19	M < W	0.09	0.38	M < W
Thailand	1	7.26	13.25	M < W	0.35	1.38	M < W
Indonesia	1	4.98	9.28	M < W	0.15	0.72	M < W
Myanmar	1	4.21	7.61	M < W	0.24	0.87	M < W
Philippines	1	5.47	7.86	M < W	0.38	1.1	M < W
South Africa	2	15.98	40.99	M < W	2.38	17.84	M < W
Egypt	2	23.50	42.48	M < W	5.69	18.60	M < W
Iran	2	19.88	33.47	M < W	2.90	10.87	M < W

Turkey	2	25.29	40.71	M < W	4.13	13.53	M < W
China	2	6.11	6.83	M < W	0.30	0.78	M < W
South Korea	2	4.57	5.03	M < W	0.28	0.84	M < W
Japan <sup>d</sup>	2	4.97	3.86	M > W	0.64	1.49	M < W
Russia	2	18.88	28.11	M < W	5.64	20.55	M < W
Mexico	2	25.12	33.98	M < W	5.97	13.51	M < W
Columbia	2	18.28	27.70	M < W	3.45	10.04	M < W
Brazil	2	19.24	26.44	M < W	3.16	7.65	M < W
Germany <sup>d</sup>	3	25.04	21.33	M > W	7.94	10.30	M < W
Italy <sup>d</sup>	3	20.94	20.41	M > W	6.67	10.58	M < W
France <sup>d</sup>	3	22.86	21.97	M > W	7.04	11.14	M < W
UK	3	27.88	29.71	M < W	8.17	11.25	M < W
Spain <sup>d</sup>	3	25.49	23.78	M > W	7.85	12.05	M < W
USA	3	36.47	38.16	M < W	10.71	13.82	M < W



**Physiological mechanisms.** There are sex differences in adiposity and fat distribution that are mediated in part by sex hormones (Chang et al., 2018). While aging is associated with weight gain for both men and women (Kapoor et al., 2017), women are particularly susceptible for weight gain during the peri and postmenopausal period due to changes in estrogen levels (Porter et al., 2020). Women on hormone replacement therapy (HRT) are more likely to sustain weight loss (Kapoor et al., 2020). However, HRT is not recommended for weight loss due to possible increased risk for stroke, DVT and other cardiovascular events. More information about sex differences in obesity is detailed in the comorbidities section below.

Research involving neuroimaging suggests there are distinct sex/gender differences in structural, chemical, and functional obesity-associated alterations in the brain (Kroll et al., 2020). Women demonstrate a greater neural response to food-related stimuli which was positively correlated with BMI. This correlation was not observed in men (Chao et al., 2017; Killgore et al., 2013). Studies are needed to clarify the extent to which mechanisms related to sex, gender and their intersection underlie discrepancies in obesity prevalence. Studies are needed that consider multilevel dimensions and measures of sex/gender including structural, social, and individual level-factors. In particular, studies that are well-powered with *a priori* comparisons of sex/gender mechanisms will help to advance our understanding of differences in obesity prevalence between women and men.

## **Comorbidities**

Obesity is associated with over 230 comorbidities and complications (Field et al., 2001; Rueda-Clausen et al., 2015; Wang et al., 2011). Some of the most common obesity-related comorbidities are type 2 diabetes, hypertension, cancer, and depression (Field et al., 2001; Nguyen et al., 2008). In this section we synthesize research on sex/gender differences in the

relationship between obesity and these comorbidities. We also highlight potential mechanisms related to sex/gender that may underlie these differences.

### ***Type 2 diabetes***

Obesity is strongly associated with type 2 diabetes (Nguyen et al., 2011). Since obesity is a major risk factor for type 2 diabetes, prevalence patterns of diabetes across regions tend to resemble those of obesity (Nguyen et al., 2011). However, within many regions, diabetes is more prevalent in men than women, especially in middle-aged adults (Kautzky-Willer et al., 2016). Globally, 9.0% of women and 9.6% of men have type 2 diabetes (Saeedi et al., 2019). In a study of adults >30 years of age from Scotland, the mean BMI recorded within a year of diagnosis of type 2 diabetes in men was 31.8 kg/m<sup>2</sup>, which was significantly lower than the 33.7 kg/m<sup>2</sup> in women (Logue et al., 2011). In addition, men were diagnosed at an earlier age than women. Differences by sex/gender attenuated with increasing age. Similar results of men developing obesity at a lower BMI than women have been reported in a large cohort of adults in the UK, age-adjusted average BMI at type 2 diabetes diagnosis was 1.8 kg/m<sup>2</sup> higher in women than in men (Paul et al., 2012), and in a nationally representative sample of adults from Korea, mean BMI at the time of diabetes diagnosis was higher in women than in men (26.1 vs 25.1, respectively) (Kwon, 2014).

Several mechanisms may contribute to sex/gender differences in obesity-related diabetes risk (Tramunt et al., 2020). There are sex differences in body composition and fat deposition. BMI overestimates body fat mass in men, who generally have proportionally more fat-free muscle than women (Kyle et al., 2003). There tends to be a predominance of visceral fat in men and subcutaneous fat in women (Fuente-Martín et al., 2013). Recently, one study found that men over the age of 70 had higher a higher prevalence of type 2 diabetes than women, which may be attributed to a larger amount of visceral fat (Nordström\* et al., 2016). Another article

concluded that both waist circumference and BMI were positively associated with type 2 diabetes in men whereas only waist circumference showed an association in women (Tian et al., 2018). Some aspects of glucose homeostasis and energy balance are differentially regulated in men and women (Tramunt et al., 2020). Women have a higher likelihood of accumulating intramyocellular lipids in leg skeletal muscles, without negative effects on insulin sensitivity (Moro et al., 2009). Men are more insulin resistant than women from late puberty into adult life, partially due to enhanced glucose uptake by skeletal muscle in women (Kautzky-Willer et al., 2012; Lundsgaard & Kiens, 2014). Preclinical and clinical studies have shown the importance of gonadal hormones in glucose homeostasis. For example, there is a protective role of endogenous estrogens in women. Relative to premenopausal women, those who are postmenopausal or have premature ovarian insufficiency have an increased incidence of type 2 diabetes (Anagnostis et al., 2019; Mauvais-Jarvis et al., 2013). Menopause also triggers a progressive accumulation of visceral fat, with subsequent increases in diabetes risk (Mauvais-Jarvis et al., 2013).

### ***Hypertension***

Obesity is more strongly associated with blood pressure in women than men (Fujita & Hata, 2014; Sharabi et al., 2004). One study showed that among participants with a baseline BMI greater than 28 kg/m<sup>2</sup>, men and women who had a 3-unit increase in BMI over the observational period of approximately 8 years had an increase in systolic blood pressure of 5.1 mm Hg and 13.3 mm Hg, respectively (Wilsgaard et al., 2000). Mechanisms to explain why obesity has a greater adverse effect on blood pressure in women have yet to be fully elucidated. Obesity-induced hypertension may have sex-specific pathways (Faulkner & Belin de Chantemèle, 2018; Kaneva & Bojko, 2021). Estrogen, a vasoprotective sex hormone, is characteristically increased in obesity (Campbell et al., 2012), but cardiovascular protection is

diminished, possibly due to the pro-hypertensive effects of leptin (Faulkner & Belin de Chantemèle, 2018). Increase BMI is associated with higher sympathetic activation in men but BMI is not associated with sympathetic activation in premenopausal women (Brooks et al., 2015). This may be in part due to differences in sympathetic tone related to adipose deposition location; visceral adipose tissue results in greater muscle sympathetic nerve activity than adipose in different areas (Alvarez et al., 2004). Other proposed pathways include renin-angiotensin-aldosterone system activation and inflammation (Taylor & Sullivan, 2016).

### ***Cancer***

The overall rates of cancer related to excess weight are higher in women than men with 55% of cancers diagnosed in women and 24% diagnosed in men considered weight-related cancers (Steele et al., 2017). The mechanisms contributing to higher cancer incidence and mortality may include alterations in sex hormone metabolism, insulin and insulin-like growth factor levels, and adipokine pathways (Argyropoulou et al., 2021). A recent review was published describing the sex/gender differences in obesity-related cancers (Steele et al., 2017).

### ***Depression***

In cross-sectional studies, obesity is more strongly associated with depression among women than men (Preiss et al., 2013). In a systematic review, 12 of 20 articles reported that depression and obesity were comorbid in women but not men (Preiss et al., 2013). A meta-analysis by de Wit and colleagues combined the results of 11 correlational studies identified a trend towards moderation by sex, and a robust relationship between depression and obesity among women, but not men (De Wit et al., 2010). However, in longitudinal analyses, sex is not a consistent moderator of the bidirectional relationship between obesity and depression (Faith et al., 2011; Luppino et al., 2010).

## **Treatment**

### ***Screening and Diagnosis***

Routine screening and diagnosis for obesity continues to be low, with less than 55% of patients with obesity having a recorded diagnosis of this condition (Kaplan et al., 2018). Several studies of electronic medical records from different healthcare systems have shown that documentation of obesity in patient problem lists is significantly lower in men than women (Kapoor et al., 2020; Mattar et al., 2017). This is problematic because without screening and documentation, patients may not receive treatment. The lack of diagnosis may account for some of the sex/gender disparities in obesity treatment.

### ***Lifestyle Treatment***

**Treatment seeking and initiation.** Women are more likely than men to pursue lifestyle weight loss interventions in clinical and research settings. Before weight loss treatments are initiated, there are differences in the types of treatments that men and women are offered by healthcare providers. In a study of adults with overweight or obesity, women were significantly more likely than men to be counseled by a healthcare provider to lose weight, increase exercise, and reduce calorie intake (Greaney et al., 2020). Women were more than twice as likely to seek out a commercial weight loss program while men typically report using their “own regime” (Zenténius et al., 2018). Researchers have noted difficulty in recruiting men to their weight loss studies with men representing only 27% of weight loss study samples (Pagoto et al., 2012). These differences may be explained by women having greater weight dissatisfaction as well as women being perceived as more interested in, and therefore more receptive to, weight loss counseling (Greaney et al., 2020; Tsai et al., 2016). Furthermore, women are more likely to maintain regular visits with a healthcare provider, which may provide providers with more opportunities and greater comfort in discussing sensitive matters such as weight loss.

**Weight loss.** Men tend to have greater absolute weight loss (kg) than women, but this appears due to their greater baseline weight and differences are attenuated when comparing percent weight loss. In a systematic review of 49 randomized controlled trials, the overall pooled effect size comparing differences in absolute weight loss by men and women was small (Hedge's  $g$  -0.32) (Williams et al., 2015). The effect size of comparisons for percent weight change was -0.19. Analyses that include adjustment for baseline weight or percent body weight loss should be used in future studies since men are more likely to have a higher starting weight than women.

While the studies mentioned above found limited differences between weight loss in men and women, other studies have demonstrated the possibility that different methods of delivering interventions may be more useful for different sex/genders. For example, one study found that an online behavioral intervention was more successful in men, with men losing 7.7% body weight and women losing 3.9% (Ross & Wing, 2016). Similarly, another study found that men lost more weight in weight loss counseling programs that utilized group visits than they did in programs of phone visits, whereas women were equally successful in both (Vimalananda et al., 2016).

Studies have also found some evidence that specific dietary approaches may have differential effects by sex/gender. For example, one study of adults randomized to either healthy low-carbohydrate (HLC) or healthy low-fat (HLF) for 12-months found that men were more likely to adhere to HLC diets than women, and that women had higher adherence to HLF diets than HLC diets (Aronica et al., 2021). Men had more success with HLC diets than HLF diets, while women did not demonstrate a significant difference in success between the two diets. Multiple studies also assessed gender differences following low energy diets or very-low energy diets, with many findings that men were more successful in achieving higher percent weight loss

(Christensen et al., 2018; Guo et al., 2018; Sumithran et al., 2018). However, these studies are post-hoc analyses and were not powered or designed to specifically test differences based on sex/gender.

Interventions targeting physical activity for weight loss may also have different outcomes in men and women, but current research is limited. Both genders have been found to be more successful in maintaining weight loss if they spend more time on low-intensity activities such as walking (Poulimeneas et al., 2020). Men were also more likely to be successful if they also increased vigorous physical activity, whereas women's weight loss was more significantly correlated to low-intensity activities (Poulimeneas et al., 2020). However, another study found that women, but not men, were more likely to lose more weight with high levels of exercise when compared to no exercise (Hand et al., 2020).

The low enrollment and participation of men in weight loss programs have been hypothesized to be due to a mismatch between men's preferences for weight loss programs and currently available programs. One approach that has been used to address this mismatch is gender-targeted interventions. A meta-analysis was conducted of 107 randomized controlled trials, 30 gender-targeted and 77 gender-neutral studies (Sharkey et al., 2020). Of the 261 intervention arms reported in these studies, there was a significant difference between the central foci of gender-targeted and gender neutral studies. Gender-targeted studies tended to focus on physical activity and were more likely to be face-to-face, while gender-neutral studies focused on nutritional interventions and often were conducted virtually. However, the meta-analysis determined no significant difference in overall weight losses.

## ***Pharmacotherapy***

There are currently five medications approved by the US Food and Drug Administration for weight management: orlistat, naltrexone/bupropion, phentermine/topiramate, liraglutide, and most recently semaglutide. Women are more likely to be prescribed and use each of these medications than men (Ganguly et al., 2018; Thomas et al., 2019). An analysis of 26,522 patients receiving a new prescription for weight management medication between 2015 to 2016 found that women accounted for 80.5% of new naltrexone/bupropion prescriptions, 82.2% of phentermine/topiramate prescriptions, and 72.4% of liraglutide prescriptions (Ganguly et al., 2018). Several studies have suggested that women are significantly more successful on pharmacotherapy for weight loss than men, though few studies have examined these differences. One example of this difference is seen with liraglutide. A study followed 4,952 patients on varying doses of liraglutide or placebo over 56-weeks and demonstrated that gender was one of the two most influential covariates for weight loss on liraglutide. This is likely due to sex-specific pharmacokinetic effects that result in exposure to the drug in women being 32% greater than in men of the same body weight (Overgaard et al., 2016; Wilding et al., 2016). Analyses of sex/gender differences are not yet available for semaglutide at the 2.4 mg once weekly, subcutaneous dosage approved for chronic weight management. However, a post hoc analysis of semaglutide was conducted of the phase 3 SUSTAIN (Semaglutide Unabated Sustainability in Treatment of Type 2 Diabetes) cardiovascular outcome trial. This study enrolled participants with type 2 diabetes and randomized them to receive once weekly, subcutaneously injected semaglutide 0.5 or 1.0 mg or placebo. In post hoc analyses, a similar reduction in weight was observed with semaglutide by gender (Leiter et al., 2019). Further studies are needed to examine mechanisms underlying sex/gender differences in obesity pharmacotherapies (Cataldi et al., 2019; Mauvais-Jarvis et al., 2021).



## ***Bariatric Surgery***

Women are more likely to undergo bariatric surgery than men (Golzarand et al., 2017; Kochkodan et al., 2018). One study of 61,708 patients over ten years found that 22% of bariatric surgeries were performed on men, and 78% on women (Kochkodan et al., 2018). Among people who receive bariatric surgery, men tend to be older, present with higher BMIs and greater comorbidities (Kochkodan et al., 2018). Despite this gender imbalance, some studies have found no association between gender and interest in bariatric surgery in patients seeking weight loss (Fung et al., 2015), or between gender and levels of concerns about the cost, benefits, or procedure details regarding the surgery (Rozier et al., 2019). Therefore, it is possible that the gender imbalance in bariatric surgery patients is not due to patient interest and is instead a result of disproportionate screening, diagnosis, and counseling by healthcare providers as well as differences in health awareness and perceptions of obesity. As women are more likely to be screened and counseled to lose weight, it is possible that they are more likely to be counseled to seek out bariatric surgery, leading to the majority of bariatric surgeries being performed on women.

There are few differences between men and women in weight loss after bariatric surgery (Courcoulas et al., 2020; Golzarand et al., 2017; Peterli et al., 2018). However, studies have demonstrated significant associations between gender and secondary outcomes of bariatric surgery. Women are more likely to require corrections following bariatric surgery (Hjorth et al., 2019). Additionally, women tend to have worse psychological outcomes including lower body image, lower psychological well-being, higher rates of depression, and lower satisfaction with their surgery than men. Contrastingly, men have worse physiological outcomes and were less likely to have their comorbidities resolve, including hyperlipidemia, insulin-dependent diabetes, and sleep apnea (Kochkodan et al., 2018).

## **Conclusions**

This review synthesized current evidence related to sex/gender differences in obesity prevalence, co-morbidities, and treatments. In general, obesity is more prevalent in women than men due to multiple factors including sociocultural, environmental, and physiological differences. Importantly, there are intersections among weight status and social and environmental factors. Studies targeting these social determinants of health are needed. Few studies include data or discussion regarding obesity prevalence in gender minorities, particularly in the adult population. Transgender and gender non-conforming individuals may have unique risk factors for obesity, including hormone replacement therapy, psychosocial risk-factors related to depression, as well as socioeconomic risk factors related to housing and job insecurity. Further study is necessary to explore sex-specific pathways that may underlie differences in obesity-related comorbidities, which may in turn have important implications for management of these conditions. While treatment approaches appear effective for inducing clinically significant weight losses in both men and women, further interventions are needed to improve screening and diagnosis of obesity, especially in men, as well as creation of interventions that are appealing to men.

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## CHAPTER 3: PSYCHOSOCIAL STRESS, THE WORKPLACE, AND EATING BEHAVIORS IN COLLEGE EDUCATED BLACK WOMEN

### Introduction

Obesity, defined as excess adiposity that presents a risk to health and operationalized as a body mass index (BMI) of 30 kg/m<sup>2</sup> or greater, is a multifactorial disease. Obesity disproportionately affects non-Hispanic Black women in the United States (US). The prevalence in Non-Hispanic Black US women is 57.9%, which is higher than all other groups by race/ethnicity and gender (Stierman et al., 2021). Obesity is one of the core risk factors that underly cardiovascular and cardiometabolic disease (Carnethon et al., 2017), and the association of cardiovascular mortality with obesity is strongest in Black US women (Shockley & Burrell, 2024).

In the US and other high-income countries, BMI is influenced by social disadvantage as measured by socioeconomic status (SES). SES is typically assessed in three ways: income (individual and household), education level, and occupational prestige (APA, 2018). High SES can refer to individuals with higher household or individual income, or with higher educational attainment. This is to say that in high income countries, women of higher SES are at lower risk for obesity (Cooper et al., 2021). However, for Non-Hispanic Black women in the US (Black US women), higher SES is not associated with the same protective effects against high BMI. This is in line with research demonstrating that at the population level, Black Americans experience less benefit from their SES than their White counterparts (Assari, 2018a; Assari & Moghani Lankarani, 2018; Farmer & Ferraro, 2005). In fact, high SES is associated with increased depressive and suicidality symptoms for Black Americans (Assari, 2017; Assari et al., 2018; Hudson et al., 2012, 2016; Hudson et al., 2013). Additionally, higher educational attainment in Black Americans is not associated with commensurate reductions in BMI, and positive changes

in health behaviors associated with drinking and smoking, sleep, and diet quality (Assari, 2018a; Assari & Moghani Lankarani, 2018).

Research regarding potential underlying mechanisms for diminishing returns in disparities in obesity for college-educated Black US women is needed. One potential mechanism is the association of stress, discrimination, and obesogenic eating behaviors. In the current study, we examined the interactions of place and discrimination and their association with obesity-related eating behaviors in US Black women, using intersectionality as a theoretical lens.

Intersectionality examines how systems of power and oppression based on factors like race, class, and gender, are interwoven and shape each other (Collins & Bilge, 2020). The intersectional paradigm encompasses several key concepts, including social inequalities, intersecting systems of oppression, social context, and complexity (Collins & Bilge, 2020). At its core, intersectionality illuminates how social inequalities permeate various societal domains, including education, employment, economics, and healthcare (Homan et al., 2021). These inequalities are not merely a product of individual social statuses or identities, but rather emerge from systemic power imbalances and oppressive structures (Cho et al., 2013). Intersectionality offers a lens to address the multidimensional nature of advantage and marginalization in both broad societal patterns and individual lives of Black US women shaping risk for obesity. Knowledge gained from this study will contribute to the literature in addressing the persistent disparity in obesity and related comorbidities in US Black women, by examining social and environmental factors.

### **Stress and eating behaviors**

Researchers have investigated experiences of discrimination as stressors that influence weight status to examine disparities in obesity for racial and ethnic minorities (Cozier et al., 2009; Cuevas et al., 2021; Hicken et al., 2018). There is a well-established association between



psychosocial stress and obesity (Cuevas et al., 2019; Cuevas et al., 2021; Fowler-Brown et al., 2009; Hamer & Stamatakis, 2008). For example, Cuevas et al. (2021) found that perceived discrimination, relationship stress, and financial stress were positively associated with BMI. A mechanism for the association between psychosocial stress and weight status may be the impact of stress on eating behaviors. The association of stress, eating behaviors, and obesity is presented in a stress/coping relationship, wherein individuals who experience discrimination may be more likely to use obesogenic eating behaviors as a response to negative emotions and experiences. Emotional eating characterized by eating behavior that occurs as a response to negative emotions such as stress, anxiety, anger, depression, and loneliness (Chao et al., 2016) has been shown to be positively associated with perceived stress in Black women (Diggins et al., 2015; Fowler-Brown et al., 2009; Longmire-Avital & McQueen, 2019; Risica et al., 2021). Eating behaviors have been associated with increased BMI or increased weight change in some studies (Carson et al., 2015{Longmire-Avital, 2019 #88}).

An emerging body of research evaluating the psychological determinants of eating behaviors in Black women indicates that there is a significant relationship between stress and emotional eating, and depression and emotional eating (Diggins et al., 2015; Longmire-Avital & McQueen, 2019; Porter Starr et al., 2014; Sims et al., 2008). Further, two longitudinal studies demonstrate a significant association between emotional eating and BMI, though Black women only accounted for 25% of the study population (Boggiano et al., 2015; Turk et al., 2012).

