

# Associations of Abdominal Fat With Perceived Racism and Passive Emotional Responses to Racism in African American Women

Anissa I. Vines, MS, PhD, Donna Day Baird, PhD, June Stevens, PhD, Irva Hertz-Picciotto, PhD, Kathleen C. Light, PhD, Maya McNeilly, PhD

Compared with White women, African American women have high rates of morbidity and mortality from many chronic diseases, such as heart disease and diabetes.<sup>1–3</sup> Abdominal body fat, the “apple-shaped” body type, has been shown to be a risk factor for these conditions, independent of total body fat.<sup>4</sup> Factors that have been associated with higher waist-to-hip ratios (WHRs) in African Americans are low socioeconomic status,<sup>5</sup> smoking, older age, lower education, and less physical activity.<sup>6–8</sup>

Psychological stress may be another risk factor for the accumulation of body fat in the abdominal region, but this has not been explored widely among African Americans.<sup>9–12</sup> Bjorn-torp hypothesized that the distribution of body fat in the visceral cavity may be attributable to activation of the hypothalamus as a result of chronic stress and the body’s inability to adjust to insurmountable life circumstances.<sup>9,10</sup> In a study of socially subordinate cynomolgus monkeys, chronic stress induced by an inability to overcome adverse situations caused an increase in weight and the centralization of adipose tissue.<sup>13</sup> In the few studies that have examined the relation between chronic stress and increased central adiposity in humans, there has been variation in the measures used to assess stress.<sup>14–25</sup> Despite the increasing disparities between African American and White women in obesity and obesity-related diseases, the number of African Americans in these studies has been small. In addition, coping in response to the stressor has not been studied in relation to increased central adiposity.

Focusing only on traditional stress measures is not adequate when studying African Americans because these measures do not capture the full range of stress they experience.<sup>26,27</sup> Racism can be a chronic stressor because of its continued influence in the lives of many African Americans.<sup>28</sup> Likewise, how the racist event is perceived can cause stress and induce

**Objectives.** An excess in abdominal fat may predispose African American women to chronic health conditions such as diabetes and cardiovascular disease. Because stress may increase body fat in the center-body region, we used the waist-to-hip ratio (WHR) to examine associations between excess abdominal fat and perceived racism (a chronic stressor) and daily stress. Passive emotional responses to perceived racism, hypothesized to have particularly adverse effects, were also examined.

**Methods.** We controlled for body mass index in multiple logistic regression models among 447 African American women who completed a telephone interview on perceived racism.

**Results.** Passive emotional responses were not related to WHR (odds ratio [OR]= 1.4; 95% confidence interval [CI]=0.8, 2.4). High perceived racism was associated with a low WHR in this population (OR=0.4; 95% CI=0.3, 0.8). However, high daily stress was related to a high WHR (OR=2.7; 95% CI=1.1, 6.7).

**Conclusions.** Findings support an association between daily stress and WHR but do not support our hypothesis that passive emotional responses to perceived racism increase abdominal fat. Further study of the stress physiology of perceived racism in African American women is warranted. (*Am J Public Health*. 2007;97:526–530. doi:10.2105/AJPH.2005.080663)

both emotional and behavioral responses. In a survey of 200 African American adults who resided in a metropolitan area, 33% reported experiences of racism within the past 6 months.<sup>27</sup> The results of the survey indicated that the experiences of racism, like other stressful events, produced feelings of distress. Moreover, studies have shown that emotions and coping responses are important determinants of physical and psychological health.<sup>29,30</sup>

It is plausible that chronic stress caused by perceived racism could influence the distribution of body fat among African American women, especially among those who respond to perceived racism with passive emotional coping responses. These are responses that do not lead to action and that involve the suppression of emotions. In a person who lacks adequate resources to circumvent its effects, the stress of perceived racism could disrupt the body’s homeostasis and produce central abdominal obesity, similar to the effects seen in stressed cynomolgus monkeys.<sup>13</sup> Our study

examined the associations of perceptions of racism and passive emotional responses to racism with central abdominal obesity in a sample of African American women. We hypothesized that higher levels of perceived racism and higher levels of passive emotional responses (e.g., hopelessness) to racism would be associated with increased central obesity.

