



# Mediating Effect of Perceived Overweight on the Association between Actual Obesity and Intention for Weight Control; Role of Race, Ethnicity, and Gender

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## ABSTRACT

**Background:** Although obesity is expected to be associated with intention to reduce weight, this effect may be through perceived overweight. This study tested if perceived overweight mediates the association between actual obesity and intention to control weight in groups based on the intersection of race and gender. For this purpose, we compared Non-Hispanic White men, Non-Hispanic White women, African American men, African American women, Caribbean Black men, and Caribbean Black women.

**Methods:** National Survey of American Life, 2001–2003 included 5,810 American adults (3516 African Americans, 1415 Caribbean Blacks, and 879 Non-Hispanic Whites). Weight control intention was entered as the main outcome. In the first step, we fitted race/gender specific logistic regression models with the intention for weight control as outcome, body mass index as predictor and sociodemographics as covariates. In the next step, to test mediation, we added perceived weight to the model.

**Results:** Obesity was positively associated with intention for weight control among all race × gender groups. Perceived overweight fully mediated the association between actual obesity and intention for weight control among Non-Hispanic White women, African American men, and Caribbean Black men. The mediation was only partial for Non-Hispanic White men, African American women, and Caribbean Black women.

**Conclusions:** The complex relation between actual weight, perceived weight, and weight control intentions depends on the intersection of race and gender. Perceived overweight plays a more salient role for Non-Hispanic White women and Black men than White men and Black women. Weight loss programs may benefit from being tailored based on race and gender. This finding also sheds more light to the disproportionately high rate of obesity among Black women in US.

**Keywords:** Blacks, gender, obesity, perceived overweight, race, weight control

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## INTRODUCTION

All-cause mortality rate increases even with a moderate excess in weight and reaches about double for individuals with obesity (body mass index [BMI] >30) compared to those not obese.<sup>[1]</sup> This is mostly due to the effect of obesity on cardiovascular disease, diabetes,

and cancers.<sup>[2]</sup> Over 60% of the US population is either overweight or obese.<sup>[2-4]</sup> In the US, with 300,000 attributable annual deaths, obesity is only second to cigarette smoking as the leading cause of death.<sup>[5]</sup> With the current trends,<sup>[4]</sup> a larger number of obesity associated mortality and morbidity is expected in the near future.<sup>[6]</sup> The existing trend in the epidemic of obesity has been attributed to the increase in unhealthy lifestyle rather than genetics.<sup>[2,3]</sup> These concerns have increased the attention of public health authorities to programs which promote intention for weight-loss.<sup>[7]</sup>

A considerable proportion of populations is contemplating with the weight loss and may have some weight loss intention.<sup>[8]</sup> Very few studies, however, have focused on factors associated with weight loss intention.<sup>[9]</sup> Information derived from research on correlates of weight loss may enhance the efficacy of weight control programs that target intention and behaviors related to weight change.<sup>[10]</sup> Such information may particularly enhance the impact of weight control programs among minority groups who suffer disproportionately high rates of obesity and its associated morbidity.<sup>[11,12]</sup> Although actual obesity<sup>[13]</sup> and perceived obesity<sup>[11]</sup> influence intention for weight loss,<sup>[11]</sup> very little is known about race-, ethnic-, and gender differences in the association between these factors.

The current study tested the mediation effect of perceived overweight on the association between actual obesity and intention for weight loss among sub-groups of populations based on the intersection of race, ethnicity, and gender. This study used data of the National Survey of American Life (NSAL) and provided nationally representative results for Blacks and Whites in the US.<sup>[14]</sup>

## METHODS

National Survey of American Life was a survey completed between February 2, 2001, and June 30, 2003. The study has been approved by the Institute Review Board of the University of Michigan, MI. All participants provided written consent for participation.

### Participants

The NSAL included 5,810 individuals including 3,516 African Americans, 1,415 Caribbean Blacks, and 879 Non-Hispanic Whites. We only included Non-Hispanic Whites, African Americans, and Caribbean Blacks if they were not under-weight (BMI <18.5).

National Survey of American Life has used a national household probability sampling. All participants were

individuals 18 years and older.<sup>[14,15]</sup> Although African Americans were sampled from either large cities, other urban and rural area, Caribbean Blacks were exclusively sampled from large cities.

### Interview

Data have been collected through face-to-face computer-assisted (86%) or telephone (14%) interview. Interviews have lasted an average of 140 min. All interviews were performed in English. The final response rate was 72.3% overall.

