



Maryland Population Research Center

WORKING PAPER

The role of weight perception in race differences in body mass index by education among women

PWP-MPRC-2019-006

July 2019



Author :

Caryn N. Bell
University of Maryland

Loneke T. Blackman Carr
Duke University



www.popcenter.umd.edu

The role of weight perception in race differences in body mass index by education among women

Caryn N. Bell, PhD¹ & Loneke T. Blackman Carr, PhD RD²

¹Department of African American Studies, University of Maryland, College Park, ²Samuel DuBois Cook Center on Social Equity, Duke University

Corresponding author:

Caryn N. Bell, PhD
Department of African American Studies
University of Maryland
College Park, MD
301-405-4189 (ph)
301-405-9932 (f)
cbell7@umd.edu

Abstract word count: 200

Text word count: 3,862

Number of references: 45

Number of tables/figures: 7

Conflict of interest statement: Caryn Bell and Loneke Blackman Carr have no conflicts of interest.

Financial disclosures: Caryn Bell and Loneke Blackman Carr have financial disclosures.

Running title: Race, education, weight perception and BMI

Key words: Race, education, weight perception, body mass index

What is known:

- Race disparities in obesity among women are persistent.
- Race disparities in obesity are largest among those with college degrees.
- Black women are more likely to "mis-perceive" their weight.

What this study adds:

- This study demonstrates that race disparities in obesity are mediated by weight perception.
- Black women who "under-perceive" their weight have lower BMIs.
- Race disparities in BMI remain after accounting for BMI among college educated women.

Objective: Due to race differences in weight perception and because of racial disparities are largest in college-educated women, the aim of this study was to determine the mediating role of weight perception on race differences in BMI by education.

Methods: Respondents to the 2007-2014 National Health and Nutrition Examination Survey were categorized as healthy weight, overweight or obese based on BMI and respondents reported on their perceptions of their weight as underweight, about the right weight or overweight. The associations between race and BMI were assessed by educational attainment and weight perception was assessed as a mediator.

Results: Black women had higher BMI than whites ($\beta=2.79$, standard error (s.e.)=0.27), and these disparities were larger in college-educated women ($\beta=3.80$, s.e.=0.50) compared to non-college graduates ($\beta=2.56$, s.e.=0.33). Race-education differences in weight perception, as well as differences in the association between weight perception and BMI were observed. Indirect effects of weight perception were found among non-college graduates ($\beta=2.14$, s.e.=0.19), and indirect ($\beta=2.50$, s.e.=0.34) and a direct effect of race on BMI ($\beta=1.17$, s.e.=0.34) among college graduates.

Conclusions: Though weight perception plays an important role, an nuanced, intersectional understanding of race, education, weight perception and BMI is required to eliminate race disparities in obesity.

Introduction

Obesity is a risk factor for several health outcomes including cardiovascular disease (1) and mortality (2). Obesity rates have grown exponentially in recent years (3) and this increase is accompanied by large racial disparities, particularly among women (3, 4). More than half of black women have obesity and fewer than one in five are at a healthy weight (4). Obesity is present in only about one in three white women (4), and these disparities have persisted over time (3).

Though socioeconomic status (SES) is often implicated in racial health disparities (5, 6), SES does not fully explain racial disparities in obesity (5, 7). The strongest predictor of health among whites, educational attainment (8), does not lead to similar health returns among blacks (9). This results in wider racial health disparities among the most highly educated (7, 9). For example, race disparities in obesity are largest among college-educated adults (7). The experience of high SES among blacks differs from that of whites, resulting in poorer health outcomes among college-educated blacks (7, 9). For example, compared to whites and lower SES blacks, high-SES blacks report more discrimination (10, 11). These experiences could blunt the health benefits of higher education (11) by triggering physiological stress responses, leading to subclinical disease and other poor health outcomes (12). Moreover, scholars suggest that high SES has different meanings and lived experiences for blacks as compared to whites (13, 14, 15).

With regard to obesity, scholars have suggested that factors like including weight perception play an important role in race differences in obesity among women (16, 17, 18, 19). Studies have shown that blacks are more likely to self-assess their weight as lower than would be assessed based on standard categories for body mass index (BMI) (16, 19). For example, black women with a BMI that falls into the overweight (BMI=25.0 – 29.9) or obese category

(BMI \geq 30.0) are more likely to assess their weight as “about right” than white women who have obesity (16, 19). This weight “misperception” is thought to be associated with higher BMI as there is evidence that it is associated with fewer weight management behaviors (17, 18), and is also more prevalent among lower SES adults (16). Because weight perception is conditioned by race and SES, it may be an important explanatory factor in race differences among college-educated women, a group that likely experiences the largest racial disparity (7).