Binge eating disorder has also been correlated with obesity in samples of low SES Black women (Richardson et al., 2015). Binge eating (BE) is characterized by consumption of an objectively large amount of food within a specific amount of time, as well as the feeling of loss of control overeating within the episode (Association, 2014; Berkman et al., 2016). Binge-eating disorder (BED) is defined as recurrent BE, with episodes occurring at least once a week for 3

months, and with clinically significant distress. Episodes of BE are associated with at least three of the following criteria: eating more rapidly than normal, eating until uncomfortably full, eating large amounts of food in the absence of physical hunger, eating alone due to feelings of embarrassment of the quantity of food consumed, feeling depressed, guilty, or disgusted with oneself after overeating. Unlike in other eating disorders such as bulimia nervosa, episodes of BE in BED are not associated with inappropriate compensatory behaviors such as purging (Association, 2022; Yanovski et al., 2015). Evidence suggests Black women experience high rates of binge eating; ≥30% of Black women with obesity report binge eating behaviors (Goode et al., 2020; Wilson et al., 2012). Binge eating is one example of eating behavior that may be affected by stress.

### **Racial discrimination and workplace stress**

High SES Black Americans contend with stressors throughout the life course related to racial discrimination (Bell et al., 2021; Hudson et al., 2020; Hudson et al., 2016; Walton & Boone, 2019). As Black women are minoritized at the intersections of race and gender, this may be amplified as they try to gain access to prestigious institutions and occupations, and experience “diminished returns for investments in social and cultural capital, and limited advancement in occupational settings due to ‘racialized’ glass ceilings” (Hudson et al., 2016, p. 223). Perceived stress due to experiences of discrimination is one proposed mechanism in the pathway between high SES and poor health outcomes in US Black women. While the concept is commonly referred to as “perceived stress,” this is not to negate the reality of the stress for the individual experiencing it.

Workplace stress is another environmental and socioecological stressor that may influence weight status. In the work environment, high-SES Black women navigate gendered and racial threats to economic and occupational advancement. Stress in the workplace and its association

with eating behaviors, specifically in Black US women, is an underexplored area. A 2012 study on occupational burnout among women in Europe found a significant association between occupational stress and emotional eating (Nevanperä et al., 2012), however little is known about this association in our population of interest.

The predominantly White work environment has been associated as a particular psychosocial stress for Black women, as it can be seen as a “triple jeopardy,” referring to its production of stress associated with (i) being of minority status and/or token identity, (ii) individual work performance, and (iii) general work-related stressors (Holder & Vaux, 1998; Jackson et al., 1995; Pettigrew & Martin, 1987). Evidence suggests a higher tendency for Black Americans of higher SES to be employed in predominantly White workplaces compared with Black Americans of lower SES (Assari & Moghani Lankarani, 2018). In a sample of 1,775 employed Black US men and women, high SES as measured by level of education and household income was associated with working in a predominantly White work group, and concurrently associated with higher perceptions of discrimination (Assari & Moghani Lankarani, 2018).

Environmental stressors, such as perceived discrimination, have been associated with binge eating, and may be more salient influencers of weight status in women than men (Assari, 2018b). Black women face unique environmental stressors at the intersection of racism and sexism, for example in the form of gendered racial microaggressions, subtle or covert expressions of oppression based on intersecting race and gender identities. A cross-sectional study of 1410 racially/ethnically diverse emerging adults (ages 18-30) examined the association of experiences of discrimination with maladaptive eating (described as overeating and binge eating) and adaptive eating (described as mindful and intuitive eating). Results showed that moderate and high levels of experiences of discrimination were each associated with a significantly greater incidence of binge eating compared with participants with no discriminatory

experiences (Yoon et al., 2022). Similar findings have been reported in community samples of 350 Black women (Johnson et al., 2012), as well as undergraduate students (Diggins et al., 2015; Longmire-Avital & McQueen, 2019). A more recent cross-sectional study of 504 young-adult Black US women found a positive association of frequency of gendered racial microaggressions and emotional eating (Volpe et al., 2024). Taken together, research on socioeconomic diminishing returns, psychosocial stress, and weight status indicates there is a need to investigate how these factors influence bodyweight in Black US women.

### Study Purpose and Specific Aims

The purpose of this study was to examine the relationships of multiple dimensions of psychosocial stress and obesity-related eating behaviors (i.e., emotional eating and binge eating) in college educated Black women who are employed full-time. In doing so, we begin to explore the role of the work setting, including its racial composition, as a unique social and environmental factor affecting this population. Guided by intersectionality as a theoretical lens, this study addressed the following aims:

#### **Primary**

Aim 1: Examine the association between perceived stress and emotional eating in college educated Black US women who are currently employed full time.

*H1: We hypothesize that higher perceived stress will be associated with higher emotional eating.*

#### **Secondary**

Aim 2: Examine the association between perceived stress and binge eating in college educated Black US women who are currently employed full time.

*H2: We hypothesize that higher perceived stress will be associated with higher binge eating.*

Aim 3: Examine the association of work stress and gendered racial microaggressions with emotional eating and binge eating.

*H3: Higher work stress and greater reports of gendered racial microaggressions will be associated with increased emotional eating and binge eating.*

### ***Exploratory***

Aim 4: Explore the role of workplace racial composition in the association of psychosocial stress and emotional eating and binge eating.

## Methods

### **Study Design**

This study used a quantitative, cross-sectional observational design using a web-based survey administered online. This design is appropriate because it allows us to describe the relationship among multiple domains of stress exposure and eating behaviors among college educated Black women who are currently employed full-time. This design allows us to examine many variables at once and make inferences about the relations between eating behaviors and perceived stress, work stress, gendered racial microaggressions, and workplace racial composition that can be tested more extensively in future research (Polit & Beck, 2020) . The survey consisted of several pre-existing validated instruments, described below, and a demographics survey and was administered online via web-based survey using REDCap (Harris et al., 2019; Harris et al., 2009) electronic data capture tools hosted at The University of Pennsylvania. The duration of subject participation was estimated at 20-30 minutes. This

included completion of the eligibility survey, consent forms, study survey, and compensation form. Data was collected from August 2023 – February 2024.

## **Sample**

Our target population was US-born Black women, 20 years of age and older, college educated, and employed full-time. calculated using PASS 2022 software (PASS, 2022) to determine the minimum sample-size required to achieve statistical significance based on Aim 1. A sample size of 105 would achieve 90% power to detect a Pearson correlation coefficient as small as 0.31 to be statistically significant using a two-sided hypothesis test at a significance level of 0.05, assuming a null hypothesis correlation of 0. All other analyses were evaluated at the alpha = 0.05 level. The sample size of 105 is consistent with prior studies with similar research questions, population, constructs, and survey instruments (Diggins et al., 2015; Longmire-Avital & McQueen, 2019).

## *Inclusion Criteria*

We included participants with the following characteristics: Non-pregnant, US- born individuals, ages 20 years and older who self-identified as non-Hispanic Black/African American women. Participants were required to be college educated with an Associate’s degree or higher and employed full time at the time of the survey (>30 hours per week). Additionally, participants were required to be English speaking and have access to a device that connected to the internet.

## **Ethical Considerations**

The University of Pennsylvania Institutional Review Board approved this study.

## **Recruitment**

After obtaining approval from the IRB, recruitment occurred between August 2023 and February 2024. We recruited a convenience sample of participants by circulating the survey link via personal and professional networks, on listservs for Black professionals at various universities and companies, posting a flyer on X (formerly Twitter) and in closed Facebook groups of Black professionals and various school alumni organizations, and by posting the study on iConnect, a clinical research subject pool at the University of Pennsylvania. We conducted multiple checks to filter out fraudulent or spam survey responses, detailed in the Supplementary Materials.

## **Study Procedures**

### *Data collection*

We created a CAPTCHA (von Ahn et al., 2003) check to ensure that respondents were human. After passing the CAPTCHA security check, participants were directed to the consent form, administered online via REDCap. In the consent form, participants were informed of the study purpose, procedure, duration, and potential risks. Participation in this study was voluntary, and participants were able to withdraw participation at any time. On the consent form, participants were provided with nationally available resources: National Alliance on Mental Illness (NAMI) for mental health, and National Eating Disorder Association (NEDA) for disordered eating. After we obtained informed consent, participants were directed to the eligibility survey. Participants who passed the eligibility survey were then directed to complete the study's survey. Participants who submitted complete surveys were eligible to receive a \$25 Amazon gift-card, distributed to the email provided. Participants who did not wish to receive compensation remained anonymous.

*Information regarding procedures for fraudulent survey activity can be found in Appendix A.*

## **Measures**

The study used the following survey instruments.

**Demographic and clinical survey.** The study used a 21-item demographic survey assessing height, weight, age, marital status, education, employment status, financial strain, depressive symptoms, sex/gender, individual and household income, obesity-related comorbidities, weight history, and remote work. The questions on financial strain were derived from the *Financial Chronic Stress Scale*. The financial chronic stress scale included 3 questions: (1) "How satisfied are you with your/your family's present financial situation?"; (2) "How difficult is it for you/your family to meet monthly payments on your bills?"; and (3) "In general, how do your (family's)finances usually work out at the end of the month? All responses are on a 3- or 5-point Likert-type scale, with higher scores indicating higher financial strain. In a study of 3,617 adults in multiple waves from the Americans Changing Lives' study, the Cronbach's alpha was 0.81. (Lantz et al., 2005). Questions on depressive symptoms included in the demographic survey came from the Patient Health Questionnaire-2 (PHQ2), a two-item questionnaire assessing depressive symptoms. While the 9-item PHQ9 has superior diagnostic ability, the PHQ2 is a brief and reliable measure to assess depressive symptoms (Cronbach's  $\alpha = 0.767$ ) (Maroufizadeh et al., 2019), and was selected to reduce participant burden. Higher scores indicate increased depressive symptoms.

**Perceived stress.** Global perceived stress was measured using *The Perceived Stress Scale 10 (PSS-10)*, a ten-item measure that assesses the amount of stress a participant believes that they have experienced in the past 30 days (Cohen et al, 1983). Items are rated on a Likert scale from 0 (never) to 4 (every day). Scores on the perceived stress scale range from 0 to 40. Four items (#4, 5, 7, 8) are reverse scored. The total score is obtained by first reversing the four items such that 0 = 4 and 4 = 0 and calculating the total raw score. The PSS-10 is not diagnostic, and therefore does not have established cutoff scores. Therefore, we used a median split to categorize the participants relative to one another in terms of higher vs lower stress (median = 18). When compared to other versions of the perceived stress scale PSS-4 and PSS-



14, a review noted that the psychometric properties of the PSS-10 were superior to those of the PSS-14 and PSS-4 (Lee, 2012). The Perceived Stress Scale showed high reliability (Cronbach's  $\alpha = 0.837$ ) (Cohen et al, 1983).

**Emotional eating.** Emotional eating was measured using the *Emotional Eating subscale of the Eating Behavior Patterns Questionnaire (EEQ)*. The 10-item subscale assesses eating patterns and tendencies in response to negative emotions. Items in this measure are rated on a 5-point Likert-type scale (1=strongly agree to 5=strongly disagree). Total scores range from 10 – 50, with higher scores indicating higher emotional eating. Cronbach's alpha = 0.77 (Schlundt et al., 2003).

**Binge eating.** Binge eating was measured using the *Binge Eating Scale (BES)*. The BES is a 16-item scale assessing binge eating behaviors. Items are presented as groups of 3-4 statements. For each item, participants are asked to select the statement that best describes them. Scores range from 0 – 46 (Gormally et al., 1982). Subsequent studies have established cut-off scores for severity of binge eating behaviors such that  $\leq 17$  = none to mild, 18–26 = moderate, or  $\geq 27$  points = severe binge eating behaviors (Marcus et al., 1988). In previous studies of Black US women, the BES has demonstrated good internal consistency (Cronbach's alpha .88), (Harrington et al., 2006).

**Workplace stress.** Workplace stress was measured using *The Work Stress Questionnaire (WSQ)*, a 21-item measure that is widely used and assesses stress experienced at work. WSQ has been predictive of illness-related absences in previous studies (Holmgren, Hensing, et al., 2009). The scale contains four categories: (1) influence at work- 4 items, (2) indistinct organization and conflicts- 7 questions, (3) individual demands and commitment- 7 questions, and (4) work to leisure time interference- 3 items. For categories (1) and (4), responses are on a 4-point Likert type scale ranging from yes- always to no-never. For categories (2) and (3),

median responses will be calculated for each participant and then dichotomized into low (answers never or seldom) and high (answers always or often). Participants are asked to rate their perceived stress to the item on a 4-point Likert-type scale ranging from not at all stressful to very stressful. A total score for each category will be calculated as the median stress rating and dichotomized into low stress perception (answers not stressful or less stressful) and high stress perception (answers stressful or very stressful). The questionnaire was found to have good face validity and high reliability (Holmgren, Dahlin-Ivanoff, et al., 2009; Holmgren, Hensing, et al., 2009). Initial scoring of the WSQ followed the developer's guidelines (see Appendix B.)

We used the guidelines from (Hultén et al., 2023) to score overall workplace stress and each dimension. We chose this paper because the original author of the scale was the lead author on the paper. Other studies did not provide adequate citations to justify their methods of creating a sum score. Following these guidelines, we created a sum score representing overall workplace stress. Then, for each dimension, a median response value was calculated across the relevant items using participants' scored responses. For the influence at work dimension, median scores  $> 2.0$  (reflecting "no, never" or "no, seldom" responses) indicated low exposure, while scores  $\leq 2.0$  ("yes, often" or "yes, always") denoted high exposure. The perceived stress dimensions were reverse-coded, with median  $> 2.0$  ("stressful" or "very stressful") categorized as high exposure and  $\leq 2.0$  ("not experienced," "not stressful," or "less stressful") as low exposure. For work interfering with leisure, median  $> 2.0$  ("yes, often" or "yes, always") equated to high interference and  $\leq 2.0$  ("no, never" or "no, seldom") was low interference. To summarize overall work stress exposure, we counted the number of dimensions (0 to 4) for which each participant scored in the "high" range based on the dichotomized median values. Prior evidence suggests elevated health risks when experiencing high stress across multiple domains (Hultén,

Holmgren et al., 2023; Holmgren et al., 2013; Hultén et al., 2022). Therefore, participants were classified into two groups: 0-1 dimension with high work stress versus 2-4 dimensions with high work stress.

***Gendered racial microaggressions.*** The 26-item *Gendered Racial Microaggressions Scale* (GRMS) was used to assess the experience and frequency of nonverbal, verbal, and behavioral negative gendered racial microaggressions experienced by Black women. Previous studies indicate GRMS was significantly and positively associated with racial/ethnic microaggressions, perceived sexist events, and psychological distress. The GRMS has four subscales, “Assumptions of Beauty and Sexual Objectification,” “Silenced and Marginalized”, “Strong Black Woman Subscale”, and “Angry Black Woman Subscale”. Participants reported the frequency (GRMS-F) and stress appraisal (GRMS-A) of gendered racial microaggressions they have experienced in their lifetime on a 6-point Likert type scale. Responses range from 0 (never) to 5 (once or more per week) for frequency, and 0 (this has never happened to me) to 5 (extremely stressful) for stress appraisal. We used the GRMS total score for both frequency and appraisal. Total frequency scores are calculated by taking the total raw score of frequency questions and dividing by 23, excluding questions #12 #17 and #20 in the frequency total score, as these are “appraisal only” questions. Total stress appraisal scores are calculated by taking the total raw score and dividing by 25, excluding question #26, as this is a “frequency only” question. The total stress appraisal and frequency scales had reliability coefficients of 0.93 and 0.92, respectively. All Cronbach’s alpha scores demonstrated strong reliability for the subscales, ranging from 0.74 to 0.88.

The “Silenced and Marginalized” (GRMS-SMS) subscale contains seven questions specifically pertaining to the work environment including “I have been disrespected in workplace” and “Felt excluded from networking opportunities.” We used the stress appraisal for this subscale as part

of our evaluation of contextualized stress. The subscale score is calculated by adding items #2, #6, #10, #14, #18, #22, #24 and dividing the total by 7. The Cronbach's alpha demonstrated strong reliability  $\alpha = .88$ .

**Workplace racial composition.** Workplace racial composition was assessed with a single item used in the National Survey of American Life (NSAL), and previous studies. The NSAL assessed the "Racial Composition of Workplace" using a single item: "Is your work group all Black, mostly Black, about half Black, mostly white, all white except you...?" Responses included (1) All Black, (2) Mostly Black, (3) About half Black, (4) Mostly White and (5) All White except you (Assari & Moghani Lankarani, 2018). Similar to previous studies, this was treated as a continuous variable, scored 1 to 5, with higher scores indicating higher percentage of White coworkers.

**Catch questions/ attention checks.** As described above.

## **Analysis**

First, we generated descriptive statistics to summarize the participant characteristics. Standard demographic variables for the entire sample are provided in Table 1. Data from Table 1 include BMI, age, education, employment status, depressive symptoms, financial strain, industry, income, past medical history, and remote work. Several items in the medical conditions section were omitted from Table 1 because they were not selected by any participants in the sample (ovarian cancer, endometrial cancer, and colorectal cancer). Data for categorical variables are reported as counts and percentages within each category. Data for continuous variables are reported as mean and standard deviation. We conducted independent t-tests or ANOVAS for continuous variables and chi-square tests for categorical variables on all demographic variables

in table 1 with the median split (high/low) for PSS score to illustrate the relationships among variables as they relate to the primary predictor.

We conducted our analyses using SAS for Table 1, and STATA for Aims 1 – 4. Broadly, for each aim, we first examined if the data met assumptions for normality by visually examining the distribution of the data in a histogram and following up with a Shapiro Wilks Test for normality where necessary. Then, we conducted simple linear regressions with emotional eating and/or binge eating as outcome variables and the variable of interest as a predictor. When the single predictor model indicated a relation between the predictor and outcome variables, we constructed a model that adjusts for other covariates. Covariates of interest were selected from the participant characteristics presented in Table 1 by examining the relation between each characteristic and the original predictor and outcome variables. In these analyses, we recategorized the education and income variables due to small cell size. For education, associate and bachelor's degrees were collapsed, as there were only six participants with associate degrees. Similarly, for income  $\leq$  \$30,000 and \$30,000-\$50,000 were collapsed as there were only three participants in the  $\leq$  \$30,000 category. The final model then adjusted for income and education, and any other participant characteristic that was associated with the variables of interest. We described the approach for each aim in more detail below.

*Aim 1 (primary): Examine the associations between perceived stress and emotional eating in college educated Black US women who are currently employed full time.*

To investigate the association between perceived stress and emotional eating, we examined the relation between the total score on the PSS-10 and the total score on the Emotional Eating subscale of the Eating Behavior Patterns Questionnaire (EEQ). All 123 participants completed these measures and were included in this analysis. To test the association between stress and emotional eating, we conducted a simple linear regression with perceived stress as the predictor

variable and emotional eating as the dependent variable. We then adjusted for covariates. Covariates were determined based on separate regression analyses of each participant characteristic in Table 1 and the predictor and outcome variables. When one of these regressions showed a significant association between a characteristic and the predictor or outcome variables, we added the participant characteristic to the covariate model. We also added education and income to the model based on our study population, to account for their potentially independent effects in this study population. Finally, we conducted a variance inflation factor (VIF) test on our final model to test for multicollinearity.

*Aim 2 (secondary): Examine the associations between perceived stress and binge eating in college educated Black US women who are currently employed full time.*

To investigate the association between perceived stress and binge eating, we examined the relationship between the total score on the PSS-10 and the total score on the Binge Eating Scale (BES). Three participants did not complete any items on the BES and were excluded from this analysis, leaving a total of 120 participants in this analysis. Of the 120 participants included in our analysis, four participants did not answer 1-2 questions on the BES. For participants who answered most of the questions, we imputed missing responses with the average of the available answers, when fewer than 20% of the responses were missing (1/16 questions or 2/16 questions).

After imputation, we generated a histogram for the Binge Eating Scale, and we conducted the Shapiro Wilks Test for normality. The data was approximately normal with a score of 0.93, so we proceeded with the assumption of a normal distribution. These initial analyses were followed by a simple linear regression with perceived stress as the predictor variable and binge eating as the dependent variable. Because the results of the simple linear regression were statistically significant, we then conducted a second model adjusting for covariates. Covariates were

determined based on regression analyses of participant characteristics in Table 1 and the predictor and outcome variables. As with Aim 1, we also added education and income to the model based on our study population. We conducted a (VIF) test on our final model to test for multicollinearity.

*Aim 3 (secondary): Examine the associations of work stress and gendered racial microaggressions with emotional eating and binge eating.*

To test the association of workplace and gendered racialized stress with emotional eating and binge eating, we replaced our global stress measure (PSS) with contextualized stress measures of workplace stress, as measured by the Work Stress Questionnaire (WSQ) and gendered racialized stress, as measured by the Gendered Racial Microaggressions Scale- Appraisal questionnaire (GRMS-A). As with Aims 1 and 2, n = 123 participants were included in our analyses for the emotional eating outcome, and n = 120 participants were in our analyses for the binge eating outcome. Four participants had incomplete data for the Work Stress Questionnaire. The Work Stress Questionnaire was scored such that there are 21 questions. Questions 5 – 18 have two parts where part 2 is the stress appraisal and represents the final score for the question overall. For example, question 5a asks “Has your workload increased?” potential responses are “Yes” (0 points) and “No” (1 point). If a participant answers “No” they receive 1 point and are directed to question 6a. If a participant answers “Yes” they are directed to question 5b, which asks “If yes: Do you perceive that as stressful?” potential responses are “Not Stressful” (1 point), Less Stressful” (2 points), “Stressful” (3 points), and “Very Stressful” (4 points). Therefore, the minimum score for each question is 1, and the maximum is 4. If a participant answered with a 0 for part A but did not answer part B for a stress appraisal, we scored this item as 1 point.

After imputation, we conducted our analysis on work stress and emotional eating using the high/low work stress score described in instruments section. As in Aims 1 and 2, we conducted a simple linear regression with emotional eating as the outcome variable and work stress as a predictor. Since work stress was scored as either high or low, the model included a dummy variable for high work stress.

For our analysis of work stress and binge eating, we repeated these steps replacing binge eating as the outcome variable. We did not conduct a covariate model as the baseline model was not statistically significant.