### Measures

The study measured demographics factors such as age and gender. The study also collected self-reported data on socioeconomic factors such as employment status, education, household income (divided approximately into quartiles), marital status, and country region.

#### *Obesity*

Body mass index was calculated based on self-reported weight and height measures, which have shown to be highly correlated with BMI when is calculated using direct measures of height and weight.<sup>[16]</sup> This approach may result in underestimation of weight and overestimation of height,<sup>[17]</sup> leading to low estimates of overweight and obesity.<sup>[18]</sup> BMI was categorized to healthy weight (BMI between 18.5 and 24.9), overweight (BMI between 25.0 and 29.9), obesity class I (BMI between 30.0 and 34.9), obesity class II (BMI between 35.0 and 39.9), and obesity class III (BMI >40.0).

#### *Perceived weight*

Perceived overweight was measured using the following single item measure: Do you consider yourself very overweight, somewhat overweight, only a little overweight, just about right, or underweight? Responses included underweight, just about right, only a little overweight, somewhat overweight, and very overweight.

#### *Intention for weight loss*

The main outcome in this study was intention for weight loss, being asked with the following single item question: Are you currently trying to lose weight? Responses included yes, no, and don't know.

### Statistical analysis

We used Stata 12.0 (Stata Corp., College Station, TX) for data analysis, using sub-population survey commands. Weight adjusted survey proportions were reported with their 95% confidence intervals (CIs). Survey logistic regressions were used for multivariable analysis, by considering BMI as the independent variable, perceived overweight as a mediator, and intention for weight loss as the dependent variable. Adjusted odds ratio and 95% CI were reported.  $P < 0.05$  considered as statistically significant.

## RESULTS

This study included a total sample of 5,810 adults that was composed of 3,516 African Americans, 1,415 Caribbean Blacks, and 879 Non-Hispanic Whites. Among all race and ethnic groups, compared with men, women reported higher overweight perception and intention to control weight [Table 1].

### Non-Hispanic White men

Among Non-Hispanic White men, higher BMI was associated with higher odds of intention to control weight. This association remained significant after controlling the effect of income, education, and age. The BMI-intention to control weight association did not remain significant when we controlled for the effect of perceived overweight. In other words among Caribbean Black women, perceived overweight fully mediated the effect of actual BMI on intention to control weight [Table 2].

### Non-Hispanic White women

Among Non-Hispanic White women, higher BMI was associated with higher odds of intention to control weight. This association remained significant after controlling the effect of income, education, and age. The BMI-intention to control weight association remained significant when we controlled for the effect of perceived overweight. This means that among Caribbean Black men, perceived overweight does not fully mediate the effect of actual BMI on intention to control weight [Table 2].

### African American men

Among African American men, higher BMI was associated with higher odds of intention to control weight. This association remained significant after controlling the effect of income, education, and age. The BMI-intention

to control weight association remained significant when we controlled for the effect of perceived overweight. This means that among African American men, perceived overweight does not fully mediate the effect of actual BMI on intention to control weight [Table 3].

### African American women

Among African American women, higher BMI was associated with higher odds of intention to control weight. This association remained significant after controlling the effect of income, education, and age. The BMI-intention to control weight association did not remain significant when we controlled for the effect of perceived overweight. This means that among African American women, perceived overweight fully mediated the effect of actual BMI on intention to control weight [Table 3].

### Caribbean Black men

Among Caribbean Black men, higher BMI was associated with higher odds of intention to control weight. This association remained significant after controlling the effect of income, education, and age. The BMI-intention to control weight association remained significant when we controlled for the effect of perceived overweight. This means that among Caribbean Black men, perceived overweight does not fully mediate the effect of actual BMI on intention to control weight [Table 4].

### Caribbean Black women

Among Caribbean Black women, BMI was positively associated with odds of intention to control weight. This association remained significant after controlling the effect of age, income, and education. The association between BMI and intention to control weight did not, however, remain significant when we controlled the effect of overweight perception. Thus, among Caribbean

**Table 1: Descriptive of BMI, perceived weight, and intention to control weight among non-Hispanic White, African American and Caribbean Black men and women**