The aim of this study is to determine the mediating effects of weight perception on race differences in BMI among college-educated women compared to non-college graduates. It is hypothesized that weight perception will mediate race differences in BMI, but the mediating effects will be greater among college-educated women. The results of this study may be central to appropriately designed interventions that address racial disparities in obesity, and will aid in understanding the complex interrelationships between race, SES and obesity.

Methods

The National Health and Nutrition Examination Survey (NHANES) is an ongoing nationally representative survey of the health, functional and nutritional status of the U.S. population that is completed over two consecutive years. The civilian, non-institutionalized population is sampled in each sequential series of this cross-sectional survey. The following groups were oversampled: low-income individuals, youth aged 12 to 19 years, adults over age 60 years, and those who identified as black/African American and Mexican American. NHANES used a stratified, multistage probability sampling design where data were collected in two phases. First, data about respondents’ health history, health behaviors and risk factors were obtained during a home interview. Participants were then invited to take part in a medical examination that included a detailed physical examination and laboratory testing. Data from

2007 to 2014 were combined to obtain a sufficient sample of college-educated black women. Respondents were asked whether they were Hispanic or Latino and asked to which racial group they belong. We included women who responded that they were non-Hispanic black or white (n=7,760).

The dependent variable was body mass index (BMI). During the medical examination, participants' measured height and weight was collected. BMI was calculated as weight in kilograms divided by height in meters squared.

The independent variable was race such that those who identified as non-Hispanic white were given a value of "0" and those who identify as non-Hispanic black were given a value of "1". The potential mediating variable was weight perception. BMI was categorized as "healthy" (BMI=18.0 – 24.9 kg/m²), overweight (25.0 – 29.9 kg/m²) or obese (≥ 30 kg/m²). Respondents were asked "how do you consider your weight?", and possible responses included "overweight", "underweight" or "about the right weight". Weight perception was categorized by comparing clinically assessed weight status from BMI to self-assessed weight resulting in the following categories: healthy (BMI)-about right (self), healthy (BMI)-underweight (self), healthy (BMI)-overweight (self), overweight (BMI)-overweight (self), overweight (BMI)-underweight (self), overweight (BMI)-about right (self), obese (BMI)-overweight (self), obese (BMI)-underweight (self), obese (BMI)-about right (self).

The stratifying variable was educational attainment and was dichotomized. Respondents were asked the highest level of education that they had completed. Respondents who had not completed a 4-year Bachelor's degree were categorized as non-college graduates and respondents who completed a 4-year Bachelor's, Master's, doctoral or professional degree were categorized as college graduates.

The following covariates were included: age, marital status, income, insurance, self-rated health, depressive symptoms, smoking status and physical inactivity. Age was measured continuously while other variables were measured dichotomously or categorically. Marital status was categorized as currently married or living with partner, formerly married (separated, divorced or widowed) and never married. Insurance status represented those who had health insurance, while self-rated health was dichotomized to represent fair or poor health. Respondents were asked “Would you say your health in general is: excellent, very good, good, fair or poor?” A dichotomous variable was created such that those who responded “fair” or “poor” received a value of “1” and all other responses received a value of “0”. Depressive symptoms were measured by the Patient Health Questionnaire-9 (PHQ-9) and was categorized as none, mild, moderate, moderately severe or severe (20). Current smoking represented those who reported smoking cigarette some days or every day. Respondents were asked how often they participated in moderate or vigorous physical activity. Those who responded that they never participated in moderate or vigorous activity were categorized as physically inactive.

The mean and proportional differences between race groups for analytical variables were evaluated using Student’s t (for continuous variables) and chi-square tests (for dichotomous or categorical variables). Adjusting for all co-variates, the association between weight perception and BMI was assessed using linear regression and race differences were demonstrated as mean BMI by weight perception category among college-educated and non-college graduate women. The associations between race and college education with BMI were assessed using linear regressions and adjusting for co-variates (Model 1). The interaction between race and college education on BMI was assessed using multiplicative interaction terms to determine whether the magnitude of the race difference in BMI differ by education among women (Model 2). In Model

3, the association between race and BMI by education was assessed. Race differences in weight perception by education were also assessed using ordinal regressions and displayed as the percentage of women in each weight perception category. Lastly, race differences in BMI were compared before and after accounting for weight perception (21). Direct effects of race and indirect effects of weight perception were assessed (22). Following the procedure recommended by the National Center for Health Statistics, all analyses used Taylor-linearization procedures for the complex multistage sampling design and a weight variable was created to account for the combining of multiple years of NHANES. STATA statistical software, version 14 (StataCorp LP, College Station, TX) was used for data analyses.