In our analysis of gendered racial microaggressions stress appraisal and emotional eating, we conducted a simple linear regression with GRMS-A as the predictor variable and emotional eating as the dependent variable. We then repeated the steps with the “Silence and Marginalized” subscale for additional analyses. We repeated these steps in our analysis of GRMS-A and binge eating.

*Aim 4 (exploratory): Explore the role of workplace racial composition in the association of psychosocial stress and emotional eating and binge eating.*

Finally, for our exploratory analysis we conducted pairwise correlations and chi-square tests to create descriptive statistics to describe the relationships of workplace racial composition with our primary predictor and outcome variables, as well as key variables of interest. We recategorized the workplace racial composition variable due to small cell size. The new workplace racial composition variable used for this analysis was “Mostly Black”, “About half Black”, and “Mostly White”. We then conducted a series of pairwise correlations between perceived stress and emotional eating and perceived stress and binge eating, within the new categories of workplace racial composition. Additionally, we conducted chi-square tests to



create descriptive statistics to describe the relationships of workplace racial composition with key variables of interest being education level and income.

## Results

### **Descriptive Statistics**

Analyses related to emotional eating included  $n = 123$  participants, and analyses related to binge eating contained  $n = 120$  participants. All participants identified as cisgender females. The majority of the sample (46.3%) had a Bachelor's degree and 4.9% had an Associate's degree (these two were collapsed in analyses for a total of 51.2%), 35.8% had a Master's degrees, 13% had a doctorate. The mean age of participants was 34.9 years ( $SD = 9.72$ ). The mean BMI was 30.6 ( $SD = 8.13$ ). Additional demographic characteristics of participants are presented in Table B1.

The mean Perceived Stress Scale (PSS) score was 18.1 ( $SD = 6.53$ ). The mean Emotional Eating Questionnaire (EEQ) score was 34.7 ( $SD = 6.69$ ), and the mean Binge Eating Scale (BESQ) score was 12.2 ( $SD = 8.44$ ). Finally, for Workplace Racial Composition (WRC), 58.5% of the sample described their work environment as "Mostly White." Additional descriptive statistics for variables of interest can be found in Table B2.

All survey measures showed good reliability, on par with their published norms cited above in the Methods section: PhQ2 Cronbach's  $\alpha = 0.842$ , PSS-10 Cronbach's  $\alpha = 0.874$ , EEQ Cronbach's  $\alpha = 0.849$ , BES Cronbach's  $\alpha = 0.887$ , WSQ Cronbach's  $\alpha = 0.875$ , GRMS Cronbach's  $\alpha = 0.929$ , GRMS "Silenced and Marginalized" subscale Cronbach's  $\alpha = 0.852$ .

### **Aim 1: perceived stress and emotional eating**

First, we tested the hypothesis that higher perceived stress is associated with increased emotional eating. As hypothesized, a simple linear regression of PSS on EEQ showed that PSS

was positively associated with EEQ (see Figure 1-scatterplot;  $R^2 = 0.11$ ,  $F(1, 121) = 14.34$ ,  $p < 0.001$ ), such that participants with higher perceived stress reported higher emotional eating ( $\beta = 0.333$ ,  $SE = 0.088$ ,  $p < 0.001$ ).

**Figure 3.1 Perceived stress significantly correlated with emotional eating scores**



We selected all participant characteristics associated with PSS score or emotional eating as covariates in the full model. Age, depression, and anxiety were all positively associated with PSS score, such that participants who are younger or reported more depressive symptoms on PHQ-2 and a self-reported history of anxiety on the demographic form (PMH-8) also had higher PSS scores (See Table B3. Participant characteristics associated with PSS, for coefficients). Additionally, BMI and PHQ-2 were positively associated with emotional eating such that participants with a higher BMI and more depression symptoms reported more emotional eating (See Table B4. Participant characteristics associated with EEQ, for coefficients). To account for these potential confounders, we tested a model of emotional eating as the outcome variable and perceived stress and the potential confounds as the predictors, in addition to education level and income. This overall model was statistically significant, and model fit was improved

compared to the base model ( $R^2 = 0.23$ ,  $F(10, 112) = 3.30$ ,  $p < 0.001$ ), with both PSS ( $\beta = 0.272$ ,  $SE = 0.12$ ,  $p = 0.03$ ) and BMI ( $\beta = 0.244$ ,  $SE = 0.07$ ,  $p = 0.001$ ) positively associated with EEQ score (see Table 3.1 for all coefficients). This suggests that both higher perceived stress and BMI are associated with more emotional eating, even after adjusting for related participant characteristics.

**Table 3.1 Model of EEQ and PSS, adjusted for potential confounds**

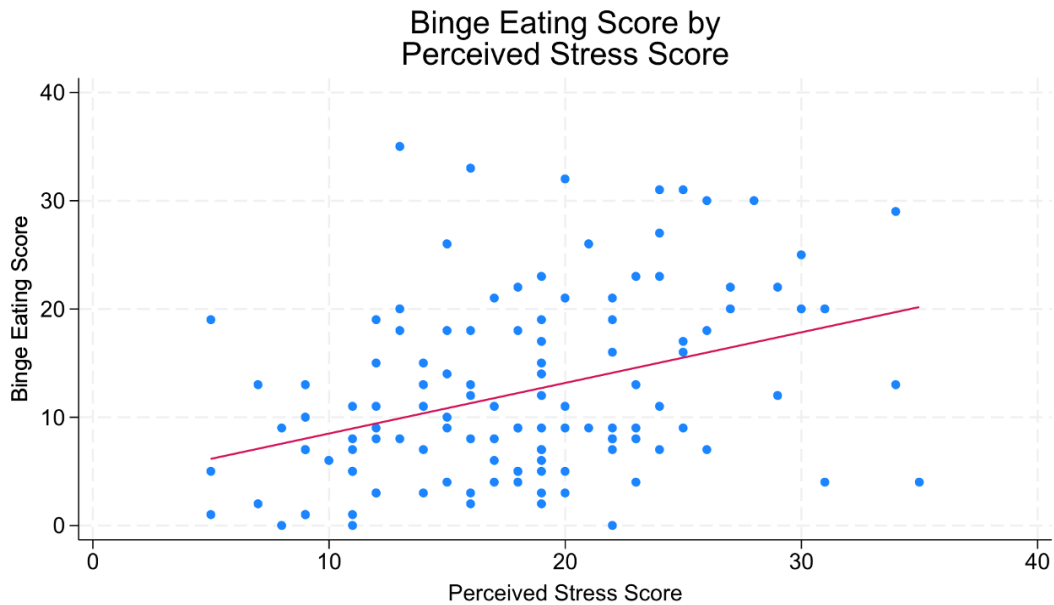
Variable	Coefficient t	Std. Error	t	P >  t	95% CI	
					LL	UL
<b>PSS*</b>	.272	.121	2.25	<b>0.026</b>	.033	.512
Age	.017	.073	0.23	0.818	-.127	.160
<i>PMH anxiety</i>						
PMH anxiety (Yes)	-.724	1.31	-0.55	0.581	-3.31	1.86
PhQ2 score	.565	.445	1.27	0.208	-.318	1.45
<b>BMI***</b>	.244	.072	3.40	<b>0.001</b>	.102	.386
<i>Education</i>						
Masters	.268	1.303	0.21	0.838	-2.31	2.85
Doctorate	1.412	2.034	0.69	0.490	-2.62	5.45
<i>Income</i>						
>\$50,000-\$75,000 per year	1.337	1.624	0.82	0.412	-1.88	4.56
>\$75,000-\$100,000 per year	1.751	1.845	0.95	0.345	-1.90	5.41
>\$100,000 per year	1.805	2.174	0.83	0.408	-2.50	6.11

Note. \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$ ; CI = confidence interval; LL = lower limit; UL = upper limit.

## Aim 2: perceived stress and binge eating

We tested the hypothesis that higher perceived stress is associated with increased binge eating. As hypothesized, PSS was positively associated with BES (see Figure 3.2;  $R^2 = 0.133$ ,  $F(1, 118) = 16.15$ ,  $p < 0.001$ ), such that participants with higher scores on perceived stress reported more binge eating symptoms ( $\beta = 0.467$ ,  $SE = 0.109$ ,  $p < 0.001$ ).

**Figure 3.2 Perceived stress significantly associated with binge eating scores**



Body Mass Index and PHQ-2 were positively associated with binge eating such that participants with a higher BMI and more depression symptoms reported more binge eating (See Table A5. Participant characteristics associated with BES, for coefficients). To account for these potential confounders, we tested a model of binge eating as the outcome variable, perceived stress and the potential confounds as the predictors. In addition to the potential confounds identified by the individual models (age, anxiety, depressive symptoms, and BMI), we also added education level and income to this model based on our *a priori* hypotheses. This overall model was significant, and model fit improved compared to the base model ( $R^2 = 0.257$ ,  $F(10, 109) = 3.76$ ,  $p < 0.001$ ), with PSS ( $\beta = 0.345$ ,  $SE = 0.15$ ,  $p = 0.023$ ), PhQ2 ( $\beta = 1.163$ ,  $SE = 0.555$ ,  $p = 0.039$ ), and BMI ( $\beta = 0.227$ ,  $SE = 0.091$ ,  $p = 0.015$ ) positively associated with BESQ score (see Table 3.2 for all

coefficients). This suggests that higher perceived stress, BMI, and depressive symptoms all were positively associated with binge eating, even after adjusting for related participant characteristics of age, reported history of anxiety, education level, and income.

**Table 3.2 Aim 2 PSS and BESQ covariate model**

Variable	Coefficient t	Std. Error	t	P >  t	95% CI	
					LL	UL
PSS*	.3450	.150	2.30	<b>0.023</b>	.0474	.6425
Age	.050	.090	0.55	0.582	-.129	.2278
<i>PMH anxiety</i>						
PMH anxiety (Yes)	-.996	1.634	-0.61	0.543	-4.23	2.242
PhQ2 score*	1.163	.555	2.09	<b>0.039</b>	.0621	2.264
BMI**	.227	.0912	2.48	0.015	.0458	.4073
<i>Education</i>						
Masters	1.216	1.635	0.74	0.459	-2.036	4.457
Doctorate	.428	2.530	0.17	0.866	-4.586	5.443
<i>Income</i>						
>\$50,000-\$75,000 per year	3.333	2.114	1.58	0.118	-.857	7.523
>\$75,000-\$100,000 per year	3.721	2.384	1.56	0.121	-1.003	8.446
>\$100,000 per year	2.592	2.768	0.94	0.351	-2.893	8.078

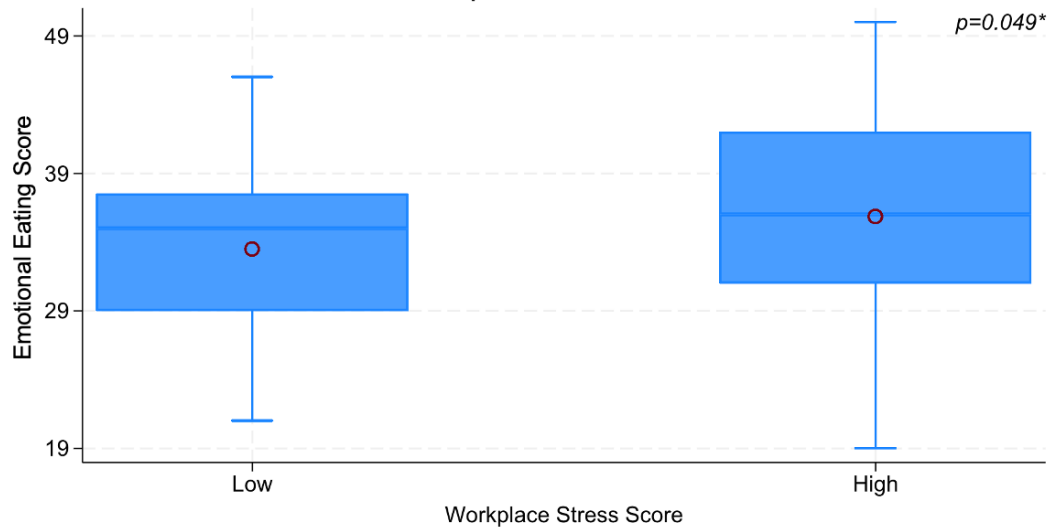
**Note.** \*\*\* p<.001, \*\* p<.01, \* p<.05; CI = confidence interval; LL = lower limit; UL = upper limit.

### **Aim 3: work stress, gendered racial microaggressions and eating behaviors**

We examined the associations of contextualized stressors, workplace stress and gendered racial microaggressions stress, with emotional eating and binge eating. High work stress, measured with WSQ, was positively associated with emotional eating ( $R^2 = 0.032$ ,  $F(1, 121) = 3.96$ ,  $p = 0.049$ ), such that participants with high work stress across domains reported high

emotional eating, compared to those with low work stress ( $\beta = 2.374$ ,  $SE = 1.19$ ,  $p = 0.049$ ) (see Figure 3.3).

**Figure 3.3 High work stress is associated with increased emotional eating**  
Emotional Eating Score by Workplace Stress Score



Participants with more depressive symptoms, a self-reported history of anxiety, individual incomes of >\$100,000 per year, and doctorate degrees reported higher work stress (See Table B6. Participant characteristics associated with WSQ, for coefficients). To account for these potential confounders, we tested a model of emotional eating as the outcome variable, workplace stress and the potential confounds as the predictors.

As hypothesized, high work stress was positively associated with higher emotional eating. However, after adding income, education, BMI, PhQ2, PMH anxiety, and age to the model, the effect of work stress was no longer significant; WSQ:  $\beta = 1.25$ ,  $SE = 1.26$ ,  $p = 0.35$ . While WSQ was no longer significant, the following variables were significant: BMI:  $\beta = 0.25$ ,  $SE = 0.073$ ,  $p = .001$ ; and PhQ2:  $\beta = 1.03$ ,  $SE = 0.39$ ,  $p = .009$ . See Table 3.3 for all coefficients.

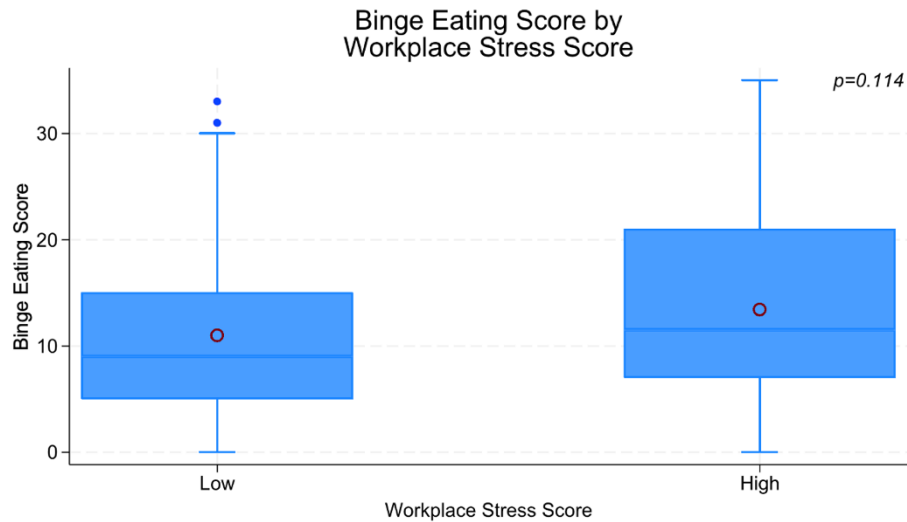
**Table 3.3 Aim 3 WSQ and EEQ covariate model**

Variable	Coefficient	Std. Error	t	P >  t	95% CI	
					LL	UL
<i>WSQ score</i>						
WSQ (High)	1.255	1.270	0.99	0.325	-	3.770
BMI***	.252	.073	3.44	<b>0.001</b>	.1069	.396
PhQ2 score**	1.034	.391	2.64	<b>0.009</b>	.2592	1.809
Age	-.024	.071	-0.34	0.734	-	.1163
					.1646	
<i>Income</i>						
>\$50,000-\$75,000 per year	1.064	1.654	0.64	0.521	-	4.340
					2.213	
>\$75,000-\$100,000 per year	1.421	1.881	0.76	0.451	-	5.148
					2.305	
>\$100,000 per year	1.340	2.261	0.59	0.554	-	5.820
					3.138	
<i>Education</i>						
Masters	-.076	1.317	-0.06	0.954	-	2.533
					2.686	
Doctorate	1.230	2.119	0.58	0.563	-	5.427
					2.967	
<i>PMH anxiety</i>						
PMH anxiety (Yes)	-.389	1.325	-0.29	0.770	-	2.238
					3.015	

**Note.** \*\*\* p<.001, \*\* p<.01, \* p<.05; CI = confidence interval; LL = lower limit; UL = upper limit.

Next, we tested if higher work stress is associated with more binge eating. A general linear model of binge eating with a categorical predictor of high or low work stress showed that high work stress was not significantly associated with binge eating (model:  $R^2 = 0.0210$ ,  $F(1, 118) = 2.53$ ,  $p = 0.1143$ ; High WSQ:  $\beta = 2.4365$ ,  $SE = 1.53$ ,  $p = 0.114$ ). The Cohen's-D effect size based on mean comparison of high vs low WSQ scores by BESQ scores was 0.29063 indicating a small effect size (see Figure 3.4- boxplot). Because the baseline model did not show a significant association, we did not conduct any additional analyses. However, although not statistically significant, the direction of the association is in line with our hypothesis.

**Figure 3.4 Side-by-side box plot BESQ by WSQ**

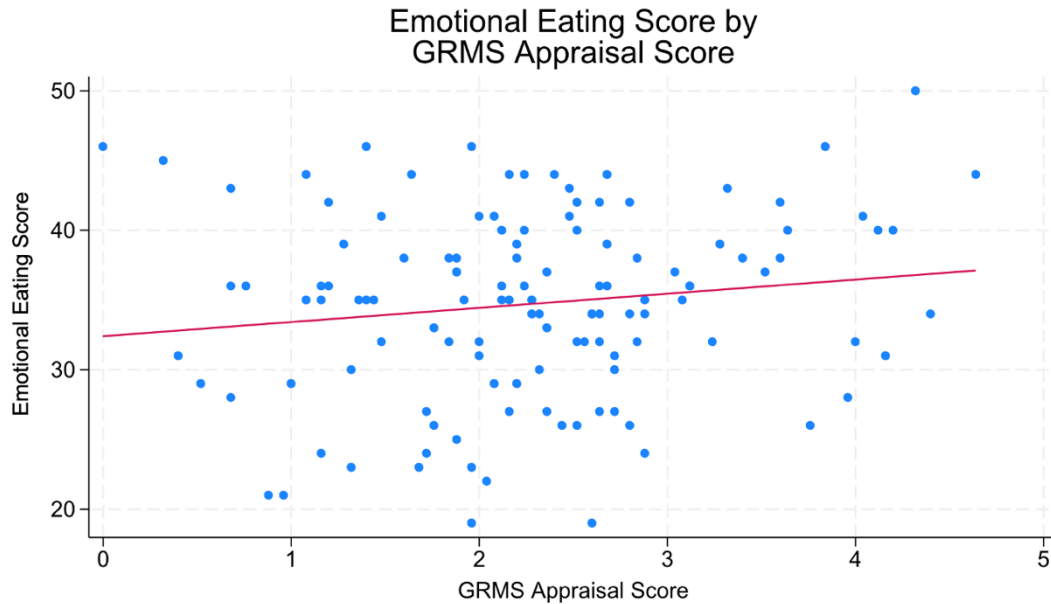


**Note.** No statistically significant differences between mean binge eating and work stress scores

Next, we tested if stress from gendered racial microaggressions was associated with emotional eating and binge eating. Contrary to our hypothesis, the GRMS-A was not associated with binge eating. Scores on GRMS-A were not significantly associated with EEQ (see Figure 3.5-scatter plot;  $R^2 = 0.1138$ ,  $F(1, 121) = 2.54$ ,  $p = 0.1138$ ; GRMS-A:  $\beta = 1.016$ ,  $SE = .6377$ ,  $p = 0.114$ ). Because the baseline model did not show a significant association, we did not conduct any additional analyses. However, although not statistically significant, the direction of the association is in line with our hypothesis.

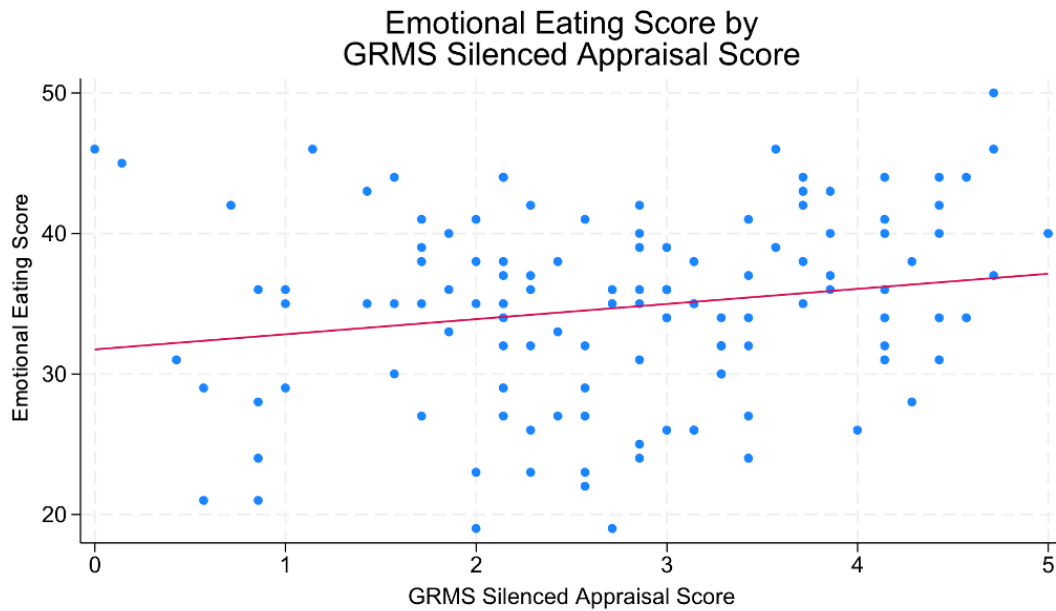


**Figure 3.5 Scatter plot GRMS-A and emotional eating**



We tested if higher gendered racial microaggressions stress appraisal using the “Silenced and Marginalized” subscale (GRMS-A SMS) was associated with increased emotional eating and binge eating. Contrary to our hypothesis, we found no association among GRMS-A SMS and BESQ. However, as hypothesized, GRMS-A SMS was positively associated with EEQ (see Figure 6-scatterplot;  $R^2 = 0.0334$ ,  $F(1, 121) = 4.18$ ,  $p = 0.043$ ), such that participants with higher scores on SMS reported more emotional eating ( $\beta = 1.08$ ,  $SE = 0.527$ ,  $p = 0.043$ ).