	Percentage (95% CI)					
	Non-Hispanic Whites		African Americans		Caribbean Blacks	
	Men	Women	Men	Women	Men	Women
Obesity						
Overweight	37.1 (29.7-44.6)	46.0 (38.9-53.1)	29.7 (26.5-32.9)	27.8 (26.0-29.6)	40.6 (35.6-45.6)	36.4 (32.9-39.9)
Obesity class I	40.1 (34.3-45.9)	23.1 (15.5-30.6)	40.8 (38-43.5)	30.8 (28.5-33.1)	40.6 (32.9-48.2)	32.2 (27.9-36.5)
Obesity class II	17.5 (12.1-22.8)	17.5 (14.0-21.0)	18.9 (16.6-21.1)	22.5 (20.4-24.6)	12.8 (5.7-19.8)	16.2 (12.7-19.7)
Obesity class III	3.8 (1.6-5.9)	8.8 (5.6-12.0)	6.6 (5.3-8)	11.0 (9.3-12.7)	5.5 (1.1-9.9)	9.3 (5.3-13.4)
Perceived overweight						
Just about right	45.4 (37.5-53.2)	29.5 (24.8-34.2)	55.8 (52.8-58.8)	30.6 (28.8-32.4)	67.4 (53.7-81.2)	30.8 (24.5-37.1)
Only a little overweight	28.4 (19.1-37.8)	20.9 (18.0-23.8)	22.7 (19.8-25.5)	22.1 (20.3-24.0)	17.6 (8.9-26.4)	28.7 (20.3-37.2)
Somewhat overweight	20.9 (16.0-25.8)	31.0 (26.4-35.6)	16.5 (13.6-19.4)	30.2 (28.1-32.4)	12.3 (5.4-19.1)	27.2 (18.7-35.7)
Very overweight	5.3 (1.6-9.0)	18.6 (14.2-23.1)	5.0 (3.7-6.4)	17.0 (15.3-18.8)	2.7 (0.7-4.6)	13.3 (8.8-17.7)
Weight control intention						
No	62.6 (58.9-66.3)	47.0 (42.0-52.1)	67.8 (64.9-70.7)	48.7 (45.5-51.9)	73.3 (61.4-85.2)	47.1 (40.1-54.1)
Yes	37.4 (33.7-41.1)	53.0 (47.9-58.0)	32.2 (29.3-35.1)	51.3 (48.1-54.5)	26.7 (14.8-38.6)	52.9 (45.9-59.9)

CI=Confidence interval, BMI=Body mass index

**Table 2: Association between BMI level and perceived overweight with intention to control weight among non-Hispanic white men and women**

	OR	SE	t	P	95% CI	
					Lower bound	Upper bound
White men						
Model I						
BMI	2.69	0.462	5.76	<0.001	1.865	3.878
Model II						
BMI	2.763	0.46	6.11	<0.001	1.938	3.94
Income	1.000	0.001	-0.41	0.691	1.000	1.000
Education	1.532	0.159	4.12	0.001	1.229	1.911
Age	1.01	0.008	1.22	0.242	0.992	1.028
Model III						
BMI	1.352	0.347	1.18	0.258	0.783	2.336
Income	1.000	0.001	0.09	0.933	1.000	1.000
Education	1.564	0.154	4.53	<0.001	1.267	1.93
Age	1.004	0.009	0.44	0.669	0.985	1.023
Perceived overweight	3.138	1.036	3.46	0.003	1.552	6.343
White women						
Model I						
BMI	1.722	0.169	5.53	<0.001	1.397	2.124
Model II						
BMI	1.809	0.178	6.03	<0.001	1.467	2.231
Income	1.000	0.001	2.01	0.063	1.000	1.000
Education	1.177	0.179	1.07	0.302	0.851	1.627
Age	0.987	0.005	-2.67	0.017	0.976	0.997
Model III						
BMI	0.68	0.113	-2.32	0.035	0.478	0.969
Income	1.000	0.001	0.93	0.368	1.000	1.000
Education	1.205	0.204	1.1	0.288	0.84	1.727
Age	0.979	0.008	-2.61	0.02	0.962	0.996
Perceived overweight	4.188	1.036	5.79	<0.001	2.472	7.097

CI=Confidence interval, BMI=Body mass index, OR=Odds ratio, SE=Standard error

**Table 3: Association between BMI level and perceived overweight with intention to control weight among African American men and women**

	OR	SE	t	P	95% CI	
					Lower bound	Upper bound
African American men						
Model I						
BMI	3.425	0.447	9.44	<0.001	2.627	4.464
Model II						
BMI	3.453	0.458	9.35	<0.001	2.638	4.521
Income	1.000	0.001	0.65	0.522	1.000	1.000
Education	1.351	0.086	4.74	<0.001	1.187	1.537
Age	1.000	0.006	0.05	0.964	0.989	1.012
Model III						
BMI	1.806	0.315	3.39	0.002	1.268	2.574
Income	1.000	0.001	0.43	0.669	1.000	1.000
Education	1.282	0.093	3.43	0.002	1.106	1.485
Perceived overweight	3.667	0.549	8.68	<0.001	2.706	4.971

Contd...