Results

Race and education differences in demographics, weight perception and body mass index (BMI) are displayed in Table 1. There were differences in age, marital status, household income, health insurance status, self-rated health, depressive symptoms, smoking status and physical inactivity. The highest mean BMI was observed among non-college graduate black women (32.3 kg/m²), followed by college educated black women (31.7 kg/m²), then non-college graduate white women (29.2 kg/m²). College-educated white women had the lowest mean BMI (27.0 kg/m², $p < 0.001$). Racial and education differences in BMI versus self-assessed weight status are observed ($p < 0.001$). These data also demonstrate racial and educational differences in the percentage of women who perceive themselves as underweight or about the right weight, but are considered to have obesity or be overweight based on BMI categories. For example, among those who had obesity, about 7% of college-educated black and white women perceived themselves as underweight or about the right weight. However, among women who were non-college graduates, about 15% of black women who had obesity considered themselves

underweight or about the right weight, while only 7% of white women were in this category. Among those who were overweight based on BMI, about 50% of non-college graduate black women considered themselves underweight or at about the right weight, compared to about 25% non-college graduate white women. Among college-educated women, 30% of overweight (based on BMI) black women perceive their weight as underweight or about right, while about 20% of white women were in this category.

Figures 1A and 1B show race differences in BMI by weight perception among college-educated women and non-college graduates. In Figure 1A, white college-educated women who were overweight based on BMI, but considered themselves underweight had higher BMIs than black college-educated women in the same weight perception category. Black college-educated women who had obesity based on BMI and considered themselves overweight had higher mean BMIs than white college-educated women in the same category. Among those who were overweight or had obesity based on BMI, black college-educated women who perceived themselves as underweight or about the right weight had lower BMIs than those who perceived themselves as overweight. However, among college-educated white women who were overweight or had obesity, perceiving their weight as underweight or about the right weight was associated with similar or higher BMIs compared to those who were overweight or obese based on BMI and considered themselves overweight. Among non-college graduate women, there were no race differences in mean BMI by weight perception. Among those who were overweight based on BMI, there was no difference in BMI between those who perceived themselves as overweight and those who under-perceived their weight. However, for non-college graduate women who had obesity (based on BMI), those who perceived their weight as about right had lower BMIs than those who perceived themselves as overweight.

Table 2 displays the associations between race and college education with BMI among women. In Model 1, adjusted for co-variables, black women had a BMI that was 2.79 kg/m² greater than white women ($\beta=2.79$, s.e.=0.27). College-educated women had lower BMIs than non-college graduates ($\beta= -1.38$, s.e.=0.28). Model 2 shows the interaction between race and college education and shows that college education positively moderates the association between race and BMI ($\beta=1.54$, s.e.=0.59). In Model 3, college-educated black women had BMIs that were 3.80 kg/m² higher than college-educated white women ($\beta=3.80$, s.e.=0.50). The race difference in BMI was smaller among non-college graduates such that black women had BMIs that were 2.56 kg/m² higher than non-college graduate white women ($\beta=2.56$, s.e.=0.33).

Race differences in weight perception are demonstrated in college graduates (Figure 2A) and non-college graduates (Figure 2B). Compared to their white counterparts, smaller percentages of black college-educated women were assessed as healthy weight based on BMI and self-assessed as “about right” (12.3% versus 26.2%), and assessed as healthy weight and self-assessed as overweight (5.8% versus 9.6%). More college-educated black women had obesity based on BMI and self-assessed as overweight (50.3% versus 30.3%). Similarly, among non-college graduates, a smaller percentage of black women were healthy weight based on BMI and self-assessed as “about right” (11.6% versus 21.6%) or healthy weight and self-assessed as overweight (4.4% versus 6.8%), while a larger percentage had obesity based on BMI and self-assessed as overweight (51.5% versus 35.5%). However, there were additional race differences among non-college graduates. A smaller percentage of black non-college graduates were considered overweight based on BMI and self-assessed as overweight (18.3% versus 23.2%), while a larger percentage of black non-college graduates had obesity based on BMI, but self-assessed their weight as “about right” (3.8% versus 1.8%) displaying greater misperception.