**Figure 3.6 GRMS-A SMS is significantly associated with emotional eating**



Additionally, we found that income, a self-reported history of hypertension (PMH htn), and a self-reported history of high cholesterol (PMH cholesterol) were associated with GRMS-A SMS such that participants with an annual income of \$50,000 - \$75,000 per year and \$75,000 - \$100,000 per year had significantly higher SMS scores than those with incomes under \$50,000 (See Table B7 Participant characteristics associated with GRMS-A SMS, for coefficients). To account for these potential confounders, we tested a model of emotional eating as the outcome variable, GRMS-A SMS and the potential confounds as the predictors.

As hypothesized, high GRMS-A SMS was positively associated with higher emotional eating. However, after adding PhQ2, BMI, income, education, PMH hypertension and PMH high cholesterol to the model the effect of GRMS-A SMS was no longer significant (GRMS-A SMS:  $\beta = .531$ ,  $SE = .564$ ,  $p = 0.35$ ). See Table 6 for all coefficients.

**Table 3.4 Aim 3 GRMS-A SMS and EEQ covariate model**

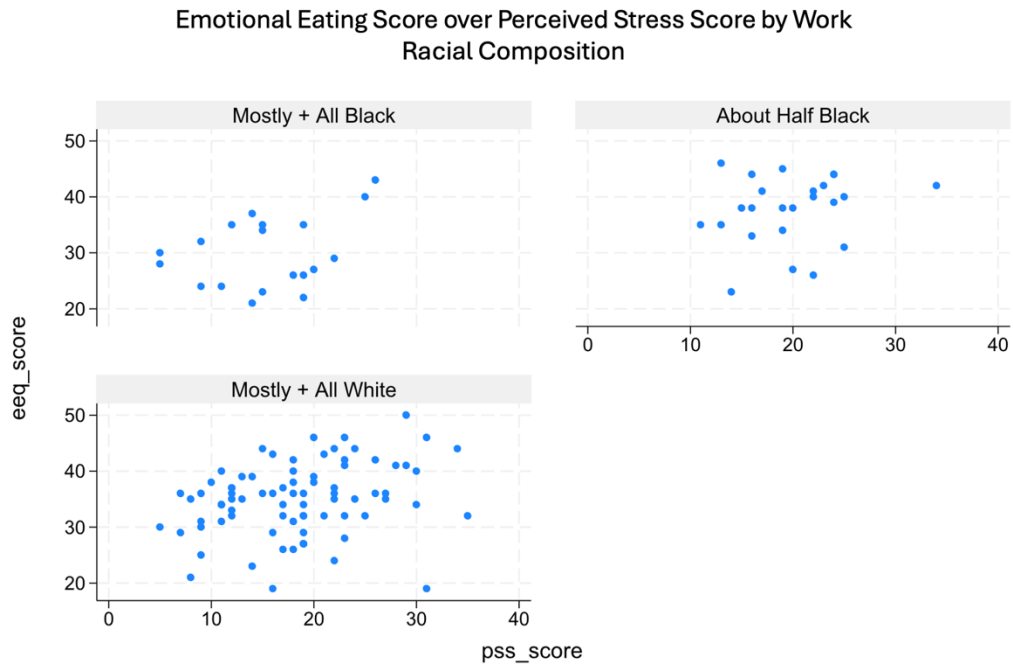
Variable	Coefficient	Std. Error	t	P >  t	95% CI	
					LL	UL
GRMS-A SMS	.531	.564	0.94	0.348	-.586	1.649
PhQ2 Score**	1.001	.355	2.84	<b>0.005</b>	.304	1.708
BMI***	.265	.075	3.53	<b>0.001</b>	.116	.4139
<i>Income</i>						
>\$50,000-\$75,000 per year	.554	1.687	0.33	0.743	-2.789	3.896
>\$75,000-\$100,000 per year	1.086	1.862	0.58	0.561	-2.602	4.775
>\$100,000 per year	1.355	2.120	0.64	0.524	-2.845	5.555
<i>Education</i>						
Masters	-.383	1.310	-0.29	0.770	-2.971	2.205
Doctorate	.802	2.165	0.37	0.712	-3.487	5.090
<i>PMH hypertension</i>						
PMH hypertension (Yes)	-1.539	1.777	-0.87	0.388	-5.059	1.981
<i>PMH high cholesterol</i>						
PMH high cholesterol (Yes)	.549	1.797	0.31	0.761	-3.013	4.110

Note. \*\*\* p<.001, \*\* p<.01, \* p<.05; CI = confidence interval; LL = lower limit; UL = upper limit.

### **Exploratory analyses: workplace racial composition**

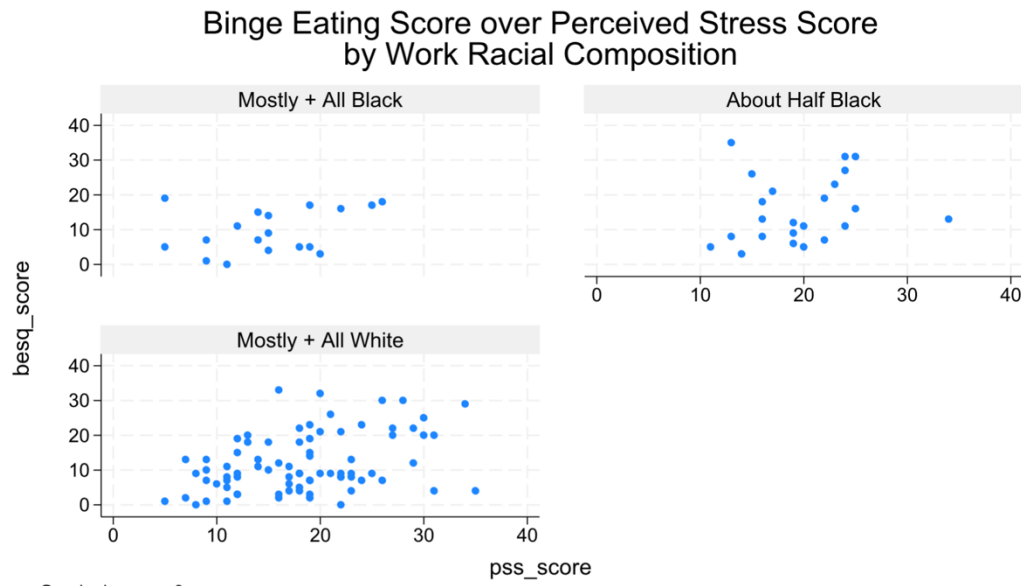
In our exploratory analysis of the role of workplace racial composition in the association between psychosocial stress and emotional eating, although not statistically significant, we observed a U-shaped pattern in the data such that stress and emotional eating are more strongly correlated in participants who reported mostly/all Black work environments ( $r = 0.3437$ , ns) and mostly/all White ( $r = 0.2863$ ,  $p = 0.01$ ) than in those who reported “About Half Black” work environments ( $r = 0.1975$ , ns)(See Figure 3.7- scatterplots). Because our cell sizes are relatively small in these stratified analyses, these analyses/results would need to be validated in a larger sample in order to interpret these results with confidence.

**Figure 3.7 Pairwise correlations PSS and EEQ by WRC**



Regarding the role of workplace racial composition in the association of stress and binge eating, pairwise correlations again revealed a U-shaped pattern such that stress and binge eating are more strongly correlated in mostly/all Black work environments ( $r = .3448$ , ns) and mostly/all White ( $r = 0.3842$ ,  $p < .001$ ) than in “About Half Black” work environments ( $r = 0.1958$ , ns) (See Figure 8- scatter plots). The results were again significant for the “Mostly/all White” group ( $p < .001$ ), though significance should be interpreted with caution.

**Figure 3.8 Pairwise correlations PSS and BESQ by WRC**



Next, a chi-square test of independence was performed to examine the relationship between workplace racial composition and education level. This relationship was significant,  $X^2(6, N = 123) = 20.3611, p = .002$ . Participants at higher levels of education were more likely to work in predominantly White work environments. We also performed a chi-square test of independence to examine the relationship between workplace racial composition and income level. This relationship was significant,  $X^2(8, N = 123) = 25.3221, p = .001$ . Participants at the highest level of income (>\$100,000 per year) were more likely to work in predominantly White work environments.

## Discussion

Our study assessed the associations of psychosocial stress and contextualized stress appraisals with eating behaviors in college educated Black US women employed full-time. Our findings demonstrate that perceived stress, workplace stress, and stress from gendered racial microaggressions are all positively associated with emotional eating in college educated Black

US women who are employed full-time. Further, our findings illustrate a positive association between perceived stress, workplace stress and binge eating. The relationships among multiple dimensions of psychosocial stressors and obesogenic eating behaviors explored within a socioecological context may partially explain the persistent disparities of obesity in Black US women at the highest levels of socioeconomic status.

We found that higher perceived stress was associated with more emotional eating and binge eating. Our findings are aligned with previous studies assessing associations of perceived stress with emotional eating and binge eating in populations of Black US women (Diggins et al., 2015; Harrington et al., 2006; Longmire-Avital & McQueen, 2019; Pickett et al., 2020). Our findings add to this growing body of literature to highlight the importance of psychosocial variables like stress in eating behaviors.

We found that higher contextualized stress was associated with more emotional eating, but not binge eating. Previous studies have assessed associations of contextualized stress and emotional eating with mixed results. (Longmire-Avital & McQueen, 2019) and (Volpe et al., 2024) found statistically significant associations in populations of young adult Black US women. In contrast, Diggins et al. (2015) found no association in a similar population. We framed contextualized stress within the context of the work environment, as we theorized that the work environment may be a unique social and environmental factor for this population that influences stress and eating. The “Silenced and Marginalized” subscale contains questions that are specific to stress appraisals of experiences of gendered racial microaggressions within the work environment. We found that response to the GRMS-A “Silenced and Marginalized” subscale (GRMS-SMS) was positively associated with emotional eating but not in adjusted models, though the full GRMS scale was not significantly associated with emotional eating. However,

previous studies with larger populations of Black women have found a significant positive association between these variables (Volpe et al., 2024).

While we did not find an association between contextualized stress and binge eating, previous studies have found positive associations. In their study of relationships among trauma, stress, ethnicity, and binge eating in Black US women, Harrington et al. (2006) found that both stress ( $r = 0.21, p < .05$ ) and discriminatory stress ( $r = 0.22, p < .05$ ) were positively related to BES scores. This study population was a university population of young adult Black women of lower SES. Discriminatory stress was measured using a combination of the Schedule of Racist Events and the Schedule of Sexist Events. Additionally, it is possible that the differences in population and the measure of contextualized stress may account for the differences in results. A notable strength of using the Gendered Racial Microaggression Scale (GRMS) is that it provides us with an intersectional appraisal of discrimination specific to Black women, by design. The GRMS was developed using an intersectional lens specifically for Black women and their experiences of gendered racism (Lewis & Neville, 2015). Intersectional appraisals of discrimination are important because they acknowledge complex, nuanced, multiple identities that are salient in group and individual-specific ways. To that end, intersectional scholars suggest that other measures of discrimination may not fully capture the experience of multiply discriminated individuals, such as Black women, as they may not necessarily know for which reasons they were discriminated against because the experience is not separate at a particular time point (Bowleg, 2008; Scheim & Bauer, 2015).

More studies are needed that directly examine associations of workplace stress and emotional eating in populations of US Black women who are employed full-time. There is some evidence in mixed populations of other marginalized groups that workplace stress influences eating behaviors (Mason & Lewis, 2015). Additionally, while the workplace stress scale used in the

current study was designed for women, it was not designed for Black US women. Qualitative studies demonstrate that there are unique and specific stressors within the work environment for our population of interest. Some items or subscales of intersectional discrimination measures capture elements of appraisals of discrimination in the work environment, such as the Gendered Racial Microaggressions Scale and The Jackson Hogue Phillips Contextualized Stress Measure (Jackson et al., 2005); however, more focused studies and measures may be better able to capture relevant constructs and therefore better understand their potential associations with stress and identify potential points of interventions.

Results from our exploratory analyses offers intriguing areas for future research. Our exploratory analysis suggests that perceived stress and eating behaviors may be more strongly correlated in participants who reported working in Mostly/All Black work environments and Mostly/All White work environments than in “About Half Black” work environments, though we did not have sufficient data in each cell to test the statistical significance of these differences in correlation magnitudes. These analyses are exploratory and hypothesis generating. Although p-values are reported, they should be interpreted with caution (Baker, 2016; Sullivan & Feinn, 2012). The descriptive statistics and effect size estimates may be useful for power analyses to help inform future more comprehensive studies on the role of workplace racial composition in the association between stress and eating behaviors in US Black women. We found that the correlation between perceived stress and eating behaviors was stronger in participants who described their workplace as mostly or all Black and mostly or all White, than in those who described their workplace as about half Black. Workplace racial composition may serve as a proxy for unique stressors affecting each type of work environment. There is a large body of literature within the social sciences addressing the unique stressors of predominantly White work environments on Black US women (see examples: (Bowleg et al., 2008; Cumberbatch, 2021; Dickens et al., 2019; Hall et al., 2012; Louis et al., 2016). Previous studies found a



positive association of high SES by education and income and predominantly White work environments, and predominantly White work environments and perceived discrimination for both men and women (Assari and Moghani Lankarani 2018). The initial findings of our exploratory aim may contribute to future larger quantitative studies that not only examine the associations of workplace racial composition on psychosocial stress, but also extend this association to health outcomes.

This study should be interpreted in the context of its limitations. First, due to the cross-sectional design we cannot interpret the observed associations among variables as causations. Next, a general limitation with an observational study is that we cannot ascertain all participant characteristics prior to data collection, and we did not oversample for equal construction of categories to conduct stratified analyses with reliable statistical significance. Therefore, for our stratified analysis of workplace racial composition in Aim 4, our sample size was small for all but one category. However, this analysis gives good descriptive statistics and potential hypothesis-generating effect size estimates that can be used to help direct future research. Additionally, because psychosocial stress is a complex, and multi-dimensional construct, our survey and similar quantitative appraisals, may not capture all aspects of the relationships among variables. Further, our sample consists of a convenience sample of people who were willing to take the survey, so it is possible that there is a certain segment of the population that is not well-represented., such as college-educated Black women who are not part of networks that would be captured by our recruitment methods. Finally, suspicions of fraudulent responses resulting from online recruitment necessitated ad hoc changes in data quality control that future work should incorporate in the study design stage prior to commencing data collection.

Despite its limitations, this study provides valuable insight into potential mechanisms for disparities in obesity in high-SES Black US women. As hypothesized, greater perceived stress

and contextualized stress was associated with higher maladaptive eating behaviors. Continued engagement in maladaptive eating behaviors may lead to higher body weight over time. The relationship among perceived stress and maladaptive eating behaviors may be stronger for Black US women working in environments that are predominantly White. More research examining this specific domain with intersectional methods is needed to provide further insight into these mechanisms.

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## CHAPTER 4: WEIGHT AND SHAPE PERCEPTIONS OF COLLEGE EDUCATED BLACK WOMEN IN PREDOMINANTLY WHITE WORK ENVIRONMENTS

### Introduction

In the United States (US), greater than 80% of Black women reach diagnostic criteria for having overweight or obesity, defined as a Body Mass Index (BMI) of 25 or greater (CDC, 2022).

Obesity is linked to a myriad of conditions associated with negative health consequences including type 2 diabetes, hypertension, and stroke (Field et al., 2001; Nguyen et al., 2008; Patterson et al., 2004). Researchers often find that one factor that correlates to obesity prevalence is socioeconomic status (SES). SES, typically assessed as individual or household income, education level, and/or occupational prestige (APA, 2018), remains an important factor to consider in studies of overweight and obesity because it allows researchers to proxy for resource related-influences on health-related practices related to weight status. The causal mechanisms associated with SES include limited access to healthful food options (food deserts), substandard neighborhood conditions, and inadequate nutritional knowledge and education. Such resource-based explanations are frequently presented to elucidate the uneven distribution of obesity across different populations in developed countries, such that higher SES is associated with lower rates of obesity and associated conditions (Coogan et al., 2010; Gordon-Larsen et al., 2003; Hawes et al., 2019; Jones-Smith et al., 2013; Kershaw et al., 2013; Kershaw & Pender, 2016; Krueger & Reither, 2015; Kwate, 2008). Additionally, racialized trends in SES stratification map on to patterns in obesity prevalence, making this a topic to consider from multiple, interwoven perspectives.

National data from the US suggest that disparities in obesity for Black women are greatest at the highest levels of socioeconomic status (SES) by education and household income (Ogden

et al., 2017). For example, while White US women with college education or higher have significantly lower obesity prevalence than White US women with a high school diploma, the prevalence of obesity by education level for Black women remains relatively unchanged. Similar patterns are observed with household income (Ogden et al., 2017). This is to say that while socioeconomic status is typically protective in high SES countries like the US, the same is not true for Black US women at the population level (Ciciurkaite, 2021). In other words, SES and resource-related mechanisms cannot account for the rate of obesity in Black US women.

An emerging area in the investigation of mechanisms driving disparities in obesity for Black US women is body perceptions of weight, shape and size (Bell & Blackman Carr, 2020; Hendley et al., 2011). Body perceptions of weight, shape and size refer to how an individual understands their body composition relative to their own standards of ideal body types. These interrelated concepts exist within specific social and cultural contexts that can affirm or challenge their own conceptualizations of the ideal or healthy body. However, the intersection of body ideals, body and weight perception along with social and cultural contexts are explored in limited scope for high-SES Black US women. Given large racial disparities in obesity among Black US women not fully accounted for by risk factors identified in existing research, we examined the ways SES and social context may interact with these body perceptions to influence weight status for this population. There is a need for intersectional research that acknowledges the various sociocultural and socioecological contexts that may influence weight status and related concepts for Black US women (Lowy et al., 2021).

### *Weight perception and body image*

The idea of weight perception refers to how one views their own weight and body size and how weight and size is viewed by others. As research explores factors associated with the high prevalence of overweight and obesity in Black US women, the impact of weight perception

appears critical (Hendley et al., 2011). Existing literature posits that Black women have uniquely constructed weight perceptions when compared to other racial and ethnic groups which may be related to disparities in levels of obesity prevalence (Elizabeth et al., 2014). Previous studies suggest that Black women are more likely to underestimate their weight, perceiving themselves in a lower BMI category (Dorsey et al., 2009, 2010). Some have suggested that this underestimation leads to higher body weight and lower engagement in weight management behaviors (Bell & Blackman Carr, 2020; Dorsey et al., 2009; Krauss et al., 2012).

Weight perception is also closely linked with concepts of body image and associated weight and shape concerns (Nissen & Holm, 2015). Body image can be thought of as a multidimensional construct which includes an individual's perceptions, beliefs, and attitudes toward their body (Cash, 2004). Perception, including body shape, weight, or size is an aspect of body image. Additionally, body satisfaction influences perception where there is either congruence or incongruence with the individual's body and what is considered ideal culturally and socially (Cash, 2004, 2005). Researchers propose that Black women's underestimation of bodyweight may be explained by racial differences in body image perception, asserting that Black women have more body positivity that excludes them from the desire to lose weight (Bennett & Wolin, 2006; Chithambo & Huey, 2013; Pickett & Peters, 2017; Powell & Kahn, 1995; Sa et al., 2020). This suggests that a subset of Black women in the US may reject normative, typically Eurocentric, (namely White-appearance of thinness, lighter skin, and long straight hair) (Lowy et al., 2021) beauty ideals around body image and instead describe an acceptance of or for higher body weight and body size. Although several studies contend that Black women may have more weight positive body image, other research has challenged this narrative, underscoring that body image is context specific, and the context and experiences of Black women are not monolithic (Awad et al., 2020; Boutté et al., 2022; Flynn & Fitzgibbon, 1998; Hesse-Biber et al., 2010). These studies assert that Black US women are a heterogenous group and socialized in

different environments and contexts that may have different appearance norms and expectations (Boutté et al., 2022; Hesse-Biber et al., 2010; Sanderson et al., 2013; Selzer Ph D, 2013). For example, in a qualitative study of Black undergraduate women at a predominantly White institution, researchers found that early childhood experiences in for example, the family and school environment, had powerful impact on participants' racial identity and consequent weight-associated body image. Early experiences of socialization in White environments contributed to cultural identity formation and shaped body weight ideals. Women who identified economically as upper or middle class and felt accepted by White peers reported more pressure to be thin as defined by White norms (Hesse-Biber et al., 2010). The associations of SES may also impact weight perception (Paeratakul et al., 2002). A previous study found that the odds of accurately perceiving weight status were higher in individuals with higher income and higher levels of education. Regarding college-educated Black women, this may also complicate previous notions that they are at risk for misperception of overweight status.

In understanding the heterogeneity of weight, shape, and size perception among Black women, education level and occupational context may be crucial factors. Body perceptions cannot be separated from sociocultural context (Talleyrand et al., 2017; Watson et al., 2019), and the intersection of race and gender may uniquely shape the body perceptions and workplace experiences of Black women (Crenshaw, 1991; Settles et al., 2008). As education and occupational prestige are vehicles for upward class mobility (Robinson & Mullins Nelson, 2010), college educated Black women may find themselves in educational, occupational, and social spaces that are not only predominantly White, but also elitist, presenting another set of cultural expectations and norms with which to contend (Sugiyama et al., 2024). A focus on stigma is applicable to studies of weight and shape perceptions in Black US women in predominantly White work environments because it provides a link between external pressures such as social environment and dominant norms with individual perceptions of self and subsequent "fixing"

behaviors (Goffman, 2009). To this point, Black college educated women working in predominantly White environments may contend with stigma in the form of stereotype threat and impression management—referring to the phenomena in which members of marginalized groups fear confirming negative stereotypes, and adjust their self-presentation to manage other’s impressions and perceptions of their stigmatized social identity (Goffman, 2009; McCluney et al., 2021; Steele & Aronson, 1995).