**Table 3: Contd..**

	OR	SE	t	P	95% CI	
					Lower bound	Upper bound
African American women						
Model I						
BMI	2.000	0.123	11.3	<0.001	1.766	2.266
Model II						
BMI	2.150	0.141	11.66	<0.001	1.882	2.457
Income	1.000	0.001	1.74	0.092	1.000	1.000
Education	1.268	0.094	3.21	0.003	1.091	1.474
Age	0.987	0.004	-3.54	0.001	0.98	0.995
Model III						
BMI	1.053	0.097	0.57	0.573	0.874	1.269
Income	1.000	0.001	0.46	0.648	1.000	1.000
Education	1.156	0.091	1.84	0.075	0.985	1.357
Age	0.985	0.003	-4.52	<0.001	0.978	0.992
Perceived overweight	3.714	0.31	15.72	<0.001	3.135	4.401

CI=Confidence interval, BMI=Body mass index, OR=Odds ratio, SE=Standard error

**Table 4: Association between BMI level and perceived overweight with intention to control weight among Caribbean Black men and women**

	OR	SE	t	P	95% CI	
					Lower bound	Upper bound
Caribbean Black men						
Model I						
BMI	6.789	1.358	9.58	<0.001	4.488	10.268
Model II						
BMI	6.958	1.33	10.15	<0.001	4.685	10.333
Income	1.000	0.001	2.12	0.045	1.000	1.000
Education	1.029	0.301	0.1	0.923	0.562	1.885
Age	0.988	0.011	-1.17	0.253	0.966	1.01
Model III						
BMI	2.231	0.654	2.74	0.012	1.216	4.092
Income	1.000	0.001	1.72	0.099	1.000	1.000
Education	0.971	0.268	-0.11	0.916	0.548	1.72
Age	0.997	0.011	-0.3	0.769	0.974	1.02
Perceived overweight	12.438	3.689	8.5	<0.001	6.734	22.973
Caribbean Black women						
Model I						
BMI	1.659	0.218	3.85	0.001	1.264	2.179
Model II						
BMI	1.682	0.124	7.06	<0.001	1.444	1.959
Income	1.000	0.001	-1.1	0.281	1.000	1.000
Education	1.209	0.157	1.46	0.157	0.925	1.581
Age	0.981	0.006	-3.11	0.005	0.968	0.994
Model III						
BMI	0.993	0.235	-0.03	0.976	0.608	1.621
Income	1.000	0.001	-1.65	0.113	1.000	1.000
Education	1.207	0.144	1.58	0.128	0.943	1.543
Age	0.979	0.008	-2.47	0.022	0.962	0.997
Perceived overweight	3.283	1.017	3.84	0.001	1.73	6.232

CI=Confidence interval, BMI=Body mass index, OR=Odds ratio, SE=Standard error

Black women, perceived overweight fully mediated the association between actual BMI and intention to control weight [Table 4].

## CONCLUSIONS

The findings suggest that perceived overweight fully mediates the association between actual obesity and intention for weight control among White women and Black men but not White men and Black women.

Based on our study, half of overweight obese women and up to third of the overweight obese men have intention to control their weight. In one study, about 30% of Americans stated that at the time of study they were trying to reduce their calorie or fat intake in an effort to lose or maintain weight and 61% of them were doing more physical activity in order to lose or maintain weight.<sup>[8]</sup> In 2000, the American Dietetic Association reported that 28% of Americans reported an intention to change their eating behaviors to achieve a healthier diet at the time of the study.<sup>[19]</sup>

In line with the literature,<sup>[20]</sup> irrespective of race and ethnicity, women were more likely to identify themselves as overweight and take action to lose weight. Based on the literature, women, in general, are more motivated to lose weight, possibly due to perceived societal pressure to be thin and experiencing higher levels of concerns with their appearance. In addition, in general, women tend to be more health conscious.<sup>[21]</sup>

Our results in all race × gender groups and particularly among non-Hispanic White women and Black men are in support of the belief that cognition about obesity is a precursor of body dissatisfaction that leads to weight management behaviors among individuals with above-average weight. These behaviors may include an increased intake of fruits and vegetables, a lower intake of high-calorie foods and high physical activity.<sup>[22,23]</sup> Our study, however, shows that this effect may be less salient for Black women.