Table 3 shows the associations between race and weight perception with BMI among college-educated women and non-college graduates. In Model 1, among college-educated women, blacks had higher BMIs than whites ($\beta=3.80$, $s.e.=0.50$), however after adjusting for weight perception in Model 2, the race difference was reduced ($\beta=1.17$, $s.e.=0.28$). An indirect effect of weight misperception on race differences in BMI was detected ($\beta=2.50$, $s.e.=0.34$), as well as a direct effect of race on BMI ($\beta=1.17$, $s.e.=0.34$). Among non-college graduates, an indirect effect of weight perception was detected ($\beta=2.14$, $s.e.=0.19$), but there was no direct effect of race on BMI ($\beta=0.36$, $s.e.=0.23$). The association between race and BMI was reduced from Model 1 ($\beta=2.55$, $s.e.=0.33$) to Model 2 ($\beta=0.74$, $s.e.=0.16$) after adjusting for weight perception.

Discussion

The aim of this study was to determine the mediating role of weight perception on race differences in body mass index (BMI) by educational attainment. The results found significant indirect effects of weight perception on race differences in BMI among college-educated and non-college graduate women. Though weight perception accounted for a large percentage of the race disparity in BMI among both education categories, a direct effect of race was observed among college-educated women. This study also suggests that unmeasured factors other than weight perception are important to unexplained race differences in BMI among college-educated women. Additionally, the results suggest that the association between weight perception and BMI among overweight and women who have obesity varies by race and education. The concept of “underperceiving” one’s weight (i.e. being categorized as overweight or obese based on BMI, but self-assessing weight as underweight or about right) is associated with slightly higher BMI among college-educated white women only. Among college-educated and non-

college graduate black women, underperceiving weight is associated with lower BMI, and there was little to no effect of weight misperception on BMI among non-college educated white women.

To the authors' knowledge, no previous studies have examined the explanatory role of weight perception in race differences in BMI by educational attainment among women. One study found that weight misperceptions explained 13% of differences in BMI among black and white adolescent girls (23). Though the literature has focused on race differences in weight misperception (16, 17, 18, 19, 23) and other obesity-related beliefs and attitudes (24, 25, 26, 27, 28), little empirical work on the impact of these differences on racial disparities in obesity was found (23).

The results suggest that race differences in weight perception do account for a great deal of the race difference in BMI among women. Among both college-educated and non-college graduate women, about 70% of the race difference in BMI was mediated by weight perception. The behavioral mechanisms of the association between weight perception and BMI have been assessed by previous literature, and find that blacks who under-perceive their weight (that is, are categorized as overweight or obese by BMI, but self-assess their weight as "about right") are less likely to have tried to lose weight (17, 18) less likely to have met recommendations for physical activity (18), and had no relationship to energy/calorie intake (18). Recent findings indicate that black women with obesity were motivated to engage in physical activity only for the purpose of weight loss (29). This aligns with our finding of lower BMI among all women who underperceived their weight compared to those who correctly perceived their weight, except college-educated white women where under-perceiving was associated with higher BMI. A lower BMI status in black women with overweight or obesity, but perceive themselves as

underweight or about the right weight likely reflects an aesthetic preference for a higher weight, which aligns with sociocultural norms (24). Thus overweight perception, where higher BMI was observed, is an important factor underlying black women's motivation to engage in dietary and physical activity behavior change for weight loss. This evidence may reflect the common observation that black women often enter behavioral weight loss interventions at a higher BMI than white women (30, 31). Among the underperceiving Black college-educated women with lower BMI, a focus on weight gain prevention behaviors may be an acceptable way to engage them in physical activity and other health promoting behaviors. Application of a "maintain, don't gain" approach to prevent weight gain has been effective among black women with overweight and class 1 obesity (BMI=25-34.9kg/m²) (32). Behavioral treatment to produce weight loss or prevent weight gain may target black women differently based on their initial weight perception status, and increase their engagement in weight control interventions. In turn, this may support the reduction of racial disparities in obesity.

Our results indicate the importance of weight perception in relation BMI, however, action to "correct" perception should be tempered as black women appear to perceive their weight-related needs appropriately, and in a way consistent with their sociocultural values. Weight-related behaviors are shaped by the context in which they exist, as posited by the Expanded Obesity Research Paradigm (33). Within this paradigm, weight perception falls into the domain of cultural and psychosocial processes which encompasses aesthetic, moral and other social values. Liabilities and assets are inherent in that and other contextual domains that influence weight status (34). For black women, regardless of college education status, weight perception is neutral, not acting as a liability or asset. Black women have expressed that their motivation for physical activity is not centered on achieving a thin frame, but about improving health (35),

which is congruent with their cultural and psychosocial processes and health priorities.

Advancement in black women's health may be predicated by a shift away from pathology towards an understanding of what assets can support adoption of health promoting behaviors connected to weight. Such a transition acknowledges the evidence of no relationship between BMI and mortality, and weaker relationships between BMI and several cardiovascular disease risk factors in blacks versus whites (36, 37).