Stigma is a multi-dimensional concept that affects various dimensions of individual’s lives, and dramatically influences life-chances in the distribution of employment, earnings, and health, among other domains; and obstacles for stigmatized groups to advance socially and economically. Status loss and social rejection are named as two major consequences of stigma cited throughout the literature (Goffman, 2009; Link & Phelan, 2001; Phelan et al., 2014). This may be especially true for Black women in professional positions who may face pressure to meet the broader expectations of White collar work culture (Bowleg et al., 2008; Jones & Shorter-Gooden, 2009). Additionally, due to stigma, individuals can feel hypervisible in certain contexts. For Black women in predominantly White work environments, negative stereotypes combined with being marked as different, result in their being perceived as deviant from their White coworkers, subjecting them to increased surveillance (Buchanan & Settles, 2019).

Previous work on appearance stigma, implicit bias, and grooming policies in the workplace have shown that Whiteness is considered the workplace standard and regarded as more professional and more attractive (Cumberbatch, 2021; Rudman & McLean, 2016; Summers et al., 2022).

Previous research on tokenism posits that hypervisibility status in predominantly White work environments pressures Black women to modify appearance and behaviors (Dickens et al., 2019). In managing this visibility, Black women engage in “identity shifting,” and may try to reduce distinctiveness and signal belonging to counteract their position as relative outsiders (McCluney & Rabelo, 2019).

Given that outsider status can diminish social and economic advances (Goffman, 2009), we assert that Black women may frame their body perception in complex ways as they navigate the gendered, racial, and class related power structures (Collins, 2002) they face within their workplace (McCluney & Rabelo, 2019). Factors such as physical environment, social environment and related stressors and tensions are part of the dynamic that may underlie relationships between sex/gender, race, socioeconomic status, and body weight (Bell & Blackman Carr, 2020). To date, the interplay between workplace and stigma on body, weight and shape perception for college educated Black women is largely underexplored and the current literature is predominately limited to White educational institutions like colleges and universities (Hesse-Biber et al., 2010; Lee et al., 2018; Sa et al., 2020). Therefore, the purpose of this study was to describe weight and shape perceptions among college educated Black US women employed full-time in predominantly White work environments. In doing so, we are guided by and seek to answer the following research questions: How do college-educated Black US women working in predominantly White work environments perceive body weight, shape, and size? How is that perception guided by their experience in predominantly White work environments?

## Methods

This study was conducted using a qualitative descriptive design where we use participants own words to describe their perceptions and experiences of a phenomenon and capture the nuances and complexities of participants' experience (Kim et al., 2017; Sandelowski, 2000). This study was approved by the Institutional Review Board of the University of Pennsylvania.



## ***Participants***

### Inclusion and exclusion criteria

Participants eligible for the study were Black/African American women who self-identified as Black/African American and who were US born. We only included individuals from the US as previous research related to cumulative stress and weathering hypothesis demonstrate that there may be a protective effect of being born outside of the US in the context of the development of obesity (Mehta et al., 2015). Further, acculturation of recent immigrants may elicit an additional dimension of body image formation not explored in the current study (Sussman et al., 2007). Eligible participants were employed full time (>30 hours per week) in self-described predominantly White work environments. Finally, eligible participants were English speaking, aged 20 years and older, and college educated with an Associate's degree or higher, as the National Health and Nutrition Examination Survey (NHANES) data demonstrated that disparities in obesity exist at higher levels of education and household income for adults 20 years of age and older were part of the rationale for this study (Ogden et al., 2017).

### ***Sampling and recruitment:***

Our target sample size was 12-30 participants (Guest et al., 2006), with an aim to enroll enough participants to reach saturation or redundancy, where no new information is ascertained from additional data collection (Morse, 2000). We aimed to recruit a purposive sampling (Streubert & Carpenter, 2011) (Sandelowski, 2000) of participants from various age groups of individuals >20 years of age, industries, and settings, with the aim of providing heterogeneity in perspectives to fully describe the experience of college educated Black US women in predominantly White work environments.

All participants were recruited from a subsample of study subjects from a previous quantitative study on stress, eating behaviors, and workplace racial composition in college educated Black

US women. The recruitment yielded 20 participants from the previous study. The quantitative study had a similar inclusion criterion as the current qualitative study. At the end of the survey, participants had the option to opt-in to be contacted to participate in the current study.

Participants were provided with a brief description of the current study on the contact form to consent to be contacted for the current study. Participants were contacted via email and directed to an eligibility survey for the current study. Eligible participants were then invited to share their availability for an interview.

### ***Informed consent***

We obtained written and verbal consent from the participants prior to data collection.

Participants were informed of the risks and benefits to the study and provided with contact information to behavioral health resources, should the participant experience any distress or discomfort regarding the topics discussed during the interview, although no interviewee utilized such services as a result of their experience during the interview. Prior to beginning the interview, during the informed consent process, participants were verbally given a summary of the information provided in the informed consent process, outlined study procedures, and given the opportunity to ask questions. Participants were not required to answer any questions at their own discretion and were permitted to pause or end the interview at any time, for any reason.

Participants were given an additional opportunity to withdraw from the study prior to starting the interview process.

### ***Data Collection***

#### Demographic survey:

Participants completed a brief demographic survey, administered via REDCap (Harris et al., 2019; Harris et al., 2009), prior to their interviews. The survey included age, individual income, household income, education level, educational setting (including predominantly White institutions (PWI) or historically Black colleges and universities (HBCU), workplace racial

composition, job title, industry, occupational setting, hours worked per week, self-reported height and weight, MacArthur Social Status Scale, and self-rated health (Demographic Survey: Appendix B). The MacArthur Social Status Scale was included as a measure of subjective social status which is not captured by traditional measures of SES, as this may play a role in body image and perception management in the workplace. The single item measure uses a picture of a ladder asking participants to mark where on the ladder they perceive their social position. A procedure was developed to handle missing data for the survey and can be found in Appendix B.

#### Interviews:

Qualitative data was collected via one-on-one semi-structured interviews, conducted via Zoom with or without video, depending on participant preference. Interviews were audio recorded.

A semi-structured interview guide was used to elicit information about participants' cultural and personal perspectives and experiences regarding weight, body image, and predominantly White work environments. The guide was developed, piloted, and throughout the data collection process, adjustments were made to the interview guide based on the content from previous participants. During the interviews, participants were asked questions such as, "In your opinion, what does the ideal body weight, shape, and size for a woman look like?", "What importance do you think physical appearance has on your professional life, or your professional identity?", and "Does your perception of ideal bodyweight change depending on context and setting? Has it changed since college or childhood? How so?" (See Appendix B for Interview Guide).

Interviews were conducted from August 2023 to March 2024 and lasted between 40 and 75 minutes. Participants were compensated with a \$75 Amazon Gift Card sent to them via email once the interview was completed. Audio recordings were transcribed by a professional

transcription service; the transcriptions were then reviewed for accuracy and removal of all personal identifying information.

### ***Data Analysis***

Quantitative data collected via the demographic survey were analyzed using descriptive statistics with the SAS software and reported in means and standard deviations and counts and percentages. Participant BMIs were calculated based on the height and weight data provided.

Qualitative data were analyzed using thematic analysis with NVivo software. Thematic analysis was selected for this qualitative descriptive study because it allows for a detailed account of the data (Vaismoradi et al., 2013). This analysis approach allows for both interpretive and descriptive analysis (Vaismoradi et al., 2013). We followed Braun and Clarke's steps for thematic analysis (Braun & Clarke, 2006). We began by familiarizing ourselves with the data. We read and re-read the transcripts multiple times to gain a comprehensive understanding of the data.

Next, we systematically coded the data. This initial coding process was conducted inductively, allowing codes to emerge from the data itself, and deductively, as from key concepts related to weight and shape perception identified prior to beginning analysis. After the initial coding, we analyzed and organized the codes to identify broader patterns. We sorted the codes into potential themes and sub-themes, considering how different codes might combine to form overarching themes.

We then engaged in an iterative process of reviewing and refining our thematic schema. Our themes were modified, combined, and renamed as needed. As part of our analysis process, we identified the story that each theme told and considered how the themes fit together in relation to a larger narrative that responded to the overarching research questions of this study.

Throughout the data collection and analysis process we maintained rigor using Guba and Lincoln's operational techniques for addressing credibility, transferability, dependability, and confirmability. In the data collection process, the use of open-ended questions allowed participants to respond in detail creating rich descriptions that facilitate establishing transferability (Lincoln & Guba, 1985). The lead researcher maintained written and audio memos for confirmability. Throughout the process, the researcher engaged in peer debriefing with the second coder to support credibility. Throughout the analysis process, the researcher met with the qualitative expert faculty mentor, as well as a subject matter expert faculty mentor from another institution to review findings and discuss codes to support credibility and dependability. We reviewed the findings to ensure the data collected was congruous to the aim of the study. Additionally, we used the COREQ AND CASP checklist as a guide to support the integrity and rigor of the study. Information regarding researcher positionality can be found in Appendix B.

## Results

We interviewed 20 cis-gendered college educated Black women working full time in a predominantly White work environment at the time of being interviewed. Participants ranged in age from 25 – 57 years old, with a mean age of 36 years (SD = 8.29). Education levels ranged from bachelor's to doctoral degrees. Most (17/20) of participants described their workplace racial composition as "mostly White," and 3/20 were the only Black individuals in their work group. While participants worked in predominantly White work environments and reported attending a predominantly white institution (PWI) for college, they described their social circles as predominantly Black. Participants' BMI ranged from 24-50 kg/m<sup>2</sup>. The mean BMI across participants was 31.7 kg/m<sup>2</sup> (SD= 7.01) and half of participants reported height and weights that computed to a BMI of  $\geq 30$  kg/m<sup>2</sup>, meeting criteria for obesity (CDC, 2022). On a scale of "Poor" to "Excellent" self-rated health, one participant described her health as "Poor," seven

participants (35%) described their health as “Fair”; five participants (25%) described their health as “Good”, six participants (30%) as “Very good,” and one participant described her health as “Excellent”. Further information about participants can be found in Tables B1 and B2.

Several themes emerged from analysis of interview data that shed light on the experience and implications on body perceptions of being a college-educated Black woman in a predominantly White working environment. The first set of themes shed light on the gendered race-specific challenges related to their body weight, shape, and size that Black women experience in predominately White work settings, and how participants think about and navigate these challenges. The second set of themes offer insight into the overarching sensemaking and beliefs of Black women in this study about weight and size, and how they reconcile these with broader frameworks and messaging regarding what counts as a “healthy” body (See table 4.1 for a summary of themes).

Table 4.1 Summary of themes

Theme	Description / summary	Key points
<p><b>1. “You almost have to legitimize yourself”: Navigating hypervisibility and Signaling belonging in predominantly White work environments</b></p>	<p>Participants report feeling hyper-visible in predominantly White space and subjected to perceptions of White coworkers. Participants felt they were scrutinized more because of their status as a Black woman in the space. Participants felt the need to legitimize themselves to counter existing negative perceptions about their qualifications to be in the space.</p> <p>Participants describe a set of appearance related visual norms they contend with as Black women in predominantly White work environments. Participants use manner of dress and hairstyle to signal their belonging, often reporting overdressing compared to their White colleagues. For some, “looking the part” included maintaining lower body weights and smaller body sizes. This was true across settings, but particularly salient in healthcare.</p> <p>Participants described double standards in dress related to both “professional” presentation in terms of belonging in the environment and in terms of the perceived appropriateness of their clothing related to body shape or size in the workplace. Participants describe feeling sexualized for their body shapes and sizes in predominantly White work environments. To counter this, participants report being aware of their clothing, taking care to wear loose fitting clothes which cover more of their bodies.</p> <p>Participants describe the remote work environment as an improvement over in-person environments. Given that the remote work environment involves virtual meetings that do not reveal their bodies, and they are often not required to appear on camera, participants felt relief that they were not as subjected to negative attention related to their physical appearance and presentation that they receive in-person.</p>	<ul style="list-style-type: none"> <li>• Hypervisibility of Black women in predominantly White workspaces</li> <li>• Increased scrutiny and pressure to legitimize qualifications</li> <li>• Adherence to specific appearance norms to signal belonging</li> <li>• Use of dress and hairstyle to counter stereotypes</li> <li>• Emphasis on maintaining smaller body sizes, especially in healthcare</li> <li>• Double standards in professional dress codes</li> <li>• Sexualization based on body shape and size</li> <li>• Adoption of conservative clothing choices to minimize attention</li> <li>• Remote work environment perceived as less appearance-focused</li> </ul>
<p><i>1.1. “I wouldn’t be getting this reaction if I was smaller”: Resisting stereotypes and signaling belonging at the intersections of weight, and gendered racialized stigma</i></p>	<p>Participants describe navigating weight stigma as a Black woman in a predominantly White work environment. Some participants stated that they perceived receiving worse treatment at work as they gained weight, witnessing their Black female coworkers receive worse treatment, or being perceived as less credible with larger body sizes.</p>	<ul style="list-style-type: none"> <li>• Navigation of weight stigma by Black women in predominantly White workplaces</li> <li>• Perceived correlation between weight gain and deteriorating treatment at work</li> <li>• Observed mistreatment of other Black female colleagues with larger body sizes</li> <li>• Perception of decreased credibility associated with larger body sizes</li> </ul>
<p><b>2. “Every day, mental Olympics”: The stress of belonging</b></p>	<p>Participants described having to consider multiple factors in their self-presentation in order to signal belonging in the environment. This included the way they communicated, their hair style, how and when to interact with coworkers and management, their manner of dress, and their body shape and size. Participants expressed distress at having to</p>	<ul style="list-style-type: none"> <li>• Stress and mental health challenges resulting from constant self-monitoring and negotiating multiple factors considered in self-presentation to signal workplace belonging</li> </ul>

	<p>undergo daily “mental Olympics,” and stated that these norms were also enforced by other Black women in their work environments and communities. Participants described this experience as stressful, citing mental health challenges as a result. Several participants engaged with mental health providers to help navigate these issues.</p>	<ul style="list-style-type: none"> <li>• Careful management of communication style, hairstyle, interactions, dress, and body size</li> <li>• Engagement with mental health providers to cope with workplace pressures</li> </ul>
<p><b>3. “Is that really obese?”: Dimensions of Perceptions of obesity</b></p>	<p>Participants expressed discordance with how they viewed themselves, and their weight classification according to the BMI. There were nuances to their perceptions of obesity, namely in extremes. For some, these perceptions began in childhood and adolescence. Several participants expressed concern with labeling themselves as obese, or as persons with obesity, considering obesity a stigmatizing word and associating the term with severe obesity.</p> <p>Participants described biases in BMI, sharing their perceptions that the measure was based on White male populations and may not be suitable for Black women. Some participants therefore did not ascribe to using the BMI as an accurate metric for their weight status, while others indicated they use the BMI to determine their weight status. Still, the majority of those who did use the BMI also acknowledged their perceptions of its limitations in this population. Participants expressed the need for more individualized measures</p>	<ul style="list-style-type: none"> <li>• Discordance between self-perception and BMI weight classification</li> <li>• Nuanced perceptions of obesity, particularly at extremes</li> <li>• Obesity perceptions rooted in childhood and adolescent experiences</li> <li>• Reluctance to self-identify as obese due to stigma</li> <li>• Association of “obesity” term with severe obesity</li> <li>• Recognition of BMI biases, particularly its basis on White male populations</li> <li>• Varied acceptance of BMI as an accurate measure for Black women</li> <li>• Acknowledgment of BMI limitations even among those who use it</li> <li>• Desire for more individualized health measures</li> </ul>
<p>3.1. “It’s not about a number”: Prioritizing health behaviors over body weight</p>	<p>Participants describe prioritizing health behaviors over body size or body weight in terms of their personal health goals and definition of what it means to be healthy. Additionally, some participants challenged the notion that a lower body weight signals health, stating that they were previously engaging in unhealthy practices to maintain lower body weights, had chronic illnesses, or had eating disorders at lower body weights.</p>	<ul style="list-style-type: none"> <li>• Prioritization of health behaviors over body size/weight in personal health goals</li> <li>• Definition of health based on behaviors rather than physical appearance</li> <li>• Challenge to the assumption that lower body weight equates to better health</li> <li>• Acknowledgment of past unhealthy practices to maintain lower body weights, including disclosure of disordered eating</li> <li>• Recognition of chronic illnesses present even at lower body weights</li> </ul>
<p><b>4. “There is no ideal”:</b> <b>Resisting the notion of an ideal body shape</b></p>	<p>The majority of participants resist the notion of an ideal body shape for women, more specifically Black women. While they acknowledged body shape ideals, such as a smaller waist and larger hips, stemming from popular culture and the male gaze, the majority of participants stated that they did not currently ascribe to these ideals. Several participants noted that they ascribed to these ideals when they were younger, but no longer. Participants report their body ideals changing with age.</p>	<ul style="list-style-type: none"> <li>• Resistance to notion of ideal body shape for women, particularly Black women</li> <li>• Acknowledgment of multiple cultural body ideals (for example, small waist, larger hips and a thin ideal)</li> <li>• Recognition of body ideals influenced by popular culture and male gaze</li> <li>• Majority of participants do not currently adhere to these ideals</li> <li>• Shift away from body ideals previously held in younger years</li> <li>• Evolution of personal body ideals with age</li> </ul>



## **“You almost have to legitimize yourself”: Navigating hypervisibility and signaling belonging in predominantly White work environments**

Hypervisibility refers to a notion of otherness, scrutiny and surveillance (Dickens et al., 2019). For Black women in predominantly White work environments, negative stereotypes combined with being marked as different, result in their being perceived as deviant from their White coworkers, subjecting them to increased surveillance (Buchanan & Settles, 2019). Our participants unanimously reported feeling hypervisible in predominantly White space and subjected to perceptions of White coworkers. Participants felt they were scrutinized more because of their status as a Black woman in the space. Participants felt the need to legitimize themselves to counter existing negative perceptions about their qualifications to be in the space. This occurred through excelling in work performance, altering their communication styles, and altering their appearance, which several participants referred to as “looking the part”.

Participants described a set of appearance related visual norms they contend with as Black women in predominantly White work environments. They used manner of dress and hairstyle to signal their belonging, often reporting overdressing compared to their White colleagues. Participants described double standards in dress related to both “professional” presentation in terms of belonging in the environment and in terms of the perceived appropriateness of their clothing related to body shape or size in the workplace. Participants describe feeling sexualized for their body shapes and sizes in predominantly White work environments. To counter this, participants report being aware of their clothing, taking care to wear loose fitting clothes which cover more of their bodies. For some, “looking the part” included maintaining lower body weights and smaller body sizes.

Participant 14 is a 25-year-old laboratory service manager in the northeast. Like several other participants in this study, Participant 14 has been reprimanded at work for wearing the same

clothing as her White female coworker. She shared that this was not an isolated incident, but has occurred with different employers in predominantly White work environments:

*I think about the same critique in my last position that my pants are inappropriate, but it was the same pants that the other women were wearing who may not have had the same body shape that I've had. So I think it does play a role, especially a Black woman. I think of-- I say like our bodies are almost deemed inappropriate just for being that maybe other body types aren't. So I think that has definitely had a slight role in my workplace or even educational work [spaces].*

For all participants, some aspect of their physical appearance was an important part of signaling belonging in these spaces. In addition to the stigmatization of their often larger or more curvier bodies, they tried to mitigate their othering by engaging in these alterations to hair or dress. This was true across work settings. While they did not personally ascribe to an ideal shape or size, they expressed salience in the notion that the ideal shape and size within predominantly White work environments was thin, small, and without curves. In their experiences, these norms were confirmed by comments, exclusion, and even reprimand by White coworkers or supervisors, and, at times, Black coworkers and supervisors who sought to uphold the norms of the space.