## METHODS

### Participants

The study population comprised 476 non-Hispanic African American women who participated in the National Institute of Environmental Health Sciences Uterine Fibroid Study<sup>31</sup> for an investigation of perceived racism.<sup>32</sup> Participants in the parent study were aged 35 to 49 years and were randomly selected from the membership rolls of a prepaid health plan. Eighty percent of eligible women agreed to participate in the parent study. Those eligible for the assessment of

perceived racism were premenopausal women who self-reported as either Black or African American and had completed a clinic visit, a telephone interview, and a mailed questionnaire during the initial phase of the study (77% of all premenopausal African American participants). We use the term African American to represent these women. Of those eligible for the study on perceived racism (N=529), 476 completed an interview (response rate 90%).

In the parent study, participants were screened for fibroids using ultrasound. Because large uterine fibroids can increase the size of the uterus and affect waist circumference, we excluded 20 women with uterine size equivalent to a fetus of 12 weeks gestation or larger.<sup>33</sup> An additional 6 women had missing uterine size data but were excluded on the basis of their self-report of a previous diagnosis of having a fibroid of 5 cm or larger in diameter. Thus, a total sample of 450 women remained for this analysis.

### Anthropometric Variables

Body mass and waist and hip circumferences were measured in the clinic by a trained field supervisor. Participants were asked to wear lightweight clothing to the appointment, and they removed their shoes before measurements were taken. Weight was measured to the nearest half pound using a nondigital scale. Waist and hip circumferences were measured to the nearest quarter inch with a standard tape measure around the smallest part of the waist, where the umbilicus was the reference point, and around the largest part of the hips. Although computerized tomography and magnetic resonance imaging can provide accurate measures of central adiposity, these procedures require clinic time and are quite expensive to use in a large epidemiological study.<sup>34</sup> Therefore, in this study, the WHR was used to assess abdominal body fat. A high WHR, indicating high risk, was defined as greater than 0.80.<sup>35,36</sup> Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared.

### Measures of Perceived Racism and Passive Emotional Responses to Racism

The Telephone-Administered Perceived Racism Scale,<sup>32</sup> a multidimensional instrument

that consists of 3 scales and 5 response subscales, was administered during our study to assess perceptions of and responses to racism. Cronbach alpha reliabilities for all scales and subscales were 0.75 or above except for the passive behavioral subscale, with a Cronbach alpha of 0.68. Test–retest reliability varied from 0.61 to 0.82. Details about the perceived racism instrument’s construction and psychometric properties can be found elsewhere.<sup>32</sup>

We used 2 measures of the perceived racism instrument: the perceived racism scale (mean [SD]=63 [13.4]; range=29–95) and the passive emotional response subscale (mean [SD]=8.9 [3.8]; range=4–16). Each was standardized to range from 0 (lower passive emotional responses to racism and lower perceptions of racism) to 1 to facilitate the interpretation of findings. These data were analyzed as continuous variables and in tertiles. The perceived racism scale includes questions about personal experiences of racism and the respondent’s perceptions of racism experienced by African Americans as a group. The passive emotional response subscale was used to measure passive emotional coping, responses that do not lead to action or may suppress emotions (represented in the scale by feelings of hopelessness or powerlessness).

Demographic, behavioral, and psychosocial variables were obtained from the mailed and telephone questionnaires. Educational attainment was categorized as completed high school or lower, some college or technical school, or a bachelor’s degree or higher. Income was categorized as less than \$40 000 (10% had an annual household income of <\$20 000), \$40 000 to \$60 000, or greater than \$60 000. Current and former smokers were grouped together as ever-smokers. Alcohol consumption (yes or no) for each type of alcoholic beverage (beer, wine, liquor) was obtained from a self-administered food-frequency questionnaire. Parity, the number of live births, was also included in the analyses. Physical activity data were collected by asking about time spent in vigorous (e.g., running, jogging, soccer, and basketball), moderate (e.g., dancing, bicycling short distances, golfing, and gardening), and walking forms of exercise in hours per week. Daily stress (i.e., none, mild, moderate, severe) was assessed by

asking, “How stressful is your day-to-day life?” in the self-administered questionnaire.