Though a substantial percentage of the race difference in BMI was explained by weight perception among college-educated and non-college graduate women, a direct effect of race on BMI was observed among college-educated women. Several factors could be associated with the residual race difference in BMI among college-educated women. Scholars suggest that blacks with higher socioeconomic status (SES) tend to experience unique risk factors that lead to "diminished returns" of high SES (5, 6, 9, 11). These include factors in the social and physical environments. For example, studies find that higher SES blacks are more likely to report experiencing discrimination (10, 11), particularly in the workplace (38). Because discrimination has been associated with obesity among black women due to chronic stress and racism-related vigilance (39, 40, 41), it is possible that college-educated black women experience more discrimination than non-graduate black women. The experience of discrimination may exacerbate the racial disparities in BMI that persist after accounting for weight perception. High SES blacks are also more likely to live in segregated, lower income communities (42) that may be more obesogenic than high SES white neighborhoods. The racial difference in neighborhood, adverse experiences and consequences of discrimination could also account for race differences in BMI among college-educated women.

This study has important implications. It suggests that weight perceptions among women at all educational levels could be an important factor in reducing racial disparities in BMI among women. Results of the current study suggest that attempts to correct weight misperception could lead to higher BMIs, particularly among black women. Thus, correcting weight misperception among overweight or obese black women could lead to larger racial disparities in BMI. The determinants of weight perception of black women should be considered. Such a self-assessment is not a detriment to black women with overweight or class 1 obesity, as there is no relationship with mortality and weaker associations with cardiovascular disease risk factors when compared to white women (36, 37). Black women in these categories may benefit from, and be interested in, weight gain prevention efforts, while weight loss treatment may be more appropriate for women with class 2 and 3 obesity.

This study also supports the need to examine race disparities in BMI among women with an intersectional lens. Intersectionality is a framework that highlights the need to examine how multiple marginalized identities can lead to differing outcomes and lived experiences (43). First examined with regard to race and feminist movements (44, 45), the need to research racial health disparities through an intersectional lens has been well-documented (43). The larger health disparities in college-educated adults (7, 9), and the direct effects of race on BMI in college-educated women observed in the current study suggest the need to determine the ways in which race and educational attainment affect health by examining groups like college-educated black women. Also, relatively few studies have examined the role of educational attainment on sociocultural factors including weight perception among black women. Contextual factors, whether sociocultural, economic, or environmental, influence weight perception and shape how individuals engage in weight-related behaviors (34). The intersectional

framework will allow investigators to further define how disparities do and do not operate. To eliminate racial disparities in obesity and achieve health equity, an intersectional approach to examining and addressing these disparities is needed.

Study results should be considered along with its limitations and strengths. The analyses could not establish causality, nor was that the goal. Additionally, racial/ethnic groups other than blacks and whites were not included, so the potential mediation of weight perception on the effects of other racial/ethnic groups are not understood. Similarly, this investigation focused on women, thus results are not generalizable to men. This study is strengthened by the use of nationally representative data that combine multiple years of NHANES data to obtain a sufficient number of college-educated black women. Mediation analysis elucidated the pathway of weight perception and BMI, and was a robust technique to conceptualize relationships important for treating and preventing obesity, and reducing racial disparities.

Conclusion

This study found mediating effects of weight perception among black and white women differences in BMI among college-educated compared to non-college graduate women, thus supporting our hypothesis. Along with the indirect effect of weight perception on race differences in BMI, a direct effect of race on BMI among college-educated women remained. Moreover, the study found that there are racial and educational differences in the association between weight perception and BMI. Because “under-perceiving” weight (i.e. being overweight or having obesity based on BMI, but self-assessing weight as underweight or about the right weight) tended to reflect higher BMIs among college-educated white women only, using the term “weight misperception” may not be useful for black women or white women who were non-college graduates. Results of this study are important to underscore which weight control

treatment, weight gain prevention or weight loss, may be most appropriate for black women. Furthermore, this study underscores that differing self-perceptions of weight are valid. Black women know their needs, are aware of their weight status, and likely motivated to control weight as appropriate to them. Future research may seek to incorporate the critical lens of intersectionality to better understand the complex interrelationships between race, SES, obesity, and related disparities.