Participants engaged in this conversation with an awareness of how their race, gender and body habitus were all implicated in how they were perceived and operated in their place of work. Participant 20 is a 57-year-old administrator in the health sciences residing in the south. She shared her lifelong struggles with weight management, and her experiences with attaining a leadership position in academia as a Black woman at predominantly White institutions. She

underscored multiple goalposts in self-presentation to garner acceptance within the work environment:

*I don't think it's just body weight alone. I think it's the whole package, you know. Like I talked about your body weight. For me, my body weight, my hair, you know, all of those things, it's a complete package that you get judged on when you are in these spaces.*

This was true across settings, but particularly salient in healthcare. Looking the part extends to healthcare spaces, especially in regard to body weight and body size. Participant 13 shares that despite major health challenges previously described, she is perceived by patients as healthy because of her body weight; however, her Black female coworker is of a larger body size and is not taken seriously:

*I would say I've noticed that patients treat me differently than they treat my friend at work. That's based on our body size, which I've noticed. It's funny she may be healthier than me and we might be the same height, 5'4. Like I said, I don't know, 135 or something like that and she might be 250. I noticed the reactions that they sort of look at her like, "How can you help me?" or the advice that you give me versus me or others who aren't her size, and it's almost like in a healthcare setting for you to be taken seriously or for people to listen to you, you have to be a certain size. I would speak to, especially in oncology because we always push balanced meals and plant-based diets and things like that. It's sort of assumed that if you are bigger, you're not following those rules versus somebody who is my size. It's funny because she follows those rules and I don't. I would definitely say in that work environment, especially in radiation oncology. If you look a certain way, if you are not overweight, not*

*obese, you are sort of more respected versus those who are overweight or obese.*

Some participants described navigating weight stigma as a Black woman in a predominantly White work environment. Some participants stated that they perceived receiving worse treatment at work as they gained weight, witnessing their Black female coworkers receive worse treatment, or being perceived as less credible with larger body sizes. Participant 10 is a 32-year-old director of data science residing in the northeast. She describes her experience of feeling as though she has fewer opportunities as her body size has become larger, and her appearance as changed:

*I feel like maybe -- I mean, this could really just be in my head, but I feel like as my body has, you know, proceeded to be different or bigger, I feel like I get less 'pretty privileged' at work. It just used to be like this thing and not that I like necessarily wanted the attention or anything like that, but you know, a lot of doors would open for you. A lot of, "Oh, do you want this?" would happen. And it kind of started dwindling down as I -- not only as I got bigger, but I also like stopped wearing makeup. I locked my hair instead of having my curly 'fro. So, as my appearance looked different, I felt like the response to my appearance was different.*

Notably in her comments on body size changes and privilege loss at work, she also mentions changes in her hair to a more afro-centric hairstyle as an aspect of that status change. Some participants described their body size as being compounded with gendered racial stereotypes, questioning if their larger body size was perceived as "threatening" by White coworkers within that space. In response, some participants reported adjusting their communication styles to be perceived as less threatening. Participant 12 is a 32-year-old project coordinator in the

northeast. In her interview, she described navigating negative interactions and assumptions in various roles throughout her career that she recognized as gendered racial stereotypes. Despite her perceptions of being mild-mannered, shy, and agreeable, she repeatedly received reactions and feedback from White coworkers that she was aggressive or too harsh. She describes taking extra care to alter her communication to counter biases that are also related to her body size:

*I feel like if I wasn't as big as I was—I'm like, 275 [pounds] and I'm 5'9. I'm tall and I'm big. So I just feel like, I don't know how to word it, but I just felt like if things were different, like I wouldn't be getting the reaction. If I was smaller, I guess I wouldn't be as, I don't know, I guess the closest thing I could think of is like as a threat. I don't know if what's being, like, invoked when people are interacting with me, but it's just reactive and I have to anticipate that and make sure like, 'Hey, I'm not trying to start anything. We just trying to do X, Y and Z.' It just feels that way. And I feel like me being a bigger person and like taller enforces that in a way. I don't know.*

Similarly, Participant 20 describes her experience of trying to fit in at work and trying not to be perceived as a threat based on gender, race, and body size. She has noticed similar situations for other Black coworkers, and wishes they could be evaluated on merit instead of racialized perceptions:

*We still have some of these, many, Black people walking around thinking like, you know, you gotta do this, you gotta perm your hair, you gotta, you know. Why do I have to fit in? You know, why do I have to fit in? Why can't I just be me and be taken for my merit and what I bring to the table and not be perceived as such a threat, you know. And that's how we're perceived, you know, as a threat. And maybe if we weren't big, you know, big bones, big*

*boobs, big butt that [would] make us less threatening to White people. So, that's it.*

Both Participant 12 and Participant 20 specifically used the term “threat” or “threatening” when describing how their body size, race, and gender influence other’s perceptions of them at work. This was salient across nearly all participant’s stories. Notably, participants who transitioned to remote work, described the remote work environment as an improvement over in-person in the sense that they are not as subjected to negative attention related to their physical appearance and presentation. Participant 12 described notable changes in her interactions with coworkers and comfort with her body that reduced the stress and mental health challenges she experienced from navigating negative interactions with White coworkers.

“Every day, mental Olympics”: The stress of navigating belonging

Participants described having to consider multiple factors in their self-presentation in order to signal belonging in the environment. This included the way they communicated, their hair style, how and when to interact with coworkers and management, their manner of dress, and their body shape and size. Participants expressed distress at having to undergo daily “mental Olympics,” and stated that these norms were also enforced by other Black women in their work environments and communities. Participants described this experience as stressful, citing mental health challenges as a result. In several interviews, participants made a concerted point to say that while these interactions were stressful, their stress did not impact their work performance. Participant 6 shared this sentiment, but also framed it within the context of normalizing these experiences as a means of self-protection. Here she shares her thoughts that the stress of navigating belonging is normalized for Black women:

*You know what, I personally don't find it stressful. You know what, I think it is stressful, it is stressful, but I think we deal with so much as a community that*

*things get normalized. So we just become accepting of it.[...] [B]ut I feel like if you do hear from people and they tell you it's not stressful because at this point we're numb to it. Like a lot of things going on. It's like a freaking, there's a lot going on against Black woman I feel like in my opinion. So it's like at this point it's like, what else is new? This is the standard that we must live by. We're supposed to know this so it shouldn't be stressful for you. This is the norm for you. So suck it up and take it. But it is a lot, it's a lot, it's just everyday constant thinking like, okay, like is this appropriate? Is this what people would think X, Y and Z of me? Because I have this, or I don't have this. Yeah, that is stressful. Every day, mental Olympics trying to figure out where you stand and how you fit in or how people will perceive you. I don't think other communities have to do that.*

Several participants engaged with mental health providers to help navigate these issues. In her interview, Participant 12 shared her past and current experiences of the stress of navigating stereotype threat in her interactions with White coworkers:

*I'm stressed out all the time, I also have a therapist so I would bring it up there. She also helped me with like, how to like talk to him, because I had this fear of like looking angry or that being used against me. I don't know, like she basically assured me that like, it's possible for me to talk to this person and not coming off this way. I was less worried about that, so that helped. So there was that like therapy and her talking strategies but also like me being proactive, getting their manager involved so they can see what's happening, recording this person and sharing it to his manager.*

In her story, Participant 12 echoes many other participants in that she took extra care to ensure her credibility, as they are subjected to more scrutinization due to their hyper-visible status.

This study sought to understand how college educated US Black women perceived their weight and body size and how that perception is influenced by the context of working in a predominantly White work environment. The findings reveal that participants in this study largely reject measures of overweightness or obesity such as BMI that do not align with their own perceptions of their weight status. While the White-coded norms of the predominantly White work environment privilege thinness, participants' personal perceptions were often different from the cultural norms they contended with in the workplace.

#### **“Is that really obese?”: Perceptions of obesity in college-educated Black women**

Several participants expressed discordance with how they viewed themselves and their weight classification according to the BMI. They often viewed unhealthy weight and body size in the context of extremes, such as morbid obesity. For example, Participant 2, a 37-year-old health navigator from Southeastern US, reported discordance with the parameters in which her medical provider sought to use to diagnose her with obesity:

*Before the pandemic, when I had my actual physical, my doctor said I was obese. I'm like, I'm only 3 pounds over what I was last year. So, I'm like, is that really obese? To me, I guess obesity, or the word obese would mean different to each person. You know, if -- if you perhaps feel like you're obese, then I guess so. But I think there would be a line health-wise for obesity. I mean, obviously if you're 5'2" and you're 400 pounds, to me, obviously, that would be obesity. But I think there's -- it kind of depends from person to person, kind of, what that means.*



Participant 2 critiqued the standards through which she was evaluated such as her weight gain over the past year. In her view, there should be a more individualized measure for the determination of obesity and what constitutes being overweight, not a universal one. She also shared that she thinks obesity can have different meanings based on the individual.

Several participants expressed concern with labeling themselves as obese, or as persons with obesity, considering obesity a stigmatizing word and associating the term with severe obesity. Participants frequently referenced the TV Show “My 600 lb Life”, when describing their perception of persons with obesity, and indicated that it was difficult to conceptualize obesity outside of those extremes. Concerns primarily stemmed from stigmatizing language. A good example of this is Participant 1’s discourse on the term. Participant 1 is a 36-year-old school social worker in New England. She shared that she has struggled with her weight since childhood and has been working with a weight management specialist for several years. She said:

*It's just such a, there's such a stigma with it, like it's like an ugly word to me. It's like almost like not a curse word but it's just like such a negative association. [...] And when I associate like certain words and labels make that harder for me because then it feels like I'm never going to get there. Like if I were to describe myself as obese, that would feel like, oh, that's kind of where you are. You're never going to be in the healthy spectrum again.*

Participant 1 finds the word stigmatizing and discouraging. Others viewed the term as strictly medical and would not adopt it outside of the medical providers’ office.

Additionally, many like Participant 6, a 25-year old social worker in the northeast, rejected BMI as a universal standard of health due to it being historically grounded what they perceived as outdated and Eurocentric metrics of ideal body composition. In her discussion, she shares that:

*I think obesity is a social construct. [...] I actually just started, I'm looking into this, I need to read this book. I forgot what the book is called, but I did learn that BMI, I didn't know that BMI was... there's a foundation of like slavery within like the BMI. [...] The BMI way of testing like body type, not body types but body mass, the body mass index, just like assessing the body mass of certain individuals. I did not know that there was a foundation of oppression and slavery within that. But obesity has never, it literally never reigned right with me because in my opinion, there's no way of accurately assessing the body mass and the body, what's the word, the makeups of the body just by gaining the information regarding someone's height and weight*

Participants described biases in the BMI, sharing their perceptions that the measure was based on White male populations and may not be suitable for Black women. Some participants therefore did not ascribe to using BMI as an accurate metric for their health status based on these perceptions. While this perspective was not shared by all participants, the majority of those who did use the BMI also acknowledged their perceptions of its limitations in this population. Like participants 2 and 6, several participants expressed the need for more individualized measures of health relating to weight.

Conversely, Participant 11, a 39-year-old executive assistant in the Northeast, felt that conversations about the extent to which BMI bias was not applicable to Black women missed the mark, stating:

*They have this system that they use. And I've been seeing people on social media say, 'Oh, that doesn't apply to us, that doesn't apply to Black people.' But I mean, it does because we get the same diseases as anyone else. So, it really boils down to that. Like, are you at a healthy weight for your height, for*

*your frame? And if you're not, that's when you're categorized as obese and along with that comes comorbidities, diseases that you can possibly develop. Even if you don't develop those, if you're the lucky one that doesn't develop those diseases right away, just carrying around that excess weight is wear and tear on your body, on your bones.*

Participant 11's remarks not only reflect heterogeneity in perspectives among college educated Black women, but also speak to a larger conversation surrounding the tension between stigmatization of obesity, and the risk for comorbidities associated with excess weight.

Participant 11 also names social media as a source of information, reflecting conversations with other participants surrounding varying sources of health information. Beyond discussion of the BMI measure and the label of obesity, all participants still endorsed the importance of maintaining weight related health behaviors.

A sub-theme that emerged in this area was that participants felt their perception of health was not about a specific number on the scale. Instead, they described prioritizing weight-related health behaviors over body size or body weight in terms of their personal health goals and definition of what it means to be a healthy weight. Health behaviors included diet quality, physical activity, and sleep quality. Many participants included mental health as a critical aspect of a healthy body. Participants also described acknowledging and accepting changes in body weight, namely weight gain, with age, as Participant 18, a 36-year-old executive assistant in the Mid-West, states, "Are you really going to be what you were in high school? Absolutely not. But I also know how it impacts my energy. So, I'm, like, okay, this is beyond -- this is not about the number. This is okay. I just want to be healthy, healthier." In conversation with this, some participants challenged the notion that a lower body weight signals health, stating that they were

previously engaging in unhealthy practices to maintain lower body weights, had chronic illnesses, or had eating disorders at lower body weights. Participant 13 is a 31-year-old allied health professional in the northeast. In her discussion of weight status and health she commented:

*It's person dependent. When I was the skinniest that I was, I wasn't healthy. I think right now I'm at a healthy weight because my lupus is managed and I need to work out, but I'm more active than I was so I just think it just depends on where that person is in their life. Eating balanced meals, exercising as much as you can whether it's a brisk walk or intentional exercise. I think that's definitely a healthy weight because a healthy weight on somebody could be 180 lbs it could be 200 lbs, it could be 125 lbs. It's just person dependent.*

Participant 13 described a rejection of a weight standard and instead endorsed a more nuanced and individualized reflection on multiple factors beyond weight to determine health.

### **“There is no ideal”: Resisting the Notion of an Ideal Body Shape**

Nearly all participants resisted the notion of an ideal body shape for women, more specifically Black women. While they acknowledged body shape ideals, such as a smaller waist and larger hips, stemming from popular culture and the male gaze, the majority noted that they ascribed to these ideals when they were younger, but stated they did not currently ascribe to these ideals. Participants report their body ideals changing with age. Participant 8, an HR coordinator from the southeast shares her perspective:

*In my opinion, I can't really say that I have an ideal shape, to be honest, just because the older I get, the more I realize everybody views things differently.*

*People view body shape differently and there's also cultural shifts and trends that happen, like, you know, hips and a big butt was not flattering back in the nineties, like being super thin was, but then suddenly now everybody has a BBL [Brazilian butt lift] and so I don't necessarily think that there is one set way. It's just whatever makes each person feel confident and happy.*

Similar to other participants, Participant 8 described a shift in social norms over time which vary based on social factors and settings such as media consumption, and popular culture. Because the ideal is constantly shifting, she rejects the notion of the ideal all together. Interestingly, she names a past “super thin” ideal, illustrative of the heterogeneity in ideal body shapes described among participants past and present. While there was agreement across participants that there was no ideal body type, the body ideals that participants described previously adhering to and subsequently rejecting were different based on contextual factors such as racial and ethnic composition of social groups, geographic region, the decade in which they came of age, and body norms related to extracurricular activities such as ballet and track and field.

## Discussion

Our study provides insight on the body weight, shape, and size perceptions of college-educated Black US women working in predominantly White work environments and explored the potential role of the work environment in the participant’s perceptions. Findings suggest the social context of the work environment subjected interviewees to negative attention and scrutiny for their appearance that impacted their varying perceptions of their bodies. Specifically, participants expressed such environments influencing their body perceptions among 3 domains of inquiry: body weight, body size and body shape.

Our participants were acutely aware of how their appearance influenced their belonging in predominantly White work environments. In some ways, participants exhibited the concept of

double consciousness or “twoness” – a duality in self-perception as a result of looking at oneself through the lens of a White society. This concept was originated by W.E.B. DuBois (1903) and used to describe the Black middle class. In order to enter spaces that may foster economic and class mobility, Black individuals must contend with White social norms that may differ from their personal beliefs. White individuals then have the power to define themselves and others, in accordance with fixed and defined social norms, whereas Black individuals have less opportunities of self-definition within these spaces.

For our participants, their personal body perceptions were challenged by the predominantly White environment in which they worked, where they either directly experienced, witnessed, or had knowledge of negative consequences of the intersections of weight stigma and gendered racialized stigma. Participants reflected on prominent gendered racial stereotypes of being perceived as “threatening” or “aggressive,” coupled with body size (Collins, 2002). Part of this is related to the presence of gendered racial stereotypes, which research demonstrates can inversely impact feelings of belonging (Holder et al., 2015; Reynolds-Dobbs et al., 2008)

Consistent with previous findings, the majority participants with obesity as measured by the BMI, did not describe themselves as persons with obesity (Hendley et al., 2011). Further, our participants did not endorse a thin ideal (Capodilupo, 2015). Contrary to other literature (see: (Baruth et al., 2015; Chithambo & Huey, 2013) this was not due to a desire of larger body size or a different standard of beauty. Instead, this was due to wisdom that came with age, a commitment or a desire for self-care and healthy practices, and previous experiences with weight struggles that were either unfruitful, or the result of maladaptive practices such as disordered eating and body dysmorphia, or physical illness. Contrary to literature claiming a Black feminine body ideal, our sample almost unanimously declined the notion of a feminine ideal. This may be due to participant age, which is consistent with previous findings that Black

women's body ideals change with age (Marilyn et al., 2023). However, while our sample was predominantly in their 30's, participants ages ranged from 25-57, indicating some congruence across age groups. Also consistent with some of the findings of Cameron et al. (2018), several participants in our sample of college-educated Black women questioned the body mass index (BMI) as an appropriate measure of weight status for Black women. Our participants were highly educated, half held a master's degree or higher. Perhaps as a result, participants were familiar with literature and research related to obesity and Black women. Empirical knowledge was not limited to those participants working in healthcare.

Participant responses suggested that, in some respects, they viewed body weight or size as an indicator of health. Some referred to clinical measures such as Body Mass Index to decide on if they would consider themselves to be overweight, obese, or "healthy". However, some participants rejected this measure as being inherently racialized (White-male coded) and not applicable to Black women's bodies, prior studies report similar findings (Cameron et al., 2018; Justin & Jette, 2022). The rejection of the word "normal" in relationship to body habitus may stem from the historical underpinnings situating Black women's bodies as the "other" (Strings 2015, Strings 2022, Collins 2000). This history complicates conversations surrounding obesity in Black female populations. While participants reference to obesity as a stigmatizing concept is supported by previous literature in obesity stigma overall, their gendered racialized social status as Black women may present another reason to reject being presented as "abnormal" or "diseased" (Strings, 2015). It is possible that this history may provide context to the incongruence in weight perception observed in previous studies.

Our findings differ from those who assert either larger body size preference, or curvaceous shape preference for Black women (Kelch-Oliver & Ancis, 2011). With reference to body shape and size, overall, there was no ideal or preference largely agreed upon by participants in the

study. The women in the study mentioned that their evaluations on these measures were influenced by several factors including family, social circle, social media, education, occupation, and life experiences. In their diversity of experiences, they were more likely to indicate that the ideal body type is an individualized and diverse designation. Contrary to literature claiming a Black feminine body ideal, our sample almost unanimously declined the notion of a feminine ideal. This may, again, be due to participant age (Marilyn et al., 2023). However, our participants were not “immune” to pressures of body standards as asserted by previous literature (Gustat et al., 2017; Johnson et al., 2009), more so, they contended with these earlier in life, and rejected them based on their experiences (Awad et al., 2020; Harris, 2006).

It is well known that persons with obesity experience weight stigmatization across settings. Obesity is associated with perceptions of lower capabilities and laziness (Puhl et al., 2008). Weight bias in the workplace is also well-documented, with studies reporting employee candidates with obesity are perceived as less suitable for hiring than those with overweight, and current employees are less suitable for sustainable work (Bartels & Nordstrom, 2013) . Furthermore, women with obesity are considered less desirable and capable than men with obesity than men across work settings (Flint et al., 2016). While this occurred for participants in different settings, it appears most salient for participants working in the healthcare sector. Our findings contribute to a growing body of research demonstrating that healthcare providers experience obesity stigma in the workplace from patients (McClure-Brenchley et al., 2023; Moller & Tischner, 2019; Puhl et al., 2013). Participants described their concern of overlapping negative assumptions of Black women and persons with obesity of being underqualified and less credible (Justin & Jette, 2022). Additionally, some participants described receiving worse treatment and exclusion from advancement opportunities at work, such as invitations to meetings, with weight gain.



All participants recalled either witnessing or receiving punishment in the workplace for the gendered racialized stereotypical perceptions of their body shapes as sexual and enticing in fitting clothing, even when wearing the same clothing as their White counterparts. The findings suggest that these perceptions, when in concert with the standards and norms in predominantly White work environments, can create feelings of a decreased sense of belonging, hypervisibility, stress, or insecurity among Black women in these spaces. The data reveal that Black women feel judged or subjected to more scrutiny than other racial groups in these environments (Dickens & Chavez, 2018; Dickens et al., 2019; Louis et al., 2016). This feeling can also lead to revelations of double standards in the workplace, specifically regarding the physical appearance of White women—in terms of body shape and size, and often with clothing as a proxy (Cumberbatch, 2021).

### **Implications in Research, Practice, and Policy**

#### *Workplace policies and Diversity*

Regarding interventions, previous studies have suggested mentorship from more senior Black women in predominantly White work environments (Crawford & Smith 2005, Griffin & Resnick, 2011). This intervention may be beneficial as Black mentors can serve as a buffer and source of support for less senior Black professional women. However, this could also lead to more stress as institutional actors are more likely to uphold of professional norms that may be rooted in Eurocentricity due to their tenure in the work environment. In *Racism without Racists*, Bonilla-Silva discusses anti-Black Black people in the context of politics. He contends that Black employees may have a limited role in shaping policy due to appointing a few conservative Black individuals to higher office with the sole purpose of visually, symbolically integrating the political system while preserving, maintaining, and defending the order of White dominance (Bonilla-Silva, 2021). However, despite this possible confounding, it is arguable that the onus for a more

inclusive work environment should not fall on individual actors, but instead be part of a larger institutional policy supporting workplace diversity and fostering mentorship at multiple points. Policies that abandon colorblind approaches (Dickens et al., 2019), may minimize tokenism and the need for identity shifting.

#### *Implications of Remote work for workplace policy*

Our sample was mixed in terms of workplace location (remote, in-person, and hybrid). Participants who had previously worked in person but shifted to remote or hybrid work during the pandemic reported more satisfaction with their work environment and less exposure to the consequences of hypervisibility. These findings are in line with recent studies (Nicholson et al., 2022) and non-empirical references that Black women feel more comfortable working remotely because the remote work environment presents a buffer to experiences of racism ("Black women often feel more comfortable working remotely," 2021; "Some Black women feel safer working from home and are opting out of office life to escape workplace racism," 2021; Tulshyan, 2021). This marks another potential and significant opportunity for intervention via institutional policy. Participants in our sample who were persons with disabilities or chronic illnesses also expressed relief with the inclusion of remote work. Future studies will examine this empirically to inform workplace policy.

#### *Clinical implications*

The differing opinions about the usefulness of BMI and other current measures of weight status expressed by our participant highlight the need for newer measures and more diverse measures to make accurate depictions about the state of Black women's' health. Our findings illustrate that the concept of health cannot be determined by one universal measure for all participants in this study, or all patients in a clinical setting. By comparing their personal criteria for ideal weights to

what society would consider a healthy size, participants demonstrate that they perceive a “one-size-fits all” approach to measuring health as flawed. Instead, they argue for considering a personal’s personal profile including their morbidities, eating practices, physical activity routines and self-care practices. This underscores a need for clinicians and researchers alike to engage more in a critical conversation about BMI, to acknowledge stigmatizing language, and to consider adjusting the language of “normal” weight and instead having discussions with patients based on risk. While this research is currently ongoing, it is important to put this into practice.

### *Limitations*

A limitation of this study is that while we included Black US-born women, we did not account for immigrant generation. As participants described their families as sources of influence regarding body perceptions and respectability at work, it is important to acknowledge the meaningful differences that may occur when family of origin has recently emigrated to the US. Additionally, there is limited information regarding body image concerns for older Black women (Lowy et al., 2021). A strength of our study was the inclusion of multiple age ranges; however, a limitation was that the majority of our participants were in their 30s, which may have obscured meaningful differences and limited our ability to understand the perspectives of other age groups in-depth.

### **Future Research**

Future research should include studies equally sampled across generations to more thoroughly examine meaningful differences. Future studies may also focus on weight stigma in Black health professionals, as this was an interesting finding related to the intersections gendered race and weight stigma in the work environment warranting further investigation.

Additionally future studies will include other aspects of identity such as gender presentation, sexual orientation, and disability status, as these may also interact with appearance norms and

impact feelings of belonging within predominantly White work environments (Bowleg et al., 2008).