A number of studies have compared the body image perception between Whites and Blacks.<sup>[24-27]</sup> Among women, compared to Whites, Blacks may have fewer concerns about being overweight.<sup>[24]</sup> Black women may report lower body image dissatisfaction and may prefer larger body sizes than do other racial and ethnic groups.<sup>[28-32]</sup> Among women, compared to Whites, Blacks report fewer weight-related concerns, however, among men, race/ethnicity may not affect weight-related concerns.<sup>[28,33]</sup>

Although we already know that culture influences diet, physical activity, weight, intention to reduce weight, and weight-related behaviors such as exercise,<sup>[34]</sup> our information is limited on Black-White differences in the complex associations between the above factors

that finally cause obesity. Very few studies have focused on race-, ethnic-, or gender-group differences in the way culture, attitudes, values, body image, norms, and perceived overweight affect weight-related behaviors and obesity.<sup>[35]</sup> Thomas posits that among ethnic minorities, historical, social, and cultural forces determine how attitudes and perceptions determine the lifestyle behaviors, which translate in obesity.<sup>[36]</sup>

Obesity is higher among Black Americans than other race and ethnic groups, with more than half being overweight or obese.<sup>[37-40]</sup> Approximately, 40% of Blacks report no leisure-time physical activity.<sup>[1,8]</sup> In fact, among women,<sup>[14,41]</sup> compared with Whites, Blacks are less likely to eat healthy foods, and may have higher social acceptance of heavier body weight and perceive less social pressure to lose weight,<sup>[9,42-44]</sup> which may result in lower weight management strategies.<sup>[45,46]</sup>

This study adds to our knowledge about racial and gender differences in the link between weight, perceived weight, and weight loss intention. Based on theories of reasoned action and planned behavior, intention the strongest predictors of behaviors.<sup>[47-49]</sup>

Our findings have important implications. As we know that culturally tailored interventions have higher efficacy among minority groups,<sup>[50,51]</sup> the result of this study may be used for tailoring healthy weight programs that are specifically designed for Blacks.<sup>[52,53]</sup> To reduce the obesity-attributable mortality,<sup>[54]</sup> effective weight loss programs that target minority populations<sup>[52,53]</sup> should be promoted in US. Even minimum weight loss may result in an evident reduction in mortality. Thus individuals with obesity should receive help to reduce their body weight.<sup>[55]</sup>

Weight control programs among minority populations – who are at an increased risk of obesity and cardiovascular disease<sup>[38-40]</sup>–may benefit by tailoring to race and gender of their target groups. Thus, the results of this study may increase the success of the program, which try to increase intention to weight loss in the US. This is especially important because weight loss is the key factor in the control and prevention of coronary heart disease, hypertension, type II diabetes, hyperlipidemia, cardiorespiratory failure, and other chronic degenerative diseases,<sup>[56]</sup> and even a modest amount of weight control will reduce these risks.<sup>[57]</sup>

The study had a number of limitations. The first major limitation was with the measurement of study constructs. We used single items to measure overweight perception and intention for weight loss. Actual weight was also measured using self-reported weight and height. Our study did not measure other factors such as body image, perceived social pressure related to thinness, and other weight-related factors.<sup>[58,59]</sup> Behavioral presentation of intention to control weight (dieting/exercise) was not



investigated as well. However, we already know that the intention is one of the strongest predictors of behaviors, and empirical data has shown that weight loss intention predicts weight loss.<sup>[60]</sup>

The associations between body weight, weight perception, body dissatisfaction, weight control intention, and weight control behaviors are not simple.<sup>[61-65]</sup> Our finding sheds more light on the role of race, ethnicity, and gender as possible moderators on the above links, and also provides an explanation for some of the inconsistencies in the literature on some of these associations.

We argue that universal models may fail to explain the links between weight, weight perception, and weight control behaviors among all populations. Studies which show racial and gender differences in the paths from obesity to readiness and intention for weight control may have important public health implications for health education initiatives and weight loss interventions.<sup>[66]</sup> Findings of the current study are in line with a well-developed literature that has shown race, ethnicity, gender, and their intersections modify correlates of obesity and cardiovascular risk.<sup>[67-79]</sup>

To conclude, our study showed that the intersection of gender and race determines if perceived overweight fully mediates the association between perceived overweight and intention to control weight or not. The degree by which perceived overweight plays a role in the cognitive process by which one person with obesity makes a decision about weight loss may be under the influence of race and gender. Perceived overweight seems to be a more salient factor with stronger implications for weight control among White women and Black men than Black women and White men.

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