References

1. Bastien M, Poirier P, Lemieux I, Despres JP. Overview of Epidemiology and Contribution of Obesity to Cardiovascular Disease. *Progress in Cardiovascular Diseases* 2014;**56**: 369-381.
2. Flegal KM, Kit BK, Orpana H, Graubard BI. Association of All-Cause Mortality With Overweight and Obesity Using Standard Body Mass Index Categories A Systematic Review and Meta-analysis. *Jama-Journal of the American Medical Association* 2013;**309**: 71-82.
3. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, Ogden CL. Trends in Obesity Among Adults in the United States, 2005 to 2014. *Jama-Journal of the American Medical Association* 2016;**315**: 2284-2291.
4. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association* 2014;**311**: 806-814.
5. Williams DR, Priest N, Anderson NB. Understanding associations among race, socioeconomic status, and health: Patterns and prospects. *Health Psychology* 2016;**35**: 407-411.
6. Nuru-Jeter AM, Michaels EK, Thomas MD, Reeves AN, Thorpe J, R.J., Thomas TA. Relative roles of race versus socioeconomic position in studies of health inequalities: A matter of interpretation. *Annual Review of Public Health* 2018;**39**.
7. Bell CN, Thorpe RJ, Bowie JV, LaVeist TA. Race disparities in cardiovascular disease risk factors within socioeconomic status strata. *Annals of Epidemiology* 2018;**28**: 147-152.
8. Adler NE, Newman K. Socioeconomic disparities in health: pathways and policies. *Health Affairs* 2002;**21**: 60-76.
9. Farmer MM, Ferraro KF. Are racial disparities in health conditional on socioeconomic status? *Social Science & Medicine* 2005;**60**: 191-204.
10. Hudson DL, Bullard KM, Neighbors HW, Geronimus AT, Yang J, Jackson JS. Are benefits conferred with greater socioeconomic position undermined by racial discrimination among African American men? *Journal of Mens Health* 2012;**9**: 127-136.
11. Colen CG, Ramey DM, Cooksey EC, Williams DR. Racial disparities in health among nonpoor African Americans and Hispanics: The role of acute and chronic discrimination. *Social Science & Medicine* 2018;**199**: 167-180.

12. Lewis TT, Cogburn CD, Williams DR. Self-Reported Experiences of Discrimination and Health: Scientific Advances, Ongoing Controversies, and Emerging Issues. *Annual Review of Clinical Psychology*, Vol 11 2015;**11**: 407-440.
13. Pearson J. Can't buy me whiteness: New lessons from the Titanic on race, ethnicity, and health. *Du Bois Review* 2008;**5**: 27-47.
14. Lacy KR. *Blue-chip Black: Race, class and status in the new Black middle class*. University of California Press: Berkeley, 2007.
15. Landry B, Marsh K. The Evolution of the New Black Middle Class. *Annual Review of Sociology*, Vol 37 2011;**37**: 373-394.
16. Dorsey RR, Eberhardt MS, Ogden CL. Racial/Ethnic Differences in Weight Perception. *Obesity* 2009;**17**: 790-795.
17. Dorsey RR, Eberhardt MS, Ogden CL. RACIAL AND ETHNIC DIFFERENCES IN WEIGHT MANAGEMENT BEHAVIOR BY WEIGHT PERCEPTION STATUS. *Ethnicity & Disease* 2010;**20**: 244-250.
18. Duncan DT, Wolin KY, Scharoun-Lee M, Ding EL, Warner ET, Bennett GG. Does perception equal reality? Weight misperception in relation to weight-related attitudes and behaviors among overweight and obese US adults. *International Journal of Behavioral Nutrition and Physical Activity* 2011;**8**.
19. Hendley Y, Zhao LP, Coverson DL, Din-Dzietham R, Morris A, Quyyumi AA, et al. Differences in Weight Perception Among Blacks and Whites. *Journal of Womens Health* 2011;**20**: 1805-1811.
20. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9 - Validity of a brief depression severity measure. *Journal of General Internal Medicine* 2001;**16**: 606-613.
21. Baron RM, Kenny DA. THE MODERATOR MEDIATOR VARIABLE DISTINCTION IN SOCIAL PSYCHOLOGICAL-RESEARCH - CONCEPTUAL, STRATEGIC, AND STATISTICAL CONSIDERATIONS. *Journal of Personality and Social Psychology* 1986;**51**: 1173-1182.
22. Sobel ME. Asymptotic intervals for indirect effects in structural equations models. In: Leinhardt S (ed). *Sociological Methodology*. Jossey-Bass: San Francisco, 1982, pp 290-312.
23. Krauss RC, Powell LM, Wada R. Weight misperceptions and racial and ethnic disparities in adolescent female body mass index. *Journal of Obesity* 2012: 1-9.