### Conclusion

In conclusion, this study provides valuable insights into body and weight perception of US Black women and their experiences in the workplace. Hypervisibility and impression management in predominantly White work environments influenced perceptions of body perceptions of college educated Black US women. Outside of the context of the work environment, participants expressed different views on body weight, shape, and size. These findings highlight the need for further research in this population, as well as changes in workplace policies and clinical standards.

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## CHAPTER 5: CONCLUSION

### Introduction

Obesity is a complex and multifactorial disease which is a risk factor for a range of diseases across systems over time. It is one of the core risk factors that underlie cardiovascular and cardiometabolic disease (Carnethon et al., 2017). The association of cardiovascular mortality with obesity is strongest in Black US women, underscoring a critical need for understanding and addressing mechanisms for persistent disparities in obesity for this population (Shockley & Burrell, 2024). The prevalence of obesity in the United States (US) using a body mass index (BMI) threshold of 30 kg/m<sup>2</sup> or greater in Non-Hispanic Black US women is 57.9%, which is higher than all other groups by race/ethnicity and gender (Stierman et al., 2021). While obesity is typically inversely associated with markers of socioeconomic status, such as income and education level among US women of all other racial/ethnic groups, prevalence rates remain steadily high among Black US women regardless of income and education level (Ogden et al., 2017b). The association of health and socioeconomic status is racialized (Homan et al., 2021). Evidence suggests that Black US individuals experience “diminishing returns,” meaning that the socioeconomic resources of income, wealth, and education are less protective in mitigating disease risk for US Blacks than US Whites (Assari, 2018; Boen et al., 2020; Ciciurkaite, 2021). Diminishing returns are also racially gendered, meaning that Black-White health gaps in obesity and hypertension, for example, are larger among women than men (Hargrove, 2018). Upward socioeconomic mobility experienced by Black women as they attain higher income and levels of education can result in poor health outcomes by multiple mechanisms including chronic stress exposure and social exclusion (Hudson et al., 2023; Hudson et al., 2020; Hudson et al., 2016; Walton & Boone, 2021). Stigma and stereotypes are considered upstream and downstream mechanisms that negatively influence health (Hatzenbuehler et al., 2013; Phelan et al., 2014;

Priest & Williams, 2017). Exposure to these pathways may occur in the workplace for college-educated Black US women (Hudson et al., 2020).

The purpose of this dissertation was to examine the interactions of place and stigma and their associations with weight status among college-educated Black women working full-time via two mechanisms: eating behaviors and shape and weight perceptions. In examining these interactions, we sought to contribute to the literature unravelling the complex associations of socioeconomic status and weight status for Black US women, as disparities in obesity are largest at the highest levels of socioeconomic status, complicating resource-based mechanisms for higher body weight previously explored in the literature. Using a socioecological framework with an intersectional lens, we examined the role of the work environment as a space of socioecological significance for college-educated Black US women, as education and occupational achievements are vehicles for upward socioeconomic mobility for this population (Gilbert et al., 2022; Higginbotham & Weber, 1992; Holmes & Zajacova, 2014). Working full-time, a significant portion of adult life is spent in the workplace. Given what is known about social and environmental influences on weight status, it is prudent to examine the work environment as a space of influence, and as a site of potential intervention.

The overall dissertation study aims were as follows: Aim 1: Investigate influences of sociocultural and socioeconomic status in sex and gender differences on obesity prevalence, comorbidities, and treatment; Aim 2: Given the paucity of research related to sociocultural and socioecological influences on weight status for this population, explore the relationships between psychosocial stress, stigma, and workplace environment, including workplace racial composition, and their potential influence on obesity-related eating behaviors in college educated Black US women who are employed full-time; Aim 3: Understand weight and shape



perceptions in college educated Black US women who work in predominantly White environments and examine the influence of the work environment in these perceptions.

In three articles, we sought to answer the question: How does the workplace environment influence weight status in college educated Black US women? We began with addressing aim 1 through a published review of sex/gender difference in obesity prevalence, comorbidities, and treatment in Chapter 2. We then addressed aims two and three through a multi-method series of studies examining the potential impact of the workplace on weight status in college educated Black women as it relates to eating behaviors in Chapter 3 and weight and shape perceptions and body image in Chapter 4.

#### Summary of Key Findings

In Chapter 2, we presented a previously published comprehensive review of the sociocultural, environmental, psychological, and physiological mechanisms contributing to sex/gender differences in obesity prevalence. The analysis revealed that gender norms and identity significantly influence these differences through various pathways. Region-specific customs, norms, and beauty standards shape eating and physical activity behaviors differently for men and women. Gender-based food preferences, partly influenced by targeted advertising and cultural depictions of masculinity and femininity, play a role in dietary choices. Of note, the chapter also explored sex and gender differences in stress response and social relationships, which correlate with weight gain, particularly among women. The study emphasized the complex interplay between weight status, gender, race/ethnicity, and socio-environmental factors. It concludes by calling for further research that addresses these social determinants of health and incorporates multilevel dimensions of sex/gender, including structural, social, and individual factors, to better understand and address obesity disparities between men and women. We identified two areas of interest to explore in the relationship of weight status, race,

gender, and socioecological factors to further explore in the empirical studies: psychosocial stress and eating behaviors, and weight/shape perception and body image.

In Chapter 3, we conducted a web-based survey of 123 participants to explore the associations of psychosocial stress and eating behaviors among college educated Black US women employed full-time. This study had four aims, which sought to address Aim 2 of the overall dissertation. Our primary aim of this study was to examine the associations between perceived stress and emotional eating in college educated Black US women who are currently employed full time. We hypothesized that higher perceived stress will be associated with higher emotional eating. For our secondary aims, we examined the associations between perceived stress and binge eating in college educated Black US women who are currently employed full time, and the associations of work stress and gendered racial microaggressions with emotional eating and binge eating. We hypothesized that higher perceived stress will be associated with higher binge eating, and that higher work stress and greater reports of gendered racial microaggressions will be associated with increased emotional eating and binge eating. Finally, for our exploratory aim, we explored the role of workplace racial composition in the association of psychosocial stress and emotional eating and binge eating.

Our findings revealed that perceived stress and contextualized stress were associated with obesogenic eating behaviors. For aim one, our hypothesis was supported, as higher perceived stress and BMI were both significantly associated with more emotional eating, even after adjusting for related participant characteristics of age, depressive symptoms as reported by the PhQ2, reported history of anxiety, education level, and income. Our hypothesis was supported again for aim two, as higher perceived stress, BMI, and depressive symptoms were all significantly associated with more binge eating, even after adjusting for related participant characteristics. Our hypotheses for aim three were partially supported.

In aim three, the gendered racial microaggressions “silenced and marginalized” subscale (GRMS-A SMS) was positively and significantly associated with emotional eating. However, after adding PhQ2, BMI, income, education, PMH hypertension and PMH high cholesterol to the model the effect of GRMS-A SMS was no longer significant. Similarly, as hypothesized, high work stress was positively associated with higher emotional eating. However, after adding income, education, BMI, PhQ2, PMH anxiety, and age to the model, the effect of work stress was no longer significant. Our hypotheses were not supported with GRMS-A SMS or WSQ and binge eating, nor the overall GRMS-A and either measure of binge eating. Across covariate models in aims one through three, BMI and PhQ2 were both more significant than the measure of stress or contextualized stress in the model. This suggests that depressive symptoms and BMI may play a role in the associations of stress, eating behaviors, and weight status in this population in general, and in the context of the work environment.

In our exploratory aim perceived stress and eating behaviors were more strongly correlated in participants who reported working in Mostly/All Black work environments and Mostly/All White work environments than in “About Half Black” work environments. Furthermore, Participants with higher education and at the highest levels of income are more likely to work in predominantly White work environments.

In Chapter 4 we conducted 20 in-depth semi-structured interviews with Black US women who were employed full-time in participant-described predominantly White work environments. Through these interviews, we sought to answer two research questions to address aim 3 of the overall dissertation: How do college-educated Black US women working in White work environments perceive body weight, shape, and size? How is that perception guided by their experience in predominantly White work environments?

Four themes emerged related to our research question, that we conceptualized in two parts. Regarding the predominantly White work environment, hypervisibility and impression management and the stress of navigating were themes across all participants. Participants described feeling hyper-visible in predominantly White space and subjected to perceptions of White coworkers. As they felt they were scrutinized more because of their status as a Black woman in the space, participants described the need to legitimize themselves to counter existing negative perceptions about their qualifications to be in the space. Participants engaged in impressions management to conform to White-coded appearance norms and altered their manner of communication and dress to signal belonging and “look the part.” For some, “looking the part” also included maintaining a lower bodyweight. This was particularly salient for participants working in healthcare. Participants found that thinness was privileged, and larger body sizes were punished within the predominantly White work environment, as they would get written up for wearing ostensibly inappropriate clothing that was not considered inappropriate for coworkers of smaller body sizes. Participants described experiencing more exclusion at work with weight gain. Several participants found these interactions and daily management of norms and expectations stressful and engaged with mental healthcare providers to manage their stress. In contrast, while there was heterogeneity among perspectives, we found that participants’ personal perspectives on body weight, shape, and size, were often different than the aforementioned perspectives enforced within predominantly White work environments. The majority of our participants did not ascribe to a weight, shape, or size ideal, and therefore did not situate themselves in conversation with an ideal to influence their perceptions. Instead, our participants took a holistic approach to health and their perceptions of a healthy body that were not informed by popular or interpersonal notions of body ideals, but instead their feelings of well-being and their engagement in health behaviors. These health behaviors included healthy diet, regular exercise, sleep quality, mindfulness, “self-care,” and engaging with mental health

providers. For nearly all participants, mental health was critical in their perspective of having a healthy body. Several participants questioned the usefulness or appropriateness of weight status as defined by the BMI in their perceptions of overall health (Blackman Carr & Barlow, 2023).

## Synthesis

We examined the socio-ecological context of bodyweight across all three studies. Prominent themes that emerged across the two empirical studies were the connections between gendered racial microaggressions, stress and workplace racial composition. Gendered racism has been associated with psychosocial stress and distress in previous studies. In these studies, stress is often included as an intermediary in associating gendered racism with poor health outcomes (Jerald et al., 2017).

Studies revealed that controlling images play a key factor in the associations of gendered racism and stress (Jerald et al., 2017). Across studies, results demonstrate a duty to protect oneself from stereotype threat, and a desire and a sense of responsibility to improve the popular image of Black women as a group. Stigma and stereotypes are considered proximal pathways by which both cultural and structural racism influence health (Priest & Williams, 2017). Attitudes and beliefs regarding a marginalized population influence the wider social environment from human capital to national policies. Further, intrapersonal and internalized stereotypes have been demonstrated to impact performance and are associated with psychological distress. Stereotype threat refers to a phenomenon in which an individual is evaluated in reference to a negative stereotype about their specific group, which elicits a psychological stress response. The phenomenon only occurs in “stereotype-vulnerable,” or marginalized groups (Priest & Williams, 2017, p. 169).

The Gendered Racial Microaggressions Scale “Silenced and Marginalized” Subscale (GRMS-A SMS) used in Chapter 3 evaluates the stress appraisal gendered racial microaggressions experienced by Black women in the workplace and in educational environments. Part of the construction of this subscale includes gendered racial stereotypes of Black women, such as “the angry Black woman” that serve to silence Black women in these settings as they feel reluctant to speak-up for fear of being negatively stereotyped (Lewis et al., 2013; Lewis & Neville, 2015). Participants in the quantitative study rated these experiences as stressful, and their responses were associated with higher emotional eating.

While stress was central to the overall hypothesis of the survey study, it emerged as a theme in the qualitative study. Conversations surrounding stress were initiated by the participants, the extent to which we updated the interview guide to include questions regarding the stress of navigating the predominantly White work environment. Participants found navigating the predominantly White work environment stressful. Specifically, the “mental Olympics” of behavioral and appearance-related impression management was a stressor for participants. Experiences of participants in the qualitative echoed those explored in the questions of the GRMS-A SMS in the quantitative study. Participants felt the need to thwart negative stereotypes, and prove their worthiness and belongingness in the predominantly White work environment. Other studies have found that Black US women feeling the need to succeed to prove themselves in the face of adversity is a risk factor for poor health outcomes (Allen et al., 2019). Taken together, the stigma experienced by Black women within the context of the work environment contributes to weight status, either through eating behaviors, chronic stress, or to appearance norms of the predominantly White workplace.

### **Implications for Future Research**

The results of this study provide several fruitful avenues for future research. Based on the findings of this dissertation, additional research is needed to further explore the role of the work environment in shaping disparities in obesity for college educated Black US women.

### ***Intersectionality lens***

Future research in this population should be conducted with an intersectional lens, if we are to embrace, rather than avoid the social and structural inequities that, in turn, produce and reproduce inequities in health (Bowleg, 2012; Hankivsky et al., 2017). An intersectional lens can be applied to most frameworks as it interrogates power dynamics and historical context.

There is a critical need for an intersectionality lens in the reporting of nationally representative data. Without it, crucial information may be obscured. Disaggregated data, such as that of Black and White, or men and women, but not that of Black women, for example, creates invisibilities, and an erasure of women of color that obscures disparities that evince larger structural inequities (Laster Pirtle & Wright, 2021). The same can be said of the disaggregation of socioeconomic status measures. For example, the most recent nationally representative data on obesity from the CDC reports race and gender and socioeconomic status but do not look at race and gender by socioeconomic status. In fact, the most recent nationally representative obesity data from the CDC that includes gender and race/ethnicity by socioeconomic status was published in 2017, using data from the 2011-2014 NHANES (Ogden et al., 2017a). Based on the data presented in the 2017 paper, we were able to identify the disparities in obesity at higher levels of SES in Black US women that prompted our investigation into the mechanisms, underscoring the significance of this type of analysis.

### ***Workplace Racial Composition***

The role of workplace racial composition in shaping health outcomes for Black US individuals is an emerging area of research (Assari & Moghani Lankarani, 2018). We recommend conducting future research oversampling predominantly Black and about half-Black work environments with a larger and equal sample size of at least 80 participants in each group to repeat the analysis we began to address in our exploratory aim. More longitudinal studies are needed that explore the relationships among stress and eating behaviors within the context of workplace racial composition. Based on the findings of this dissertation, future research regarding the prevalence and mechanisms of obesity should focus on stress and resources within various domains. Additionally, we are calling for qualitative and quantitative research that investigates the potential factors in mitigating the stress experienced by Black US women in predominantly White work environments as points of potential intervention.

### ***Remote work***

The results of our qualitative study indicated that some participants prefer remote work, describing the remote work environment as an improvement over in-person environments given that remote work involves virtual meetings that do not reveal their bodies, and that they were often not required to appear on camera. Participants expressed feeling relief that they were not as subjected to negative attention related to their physical appearance and presentation that they receive in-person. Future studies will examine the potential role of remote work in mitigating negative experiences of Black US women in predominantly White work environment empirically to inform workplace policy.

### ***Weight status, stigma and occupation***

The perspective of Black women healthcare providers on the intersections of weight stigma and gendered racial stigma in the work environment is a potential area for future research.



Participants in Chapter 4 working in predominantly White work environments in healthcare settings found maintaining lower body weights particularly important not only in signaling belonging, but in signaling credibility among staff and patients. Future studies with particular attention to this population are warranted.

### ***Weight status and SES in Black US women***

The interviews in Chapter 4 provided rich descriptive data for future studies. Not all findings could not be included in the current study. In a future secondary analysis, we will explore the heterogeneity of resource access among college educated Black women. Of note, participants with master's degrees described lack of neighborhood resources and difficulty with finances. This suggests, similar to prior studies, that education and income are not necessarily strongly related in this population. This is also supported in our quantitative study, where we added both education and income to the covariate models. Typically, education and income are not added to the same model because they are both proxies for socioeconomic status, as discussed in Chapter 1 (Torssander & Erikson, 2010). This implies that higher educational attainment would result in higher income. However, we found no multicollinearity among these variables when adding them to the model in our population. The variance inflation factor test (VIF), which is used to test multicollinearity was relatively low (1.71), as conservative VIF cut-offs for multicollinearity are between 5 and 8.

### **Implications for Interventions and Practice**

Intersectionality is also a tool for action and intervention (Blackman Carr & Barlow, 2023; Bowleg, 2012; Hankivsky et al., 2017; Heard et al., 2020). Though weight loss interventions have, generally, been efficacious, they have consistently yielded significantly less weight loss for Black women compared to their counterparts (Blackman Carr & Barlow, 2023). In a recent

review of standard behavioral weight loss treatment for Black women, authors called for a Black feminist, womanist approach to weight loss interventions for Black US women. The results of this dissertation support this assertion, acknowledging ongoing studies that use intersectional approaches to develop relevant, population specific, and culturally tailored stress-reduction interventions for weight management in Black US women (Blackman Carr & Barlow, 2023; Buro et al., 2022).

The results of our qualitative study indicate that Black US women take a holistic approach to health. Considering social context (Bowleg, 2012; Hankivsky et al., 2017), future interventions for high-SES Black US women may take into account their constructions of holistic wellness as a health priority, as observed in our study and others (Walton et al., 2023).

### **Implications for Policy**

In addition to the rationale described above, this study selected the workplace as it is a site for relatively attainable policy changes at the community level, within individual institutions (Leka et al., 2011; Wu et al., 2021). These can include, but are not limited to, employer-sponsored mental health resources; comprehensive and intentional efforts to promote diversity, equity, and inclusion regarding race/ethnicity, gender, sexuality, and disability status; and implementing comprehensive stress management strategies that encompass providing resources for employees, tackling organizational factors contributing to stress, and minimizing both physical and psychosocial stressors within the workplace environment (Wu et al., 2021). Based on the results of our study, we assert that if our findings hold in future research, workplace policies intentionally targeting workplace diversity and inclusion, and providing access to mental health resources are of top priority. Additionally, as previously mentioned, pending additional research, workplace policies that include options for remote or hybrid work may be of use for mitigating stressors that lead to obesogenic behaviors for Black US women in predominantly White work

environments. For all future workplace policies, it is suggested that institutions take a Black feminist informed approach in policy development where they engage with the community to center their experiences to create appropriate and effective policies (Barlow & Johnson, 2021).

Additional avenues of research may have the potential to inform workplace policies at the state and national level as well. The results from our qualitative study revealing double standards in dress related to body shape and size for Black women may inform the need for additional national anti-discrimination policies related to appearance, similar to the CROWN Act, a California law that prohibits discrimination based on hair style and hair texture.

### **Limitations**

The results of this dissertation should be interpreted within the context of the study limitations. In both the quantitative and qualitative studies, we did not address other intersectional identities such as sexual orientation, or disability status. The exclusion of these categories obscures meaningful intragroup differences in the experiences of college-educated Black women (Mason & Lewis, 2015). While our inclusion criteria did include all individuals who identified as women-cisgender or transgender, we did not make a concerted effort to recruit transgender women. Therefore, the perspectives of transgender women are absent from our study. As we asserted in Chapter 2, there is a need for inclusion of gender minorities in research. Additionally, in the qualitative study, we did not include gender presentation. This is important because, while a participant may identify as a Black woman, their gender presentation may be more masculine, changing the ways in which they are perceived and perceive themselves, and in turn their feelings of belonging in the work environment (Bowleg et al., 2008). Future studies conducted with an intersectional lens will also include other aspects that may influence feelings of belonging at work which were not addressed in these studies like disability status, gender presentation, sexuality.

We emphasized the use of Body Mass Index (BMI) across all three studies. The BMI serves as a cost-effective and straightforward tool for categorizing weight status, including underweight, healthy weight (also described as normal weight), overweight, and obesity. While BMI does not directly measure body fatness, it does show a moderate correlation with more precise body fat measurement methods. Notably, BMI demonstrates comparable strength in correlations with various metabolic factors and disease outcomes as these more direct body fat assessments. Alternative methods for measuring body fatness include skinfold thickness measurements using calipers, underwater weighing, bioelectrical impedance, dual-energy x-ray absorptiometry (DXA), and isotope dilution. However, these techniques often present challenges in terms of accessibility, cost, and implementation. Several of the aforementioned measures require expensive equipment or highly trained personnel to administer, limiting widespread use. Furthermore, these methods can be difficult to standardize across different observers or machines, which complicates efforts to make reliable comparisons between studies or across different time periods. These limitations can impede consistent and comparable data collection in research and clinical settings (CDC, 2022). Additionally, some research suggests there may be differences in adiposity at higher BMIs by race/ethnicity (Heymsfield et al., 2016). However, we suggest those implications be interpreted with caution. Nevertheless, using other measures may allow for better understanding the effects of stressors and social factors on weight status.

## Conclusion

The findings of this dissertation contribute to a growing body of research that seeks to acknowledge and address the persistent disparities in obesity for Black US women using an intersectional lens. Our findings demonstrate that there are multifactorial, but addressable ways in which the work environment influences weight status for college educated Black US women. Eating behaviors, stress, body perceptions, stigma and the social environment are important factors, that may work in tandem in population specific ways. Further, the findings of this

dissertation highlight the significance of the work environment as an understudied area contributing to disparities in this population and provide hypothesis-generating results to guide future avenues of research. The nuances in health risk and protection evince complexities in the persistent disparities Black US women face with obesity despite socioeconomic gains, owing primarily to structural racism, in all of its manifestations (Shockley & Burrell, 2024). The intricate relationship between health outcomes and their social determinants underscores the complex nature of health disparities. These disparities cannot be viewed as isolated phenomena but rather as manifestations of broader societal inequities. The disproportionate burden of chronic conditions observed among Black women serves as an indicator of pervasive structural inequalities that permeate both healthcare systems and wider social structures at all levels in within various spheres. This interconnectedness necessitates a holistic, intersectional, and historically informed approach in addressing health inequities within research, policy, and practice (Chinn et al., 2021; Spinner, 2022). Acknowledging the heterogeneity among Black US populations, and centering the unique experiences of high-SES Black US women is necessary to address disparities in this population (Barlow & Johnson, 2021).

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## APPENDIX A: CHAPTER 3 SUPPLEMENTARY MATERIALS

### *Data collection- Fraudulent Survey Activity*

After our initial recruitment via personal and professional networks, we posted a flier on Twitter/X with a link to the survey. Within 24 hours, we received approximately 300 responses, the majority of which we determined to be suspicious. After reviewing the data, we recognized the following patterns raising suspicions for fraudulent or non-human respondents:

Surveys with less than 10 minutes response duration- The current study was designed to be a 20-minute survey. We ran a completion time report on 62 records completed prior to September 1st. The median completion time was 21 minutes. The 5th percentile was 12 minutes.