The relations between WHR and each of the 2 main predictor variables of interest, perceived racism and passive emotional responses to racism, were examined with logistic regression models adjusted for BMI. Potential confounders were tested 1 at a time in separate models with perceived racism and with passive emotional responses. In all models we controlled for BMI. Educational attainment, annual household income, childhood social status (categorized into high or middle income vs low income), parity, alcohol use, and physical activity were not included in the multivariate model because the estimates for the stress-related variables changed by less than 10% when these potential confounders were included in the models. Smoking status, age, and daily stress were included in the full logistic regression model adjusted for BMI. Analyses were limited to 447 women with data for BMI.

## RESULTS

The mean scores on the perceived racism scale and the passive emotional response subscale were 0.54 and 0.41, respectively (Table 1). The mean WHR was 0.80, and the average BMI was 30. There was a significant correlation of 0.50 between these 2 anthropometric indices. Participants represented a range of educational attainment and income levels (Table 1). Half of the women reported being raised as a child in a middle-income or well-off household.

Table 2 shows results of the analyses that examined the associations of perceived racism and daily stress with WHR. Higher perceived racism was significantly associated with lower WHR (odds ratio [OR]=0.5; 95% confidence interval [CI]=0.3, 0.9). This association was seen in crude and adjusted models, including the model adjusting for daily stress. High daily stress was related to a high WHR (OR=2.7; 95% CI=1.1, 6.7) after we controlled for age, smoking, and perceived racism. The association was slightly weaker when perceived racism was not included in the model (OR=2.2; 95% CI=0.9, 5.2).

There was no significant association between tertiles of the passive emotional response subscale and high WHR (Table 3). The strongest

**TABLE 1—Sample Characteristics: African American Women (n = 450), Uterine Fibroid Study, Washington, DC, 1996–1998**

Characteristic	Value
Passive emotional response to racism, <sup>a</sup> mean (SD)	0.41 (0.32)
Perceived racism, <sup>a</sup> mean (SD)	0.54 (0.18)
WHR, mean (SD)	0.80 (0.08)
BMI, <sup>b</sup> mean (SD)	30 (7.5)
Perceived racism scale, no. (%)	
Low	132 (29)
Medium	126 (28)
High	192 (43)
Passive emotional response subscale, no. (%)	
Low	147 (33)
Medium	140 (31)
High	163 (36)
Levels of WHR, no. (%)	
≤ 0.80	241 (54)
> 0.80	209 (46)
BMI, <sup>b</sup> no. (%)	
Normal (< 25)	116 (26)
Overweight (25–29)	141 (31)
Obese (≥ 30)	190 (42)
Educational attainment, no. (%)	
Completed high school or lower	86 (19)
Some college or technical school	210 (47)
Bachelor's degree or higher	154 (34)
Annual household income, no. (%)	
< \$40,000	187 (42)
\$40,000–\$60,000	115 (26)
> \$60,000	148 (33)
Age at interview, no. (%), y	
< 40	96 (21)
40–44	158 (35)
≥ 45	196 (44)
Childhood socioeconomic status, no. (%)	
Well-off or middle-income	242 (54)
Quite poor or low-income	208 (46)

Source. Uterine Fibroid Study's ancillary study on perceived racism, 1998.<sup>31,32</sup>  
 Note. BMI = body mass index; WHR = waist-to-hip ratio.  
<sup>a</sup>Standardized to a scale and subscale ranging from 0 (i.e., lower passive emotional responses to racism and lower perceptions of racism) to 1 (i.e., higher passive emotional responses to racism and higher perceptions of racism)  
<sup>b</sup>n = 447 because of missing data.