24. Chithambo TP, Huey SJ. Black/white differences in perceived weight and attractiveness among overweight women. *Journal of Obesity* 2013.
25. Baruth M, Sharpe PA, Magwood G, Wilcox S, Schlaff RA. BODY SIZE PERCEPTIONS AMONG OVERWEIGHT AND OBESE AFRICAN AMERICAN WOMEN. *Ethnicity & Disease* 2015;**25**: 391-398.
26. Kemper KA, Sargent RG, Drane JW, Valois RF, Hussey JR. Black and white females' perceptions of ideal body size and social norms. *Obesity research* 1994;**2**: 117-126.
27. Capodilupo CM, Kim S. Gender and Race Matter: The Importance of Considering Intersections in Black Women's Body Image. *Journal of Counseling Psychology* 2014;**61**: 37-49.
28. Capodilupo CM. One Size Does Not Fit All: Using Variables Other Than the Thin Ideal to Understand Black Women's Body Image. *Cultural Diversity & Ethnic Minority Psychology* 2015;**21**: 268-278.
29. Blackman Carr LT, Nezami BT, Leone LA. Understanding Exercise Differences Between Black Women With and Without Obesity: A Mediation Analysis. *under review* 2019.
30. Carr LTB, Samuel-Hodge C, Ward DS, Evenson KR, Bangdiwala SI, Tate DF. RACIAL DIFFERENCES IN WEIGHT LOSS MEDIATED BY ENGAGEMENT AND BEHAVIOR CHANGE. *Ethnicity & Disease* 2018;**28**: 43-48.
31. West DS, Prewitt TE, Bursac Z, Felix HC. Weight loss of black, white, and Hispanic men and women in the Diabetes Prevention Program. *Obesity* 2008;**16**: 1413-1420.
32. Bennett GG, Foley P, Levine E, Whiteley J, Askew S, Steinberg DM, *et al.* Behavioral Treatment for Weight Gain Prevention Among Black Women in Primary Care Practice A Randomized Clinical Trial. *Jama Internal Medicine* 2013;**173**: 1770-1777.
33. Kumanyika SK, Whitt-Glover MC, Gary TL, Prewitt TE, Odoms-Young AM, Banks-Wallace J, *et al.* Expanding the obesity research paradigm to reach African American communities. *Preventing Chronic Disease* 2007;**4**: 1-22.
34. Kumanyika S, Prewitt TE, Banks J, Samuel-Hodge C. In the Way, or On the Way? Asking Ourselves about the Role of Contextual Factors in Community Based Obesity Research. In: Brennan VM, Kumanyika SK, Zambrana RE (eds). *Obesity Interventions in Underserved Communities*. Johns Hopkins University Press: Baltimore, MD, 2014, pp 151-162.

35. Pekmezi D, Marcus B, Meneses K, Baskin ML, Ard JD, Martin MY, *et al.* Developing an intervention to address physical activity barriers for African-American women in the deep south (USA). *Women's Health* 2013;**9**: 301-312.
36. Stevens J, Juhaeri, Cai JW, Jones DW. The effect of decision rules on the choice of a body mass index cutoff for obesity: examples from African American and white women. *American Journal of Clinical Nutrition* 2002;**75**: 986-992.
37. Taylor HA, Coady SA, Levy D, Walker ER, Vasan RS, Liu JK, *et al.* Relationships of BMI to Cardiovascular Risk Factors Differ by Ethnicity. *Obesity* 2010;**18**: 1638-1645.
38. Jackson PB, Cummings J. Health Disparities and the Black Middle Class: Overview, Empirical Findings, and Research Agenda. *Handbook of the Sociology of Health, Illness, and Healing: a Blueprint for the 21st Century* 2011: 383-410.
39. Cozier Y, Yu J, Coogan P, Rosenberg L, Palmer J. PERCEIVED RACISM AND OBESITY INCIDENCE IN AFRICAN AMERICAN WOMEN. *American Journal of Epidemiology* 2013;**177**: S11-S11.
40. Cozier YC, Yu J, Coogan PF, Bethea TN, Rosenberg L, Palmer JR. Racism, Segregation, and Risk of Obesity in the Black Womens Health Study. *American Journal of Epidemiology* 2014;**179**: 875-883.
41. Hicken MT, Lee H, Hing AK. The weight of racism: Vigilance and racial inequalities in weight-related measures. *Social Science & Medicine* 2018;**199**: 157-166.
42. Reardon SF, Fox L, Townsend J. Neighborhood income composition by household race and income, 1990-2009. *Annals of the American Academy of Political and Social Science* 2015;**660**: 78-97.
43. Bowleg L. The Problem With the Phrase Women and Minorities: Intersectionality-an Important Theoretical Framework for Public Health. *American Journal of Public Health* 2012;**102**: 1267-1273.
44. Crenshaw K. MAPPING THE MARGINS - INTERSECTIONALITY, IDENTITY POLITICS, AND VIOLENCE AGAINST WOMEN OF COLOR. *Stanford Law Review Vol 43, No 6, July 1991: in Memoriam: Carl Bernhardt Spaeth; Women of Color at the Center* 1993: 1241-1299.
45. Collins PH. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. Routledge: New York, NY, 1991.