Consecutive survey entries with start and end times within 0-3 seconds of each other- We suspected that there was a very low likelihood that two or more separate individuals would start and end the survey at the exact same time within seconds of each other.

Suspicious email addresses- Email addresses that have uncommon domain names (ex:miraire, svkjp), were nonsensical (ex:fhdnjfdn@gmail.com), or followed a consecutive pattern (ex: 4 in a row that end in a random letter R) were flagged as suspicious for fraudulent activity, and needing further review. These suspicious email addresses only occurred on 9/26/2023 and 9/27/2023

We closed the survey and implemented the following security measures with multiple layers to support data quality in public surveys in REDCap: The first layer, which was present in our original survey, was a CAPTCHA challenge. This reduced who can access the survey. In the vast majority of cases, CAPTCHA prevents non-human subjects from accessing the survey. The second layer was designed to allow us to better distinguish legitimate survey entries. This

includes time stamps, which are already in the survey (Goodrich et al., 2023). Additional measures implemented included tracking longitude and latitude and IP addresses. These were optional REDCap fields that participants had to opt-in to provide. One way that we addressed this was by informing the participants that while they may opt out of providing this information, they will only be compensated if they opt in. This language was added to the consent form after an amendment to the protocol was approved by IRB. We used attention checks throughout the survey to assist in ensuring that human subjects are completing the survey, and that respondents are attentive to the questions. For example, participants were asked to identify which of three objects is considered fruit. The third layer was to create invisible fields with invalid branching logic that a real person cannot access, but a scripting language can. These are colloquially known as “Honey Pot” questions on other platforms. We also created multiple survey projects in REDCap organized by recruitment platform and date in the event that we encountered additional issues so that we would be able to better determine when and on what platform they occurred and would not have to close the entire project. We received approval from the IRB to implement these changes and to add longitude and latitude to the consent form. We implemented multiple reminders and checks to allow us to collect location data in order to receive compensation in the consent form and on the survey page. We then re-launched the survey on Facebook, limiting recruitment to closed groups of Black professionals and alumni (Schneider & Harknett, 2022). The lead researcher requested access to the private groups and permission from the group administrators to post the study flyer. This yielded 1 participant. We also launched the survey via iConnect, the University of Pennsylvania’s clinical trials paid subject pool. In collaboration with the iConnect administrator, we created a study page with a screener for Black women. Participants who passed the screener were invited to request to participate. Participants who requested to participate were then sent a link to the eligibility survey, and followed the procedure outlined above. Within 48 hours we received approximately

250 survey responses, an exponentially higher number than had been invited with the survey link (approximately 10). We suspected fraud and therefore closed the project. We then opened another project on iConnect which was invitation only. We used their recruitment tool to send individual recruitment emails to iConnect users who identified as Black women. However, we again received approximately 280 responses, almost all of which were from users we did not invite, or whose emails were not registered to iConnect. We then re-launched the survey to another group of personal and professional contacts to ensure we would obtain our minimum sample size to achieve statistical power. All entries passed the CAPTCHA and “honey pot” questions. Interestingly, the attention check items did not aid in filtering out fraudulent responses. Some participants whom we identified and verified as legitimate through personal or professional contacts answered the attention checks incorrectly. However, all entries flagged as fraudulent passed the attention check questions. Additionally, very few participants shared their longitude and latitude.

In order to clean the data, we developed a protocol to help us identify legitimate participants. We began by considering the patterns listed above. We then developed a script implemented in STATA (StataCorp, 2017) to create our analytic sample. These included survey start/stop time and survey duration. After we eliminated the majority of suspicious records using the script, included records were flagged for review. The lead investigator and faculty mentor independently reviewed the names and email addresses of the remaining records, flagging suspicious records for removal. Records flagged by both researchers were removed, records flagged by only one researcher were again flagged for further closer review by the lead investigator. The lead investigator then closely reviewed the completed survey of the record to determine inclusion and obtain our final sample. Afterwards, one previously included participant was removed due to a possible erroneous entry for height and weight.

**Table A.1 Baseline demographics**

<i>Variable</i>		<i>Under Median n=62</i>	<i>Above Median n=61</i>	<i>Total n=123</i>	<i>P</i>
Education Level	Associates (AA, AD)	4 (6.5%)	2 (3.3%)	6 (4.9%)	0.328
	Bachelors (BA, BS)	24 (38.7%)	33 (54.1%)	57 (46.3%)	
	Masters (MA, MS, MPH)	24 (38.7%)	20 (32.8%)	44 (35.8%)	
	Doctorate (PhD, MD, DO, JD, DNP)	10 (16.1%)	6 (9.8%)	16 (13.0%)	
Age (years)***	N	62	61	123	0.000
	Mean	38.6	31.1	34.9	
	STD	11.38	5.57	9.72	
	Min	24	22	22	
	Max	69	48	69	
BMI (kg/m <sup>2</sup> )	N	62	61	123	0.583
	Mean	31.0	30.2	30.6	
	STD	8.82	7.42	8.13	
	Min	18	17	17	
	Max	52	51	52	
Industry Sector	Data processing	2 (3.2%)		2 (1.6%)	0.708
	Education	21 (33.9%)	18 (29.5%)	39 (31.7%)	
	Finance	2 (3.2%)	3 (4.9%)	5 (4.1%)	
	Food services	2 (3.2%)	3 (4.9%)	5 (4.1%)	
	Health care	17 (27.4%)	23 (37.7%)	40 (32.5%)	
	Information services	1 (1.6%)	1 (1.6%)	2 (1.6%)	
	Legal services	3 (4.8%)	3 (4.9%)	6 (4.9%)	
	Military		1 (1.6%)	1 (0.8%)	
	Publishing	1 (1.6%)		1 (0.8%)	
	Utilities	1 (1.6%)		1 (0.8%)	
	Other (Please fill in)	4 (6.5%)	6 (9.8%)	10 (8.1%)	
	Government	4 (6.5%)	1 (1.6%)	5 (4.1%)	
	Non-Profit	1 (1.6%)	1 (1.6%)	2 (1.6%)	
	Research	2 (3.2%)		2 (1.6%)	
Technology	1 (1.6%)	1 (1.6%)	2 (1.6%)		
Individual Income	\$30,000-\$50,000 per year	7 (11.3%)	15 (24.6%)	22 (17.9%)	0.150
	>\$50,000-\$75,000 per year	27 (43.5%)	20 (32.8%)	47 (38.2%)	
	>\$75,000-\$100,000 per year	14 (22.6%)	17 (27.9%)	31 (25.2%)	
	>\$100,000 per year	14 (22.6%)	9 (14.8%)	23 (18.7%)	
Remote Work	Never- Works in office	17 (27.4%)	17 (27.9%)	34 (27.6%)	0.997

<i>Variable</i>		<i>Under Median n=62</i>	<i>Above Median n=61</i>	<i>Total n=123</i>	<i>P</i>
	Less than half of the time	18 (29.0%)	18 (29.5%)	36 (29.3%)	
	Half of the time	7 (11.3%)	6 (9.8%)	13 (10.6%)	
	More than half of the time	8 (12.9%)	9 (14.8%)	17 (13.8%)	
	Always- Work is completely remote	12 (19.4%)	11 (18.0%)	23 (18.7%)	
Financial Strain	N	62	61	123	0.300
	Mean	8.4	8.7	8.6	
	STD	1.25	1.27	1.26	
	Min	6	5	5	
	Max	12	12	12	
Hypertension/ high blood pressure	No	51 (82.3%)	53 (86.9%)	104 (84.6%)	0.478
	Yes	11 (17.7%)	8 (13.1%)	19 (15.4%)	
Type II Diabetes	No	61 (98.4%)	59 (96.7%)	120 (97.6%)	0.549
	Yes	1 (1.6%)	2 (3.3%)	3 (2.4%)	
Prediabetes	No	55 (88.7%)	57 (93.4%)	112 (91.1%)	0.358
	Yes	7 (11.3%)	4 (6.6%)	11 (8.9%)	
High cholesterol	No	51 (82.3%)	56 (91.8%)	107 (87.0%)	0.116
	Yes	11 (17.7%)	5 (8.2%)	16 (13.0%)	
Coronary Heart Disease	No	62 (100.0%)	60 (98.4%)	122 (99.2%)	0.311
	Yes		1 (1.6%)	1 (0.8%)	
Gallbladder disease	No	58 (93.5%)	60 (98.4%)	118 (95.9%)	0.177
	Yes	4 (6.5%)	1 (1.6%)	5 (4.1%)	
Depression	No	49 (79.0%)	46 (75.4%)	95 (77.2%)	0.632
	Yes	13 (21.0%)	15 (24.6%)	28 (22.8%)	
Anxiety	No	45 (72.6%)	36 (59.0%)	81 (65.9%)	0.113
	Yes	17 (27.4%)	25 (41.0%)	42 (34.1%)	
Sleep Apnea	No	57 (91.9%)	58 (95.1%)	115 (93.5%)	0.479
	Yes	5 (8.1%)	3 (4.9%)	8 (6.5%)	

<i>Variable</i>		<i>Under Median n=62</i>	<i>Above Median n=61</i>	<i>Total n=123</i>	<i>P</i>
Breast Cancer	No	59 (95.2%)	60 (98.4%)	119 (96.7%)	0.317
	Yes	3 (4.8%)	1 (1.6%)	4 (3.3%)	
Other cancer not listed	No	60 (96.8%)	60 (98.4%)	120 (97.6%)	0.568
	Yes	2 (3.2%)	1 (1.6%)	3 (2.4%)	
None of the above	No	39 (62.9%)	33 (54.1%)	72 (58.5%)	0.322
	Yes	23 (37.1%)	28 (45.9%)	51 (41.5%)	
Depressive Symptoms (PhQ2) <sup>***</sup>	N	62	61	123	0.000
	Mean	0.9	2.6	1.7	
	STD	1.01	1.87	1.71	
	Min	0	0	0	
	Max	4	6	6	

**Note.** Participant characteristics by median PSS score (median = 18), where under the median is lower perceived stress, and above the median is higher perceived stress. \*\*\* p<.001, \*\* p<.01, \* p<.05



**Table A.2 Independent variables**

<i>Variable</i>		<i>Under Median n=62</i>	<i>Above Median n=61</i>	<i>Total n=123</i>	<i>P</i>
Perceived Stress	N	62	61	123	0.000
	Mean	13.0	23.4	18.1	
	STD	3.62	4.23	6.53	
	Min	5	19	5	
	Max	18	35	35	
Influence - Workplace Questionnaire	N	62	61	123	0.000
	Mean	1.9	2.3	2.1	
	STD	0.54	0.68	0.64	
	Min	1	1	1	
	Max	3	4	4	
Leisure - Workplace Questionnaire	N	62	61	123	0.006
	Mean	1.9	2.3	2.1	
	STD	0.83	0.86	0.87	
	Min	1	1	1	
	Max	4	4	4	
Organization - Workplace Questionnaire	N	62	61	123	0.311
	Mean	1.5	1.6	1.5	
	STD	0.88	0.99	0.93	
	Min	1	1	1	
	Max	4	4	4	
Demands - Workplace Questionnaire*	N	62	61	123	0.048
	Mean	2.2	2.6	2.4	
	STD	0.99	1.08	1.05	
	Min	1	1	1	
	Max	4	4	4	
Appraisal - Gendered Racial Microaggressions Scale*	N	62	61	123	0.066
	Mean	2.1	2.4	2.3	
	STD	0.81	1.05	0.94	
	Min	0	0	0	
	Max	4	5	5	
Frequency - Gendered Racial Microaggressions Scale*	N	62	61	123	0.015
	Mean	1.8	2.2	2.0	
	STD	0.77	1.06	0.94	
	Min	0	0	0	
	Max	4	5	5	
Silenced and Marginalized Appraisal Subscale	N	62	61	123	0.609
	Mean	2.7	2.8	2.8	
	STD	1.06	1.21	1.13	

<i>Variable</i>		<i>Under Median n=62</i>	<i>Above Median n=61</i>	<i>Total n=123</i>	<i>P</i>
Emotional eating*	Min	0	0	0	0.014
	Max	5	5	5	
	N	62	61	123	
	Mean	33.2	36.2	34.7	
	STD	6.18	6.91	6.69	
Binge eating**	Min	19	19	19	0.002
	Max	46	50	50	
	N	62	58	120	
	Mean	10.0	14.6	12.2	
	STD	7.55	8.75	8.44	
Workplace Racial Composition	Min	0	0	0	0.240
	Max	35	32	35	
	Mostly + All Black	12 (19.4%)	7 (11.5%)	19 (15.4%)	
	About Half Black	9 (14.5%)	15 (24.6%)	24 (19.5%)	
	Mostly + All White	41 (66.1%)	39 (63.9%)	80 (65.0%)	

**Note.** \*\*\* p<.001, \*\* p<.01, \* p<.05; a Variables of interest by median PSS score (median = 18), where under the median is lower perceived stress, and above the median is higher perceived stress.

**Table A.3 Participant characteristics associated with PSS**

	R <sup>2</sup>	F(1, 121)	Prob > F	β	SE	P >  t
Age Model	0.20	31.07	< 0.001			
Age				-0.304	0.05	< 0.001
PHQ-2 model	0.41	83.02	< 0.001			
PHQ-2				2.442	0.27	< 0.001
PMH- anxiety model	0.07	9.19	< 0.001			
PMH-anxiety				3.646	1.202	0.003

**Note.** PMH-anxiety = self-reported history of anxiety on demographic form, PHQ-2 = Patient Health

Questionnaire-2 (2-item depression screen)

**Table A.4 Participant characteristics associated with EEQ**

	<i>R</i> <sup>2</sup>	<i>F</i> (1,121)	<i>Prob</i> > <i>F</i>	$\beta$	<i>SE</i>	<i>P</i> >   <i>t</i>
BMI Model	0.10	13.03	< 0.001			
BMI				0.256	0.07	< 0.001
PHQ-2 model	0.09	11.84	< 0.001			
PHQ-2				1.170	0.34	0.001

**Note.** PHQ-2 = Patient Health Questionnaire-2 (2-item depression screen)

**Table A.5 Participant characteristics associated with BES**

	<i>R</i> <sup>2</sup>	<i>F</i> (1,118)	<i>Prob</i> > <i>F</i>	$\beta$	<i>SE</i>	<i>P</i> >   <i>t</i>
BMI Model	0.059	7.42	0.0074			
BMI				0.255	0.09	0.007
PHQ-2 model	0.151	20.93	< 0.001			
PHQ-2				1.90	0.415	<0.001

**Note.** PHQ-2 = Patient Health Questionnaire-2 (2-item depression screen)

**Table A.6 Participant characteristics associated with WSQ**

	R <sup>2</sup>	F	Prob > F	β	SE	P >  t
PHQ2 Model	0.0362	4.54 <sup>a</sup>	0.0362			
PHQ2				0.559	0.026	0.035
PMH-anxiety model	0.0354	4.44 <sup>a</sup>	0.037			
PMH-anxiety				.198	0.094	0.037
Income model	0.069	2.94 <sup>b</sup>	0.069			
Income (>\$100,000/ year)				0.375	0.146	0.012
Education model	0.0797	5.20 <sup>c</sup>	< 0.001			
Education (Doctorate)				0.431	0.4136	0.002

**Note.** PMH-anxiety = self-reported history of anxiety on demographic form, PHQ-2 = Patient Health

Questionnaire-2 (2-item depression screen). <sup>a</sup> F(1,21), <sup>b</sup> F(3,119), <sup>c</sup> F(2,120)

**Table A.7 Participant characteristics associated with GRMS-A SMS**

	R <sup>2</sup>	F	Prob > F	β	SE	P >  t
Income model	0.0755	7.42 <sup>a</sup>	0.0074			
Income \$50k-75k				0.795	0.28	0.006
Income \$75k-100k				0.874	0.310	0.005
PMH-hypertension	0.0436	5.52 <sup>b</sup>	0.0436			
PMH- hypertension				-.653	0.279	0.020
PMH cholesterol	0.0518	6.61 <sup>b</sup>	0.0114			
PMH cholesterol				.764	0.297	0.011

**Note.** PMH = self-reported history on demographic form, PHQ-2 = Patient Health Questionnaire-2 (2-item depression screen). <sup>a</sup> F(3,119), <sup>b</sup> F(1,121)

## APPENDIX B: CHAPTER 4 SUPPLEMENTARY MATERIALS

### **B1. Researcher Positionality**

The lead investigator and interviewer, Ashley Cooper, is a Black woman and PhD candidate in the School of Nursing at the University of Pennsylvania, with a history of obesity. Ashley is a Women's Health Nurse Practitioner, and a board-certified Adult Nurse Practitioner, previously practicing in primary care for several years and treating comorbid conditions to obesity. Ashley is a certified health coach and has multiple certifications in obesity management. She attended predominantly White schools at all levels of her education. Ashley has worked in both predominantly White and diverse work environments in clinical and office settings. Her experiences informed her perspectives on body perceptions, presentation, and workplace racial composition.

### **B2. Missing/ incorrect data:**

One participant answered incongruously to the question regarding workplace racial composition, answering "Mostly Black" on the demographic survey. The participant was asked again during her interview, answering "mostly White." We used the latter response as the participant had entered "Mostly Black" on the demographic survey in error. One participant did not answer the question "did you attend an HBCU." We manually entered this as "No" in table B1. Three participants did not answer the question on household income, as their household income did not differ from individual- resulting in different counts for this question in Table B1.

**Table B.1 Participant demographics**

<i>Variable</i>		<i>Total (n=20)</i>
Age (years)	N	20
	Mean	36.0
	STD	8.29
	Min	25
	Max	57
BMI (kg/m <sup>2</sup> )	N	20
	Mean	31.7
	STD	7.01
	Min	24
	Max	50
BMI Class	Normal (18.5 - 25)	3 ( 15.0%)
	Overweight (25-30)	7 ( 35.0%)
	Obese (30+)	10 ( 50.0%)
Education	Bachelors (BA, BS)	10 ( 50.0%)
	Masters (MA, MS, MPH)	6 ( 30.0%)
	Doctorate (PhD, MD, DO, JD, DNP,	4 ( 20.0%)
Industry/sector	Data processing	2 ( 10.0%)
	Education	6 ( 30.0%)



<i>Variable</i>	<i>Total (n=20)</i>	
	Health care	5 ( 25.0%)
	Information services	1 ( 5.0%)
	Legal services	3 ( 15.0%)
	Publishing	1 ( 5.0%)
	Other (Please fill in)	2 ( 10.0%)
Individual income	\$30,000-\$50,000 per year	1 ( 5.0%)
	>\$50,000-\$75,000 per year	8 ( 40.0%)
	>\$75,000-\$100,000 per year	7 ( 35.0%)
	>\$100,000 per year	4 ( 20.0%)
Household income	\$30,000-\$50,000 per year	1 ( 5.0%)
	>\$50,000-\$75,000 per year	5 ( 25.0%)
	>\$75,000-\$100,000 per year	5 ( 25.0%)
	>\$100,000 - \$150,000 per year	2 ( 10.0%)
	>150,000 per year	7 ( 35.0%)
Attended PWI	Yes	20 (100.0%)
Attended HBCU	No	6 ( 30.0%)
	Yes	14 ( 70.0%)

<i>Variable</i>		<i>Total (n=20)</i>
Social circle racial composition	All Black	7 ( 35.0%)
	Mostly Black	11 ( 55.0%)
	About half Black	2 ( 10.0%)
Workplace racial composition	Mostly White	17 ( 85.0%)
	All White except you	3 ( 15.0%)
Social status scale score	N	20
	Mean	5.5
	STD	1.61
	Min	3
	Max	9
Work setting	Office- business	3 ( 15.0%)
	Office- casual	6 ( 30.0%)
	From home	7 ( 35.0%)
	Flexible work space	1 ( 5.0%)
	Classroom	1 ( 5.0%)
	Hospital or clinic	2 ( 10.0%)
Remote work	Never- Works in the office	4 ( 20.0%)
	Less than half of the time	4 ( 20.0%)

<i>Variable</i>	<i>Total (n=20)</i>
	Half of the time 3 ( 15.0%)
	More than half of the time 2 ( 10.0%)
	Always- Work is completely remote 7 ( 35.0%)
Self-rated health	Poor 1 ( 5.0%)
	Fair 7 ( 35.0%)
	Good 5 ( 25.0%)
	Very good 6 ( 30.0%)
	Excellent 1 ( 5.0%)

**Table B.2 List of participant characteristics**

Participant #	Age	Job Title	Region	Degree Level	Setting
Participant 01	36	School Social Worker	New England	Masters	In Person
Participant 02	37	Provider Advocate	South	Bachelors	Remote
Participant 03	36	Paralegal	Southwest	Doctorate	Remote
Participant 04	47	Paralegal	South	Bachelors	Hybrid <
Participant 05	33	Scientist	Southeast	Masters	Hybrid <
Participant 06	25	Social Worker	Northeast	Masters	In Person
Participant 07	31	Administrative Assistant	Northeast	Bachelors	Hybrid <
Participant 08	30	HR Coordinator	Southeast	Bachelors	Remote
Participant 09	33	Research Nurse	South	Doctorate	Hybrid =
Participant 10	32	Director, Data Intelligence & Visualization	Northeast	Masters	Hybrid >
Participant 11	39	Executive Assistant	Northeast	Bachelors	Hybrid =
Participant 12	32	Project Coordinator	Northeast	Bachelors	Remote
Participant 13	31	Allied Health Professional	Northeast	Doctorate	In Person
Participant 14	25	Laboratory manager	Northeast	Bachelors	Remote
Participant 15	35	Clinical Support Lead	Midwest	Bachelors	Remote
Participant 16	54	Systems Analyst Manager	Northeast	Bachelors	Remote
Participant 17	31	Assistant Director	Northeast	Masters	Hybrid <
Participant 18	38	Executive Assistant	Midwest	Bachelors	Hybrid =
Participant 19	37	Project Manager	South	Masters	In-Person
Participant 20	57	Academic Administrator	South	Doctorate	In-Person