**TABLE 2—Associations of Perceived Racism and Daily Stress With Waist-to-Hip Ratio (WHR > 0.80), Adjusted for BMI, in African American Women (n = 447): Uterine Fibroid Study, Washington, DC, 1996–1998**

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
Perceptions of racism					
Low (referent)	1.0	1.0	...	...	1.0
Medium	1.0 (0.6, 1.7)	1.0 (0.6, 1.7)	...	...	1.0 (0.6, 1.6)
High	0.6 (0.3, 1.0)	0.5 (0.3, 0.9)*	...	...	0.4 (0.3, 0.8)*
Daily stress					
None (referent)	...	...	1.0	1.0	1.0
Mild stress	...	...	1.3 (0.7, 2.6)	1.4 (0.7, 2.8)	1.4 (0.7, 2.9)
Moderate stress	...	...	1.7 (0.8, 3.3)	1.6 (0.8, 3.4)	1.8 (0.9, 3.8)
Severe stress	...	...	2.4 (1.0, 5.7)	2.2 (0.9, 5.2)	2.7 (1.1, 6.7)*
Age, y					
< 40 (referent)	...	1.0	...	1.0	1.0
40–44	...	1.4 (0.8, 2.6)	...	1.4 (0.8, 2.5)	1.4 (0.8, 2.5)
≥ 45	...	2.4 (1.3, 4.3)*	...	2.1 (1.2, 3.8)*	2.3 (1.3, 4.1)*
Smoking status					
Never-smoker (referent)	...	1.0	...	1.0	1.0
Ever-smoker	...	1.7 (1.1, 2.7)*	...	1.6 (1.1, 2.5)*	1.7 (1.1, 2.6)*

Note. BMI = body mass index; OR = odds ratio; CI = confidence interval. Omitted variables (...) not included by model design. Model 1 and Model 3 show perceptions of racism and daily stress adjusted only for BMI. Model 2 and Model 4 show perceptions of racism and daily stress adjusted for BMI, smoking, and age. Model 5 shows the association of WHR with daily stress and perceived racism.  
 \*P < .05.

effect of the passive emotional response subscale appeared in the upper tertile when perceived racism was included in the model, but the effect was weak, with broad confidence intervals (OR = 1.4; 95% CI = 0.8, 2.4).

**DISCUSSION**

This was the first study to examine the associations of abdominal body fat distribution with both perceptions of racism as a chronic stressor and the passive emotional coping responses to racism in a general population of African American women. Bjorntorp hypothesized<sup>9,10</sup> that chronic stress-induced defeat (i.e., responses that do not lead to action) coping responses are associated with central body fat; we therefore explored whether higher levels of passive emotional response are associated with an increased risk of a high WHR. Passive emotional responses were not related to WHR, and surprisingly, higher perceptions of racism were related to a low rather than high WHR in this population.

However, higher levels of daily stress were associated with increased WHR.

We evaluated several variables that could potentially confound a relation between perceived racism and WHR, including cigarette smoking, alcohol consumption, parity, educational attainment, and annual household income. Consistent with other studies, our research found that cigarette smoking and an age of 45 years and older were associated with higher WHRs after adjusting for BMI.<sup>5,7,8</sup> Alcohol consumption among this group of women was low, and this may have prevented our finding an association with WHR.

We identified 13 previous studies that examined a relation between psychosocial factors and central adiposity.<sup>14–25, 38</sup> Two of the studies explored this relation in diabetic populations,<sup>17,18</sup> and 3 examined only men.<sup>14,15,23</sup> Twin studies in Sweden and Finland found a significant and positive association between depression-related factors and increased central adiposity,<sup>22,38</sup> as did studies of middle-aged women in Allegheny County,

**TABLE 3—Association Between Passive Emotional Responses and Waist-to-Hip Ratio (WHR > 0.80), Adjusted for BMI, in African American Women (n = 447): Uterine Fibroid Study, Washington, DC, 1996–1998**