Table 1: Demographics, weight perception and body mass index by race and education among women, NHANES 2007-2014

	College-educated		Non-college graduates		p-value
	Black N=437	White N=1,348	Black N=2,120	White N=3,845	
Age (years), mean \pm S.E.	44.8 \pm 0.8	48.0 \pm 0.5	45.3 \pm 0.6	50.7 \pm 0.4	<0.001
Marital status, %					
Currently	43.6	70.1	34.1	59.6	<0.001
Formerly	25.8	16.7	29.8	27.7	
Never	30.6	13.2	36.1	12.7	
Poverty-to-income ratio, %					
<200% FPL	21.1	11.8	64.4	40.9	<0.001
200-400% FPL	36.7	22.9	23.8	31.2	
\geq 400% FPL	42.3	65.3	11.8	27.9	
Insured, %	89.1	94.7	77.4	85.3	<0.001
Fair / poor health, %	13.5	5.8	31.8	17.8	<0.001
Depressive symptoms, %					
None	78.3	82.0	65.6	70.0	<0.001
Mild	14.0	13.5	19.9	18.0	
Moderate	5.7	3.0	7.8	7.5	
Moderately severe	1.9	0.9	4.9	3.5	
Severe	0.2	0.5	1.8	1.1	
Current smoker, %	7.3	8.2	24.3	25.1	<0.001
Physically inactive, %	38.7	27.4	65.1	55.3	<0.001
Body mass index (kg/m ²), mean \pm S.E.	31.7 \pm 0.5	27.0 \pm 0.2	32.3 \pm 0.2	29.2 \pm 0.1	<0.001
Weight perception (BMI- / self-assessed), %					
Healthy weight / about right	15.0	32.8	12.6	21.2	<0.001
Healthy weight / underweight	1.6	1.0	2.8	2.0	
Healthy weight / overweight	3.8	10.2	1.4	6.9	
Overweight / overweight	20.1	22.9	12.1	21.8	
Overweight / underweight	0.4	0.0	1.1	0.3	
Overweight / about right	8.2	5.6	12.0	7.5	
Obese / overweight	47.2	25.5	49.5	37.7	
Obese / underweight	0.0	0.4	0.7	0.3	
Obese / about right	3.9	1.6	7.8	2.3	

Table 2: Association between weight misperception and body mass index by race and educational attainment among women, NHANES 2007-2014

	Model 1	Model 2	Model 3	
			College graduates	Non-college graduates
	β (s.e.)	β (s.e.)	β (s.e.)	β (s.e.)
Black	2.79 (0.27)*	2.47 (0.32)*	3.80 (0.50)*	2.56 (0.33)*
College graduate	-1.38 (0.28)*	-1.53 (0.29)*		
Black \times College graduate		1.54 (0.59)*		

Notes: * $p < 0.05$. Adjusted for age, income, marital status, insurance, self-rated health, depressive symptoms, smoking status and physical inactivity.

Table 3: Association between race and weight perception by education among women, NHANES 2007-2014

	College-educated		Non-college graduates	
	Model 1	Model 2	Model 1	Model 2
	β (s.e.)	β (s.e.)	β (s.e.)	β (s.e.)
Black	3.80 (0.50)*	1.17 (0.28)*	2.55 (0.33)*	0.74 (0.16)*
Weight perception (BMI- / self-assessed)				
Healthy weight / about right		---		---
Healthy weight / underweight		-0.88 (0.38)*		-1.74 (0.24)*
Healthy weight / overweight		1.50 (0.17)*		1.25 (0.14)*
Overweight / overweight		5.67 (0.14)*		5.37 (0.11)*
Overweight / underweight		3.93 (1.36)*		4.63 (0.34)*
Overweight / about right		4.48 (0.20)*		4.48 (0.12)*
Obese / overweight		14.00 (0.34)*		14.73 (0.18)*
Obese / underweight		17.93 (1.93)*		13.04 (1.76)*
Obese / about right		10.94 (0.87)*		10.36 (0.50)*
Indirect effect		2.50 (0.34)*		2.14 (0.19)*
Direct effect		1.17 (0.34)*		0.36 (0.23)

Notes: * $p < 0.05$. Adjusted for age, income, marital status, insurance, depressive symptoms, self-rated health, smoking status and physical inactivity.