	Crude Model OR (95% CI)	Model 1 OR (95% CI)	Model 2 <sup>a</sup> OR (95% CI)	Model 3 <sup>a</sup> OR (95% CI)
Passive emotional response				
Low (referent)	1.0	1.0	1.0	1.0
Medium	0.7 (0.4, 1.2)	0.7 (0.4, 1.2)	0.8 (0.5, 1.4)	0.6 (0.4, 1.1)
High	1.1 (0.7, 1.8)	1.1 (0.6, 1.8)	1.4 (0.8, 2.4)	0.9 (0.6, 1.6)
Perceptions of racism				
Low (referent)	...	...	1.0	...
Medium	...	...	1.0 (0.6, 1.7)	...
High	...	...	0.5 (0.3, 0.8)*	...
Daily stress				
None (referent)	...	...	...	1.0
Mild stress	...	...	...	1.5 (0.7, 3.0)
Moderate stress	...	...	...	1.8 (0.8, 3.7)
Severe stress	...	...	...	2.3 (1.0, 5.6)*
Age, y				
< 40 (referent)	...	1.0	1.0	1.0
40–44	...	1.4 (0.7, 2.5)	1.4 (0.8, 2.5)	1.3 (0.7, 2.4)
≥ 45	...	2.1 (1.2, 3.8)*	2.3 (1.3, 4.2)*	2.1 (1.2, 3.7)*
Smoking status				
Never-smoker (referent)	...	1.0	1.0	1.0
Ever-smoker	...	1.7 (1.1, 2.6)*	1.8 (1.2, 2.8)*	1.7 (1.1, 2.6)*

Source. Uterine Fibroid Study's ancillary study on perceived racism, 1998.<sup>31,32</sup>

Note. BMI = body mass index; OR = odds ratio; CI = confidence interval. Omitted variables (...) not included by model design. Three respondents were excluded because of missing BMI data.

<sup>a</sup>Additional adjustment for perceptions of racism (Model 2) and daily stress (Model 3).

\*P < .05.

Pa,<sup>16</sup> and 2 groups of Swedish women.<sup>21,24</sup> Hispanic Health and Nutrition Examination Survey data were used to detect an association between depression and abdominal body fat in Cuban Americans but not in other Hispanic groups.<sup>25</sup>

Only 2 studies of abdominal body fat and psychosocial factors included substantial numbers of African American women,<sup>19,20</sup> and neither reported results for depressive-related symptoms or passive responses to racism. Kaye et al. examined several psychosocial factors among 1464 African American women, 18 to 30 years old, and found significant associations between increased hostility scores and WHR.<sup>19</sup> Tull et al. focused on internalized racism as a psychosocial stressor among US-born women living in the Virgin Islands and African Caribbean immigrants to the Virgin Islands.<sup>20</sup> After adjusting for age, education, and BMI, Tull and colleagues found

that the odds of having a high WHR (>0.80) were 2.4 (95% CI=1.1, 5.3) for women with high internalized racism (the extent to which African Americans agree with racist stereotypes about African Americans).<sup>39</sup>

Our findings of an inverse association between perceived racism and WHR may be consistent with the findings of Tull et al.<sup>20</sup> Although we did not measure internalized racism, it has been hypothesized that women who perceive little or no racism (low scores on the perceived racism scale) have higher internalized racism.<sup>40</sup> If that is the case, low perceptions of racism might increase risk, and, as we observed, high perceptions would be associated with low WHR. A self-report of high perceived racism may reflect more successful coping with this stressor. Alternatively, it is possible that higher perceived racism is associated with some unknown variable that is linked to healthier lifestyle, such as social

integration or greater access to health information. In our study population, perceived racism was associated with higher education.<sup>41</sup> When we evaluated adjustment for education to address unmeasured confounding, however, there was not a significant change in the association between perceived racism and WHR.

In our sample, higher perceived racism was only modestly correlated with higher levels of daily stress (ρ=0.20), which was associated with higher WHR. This supports the growing evidence in diverse populations for psychosocial influences on WHR and the concomitant adverse health effects.

### Limitations

Our study had several limitations. The main limitation was its cross-sectional design, which limited inferences about causality. This study examined perceived racism rather than actual experiences of racism. However, it may be the perceptions of racism that determine stress levels and, ultimately, health status. We used WHR to assess central body fat instead of the more accurate computed tomography scans. However, studies have shown WHR and computed tomography scans to be correlated.<sup>35</sup> Variation in the waist and hip measures was minimized because only 1 person conducted the anthropometric assessments. This study also used logistic regression to calculate the odds ratio for estimating risk. Although this is not an optimal modeling strategy when the outcome of interest is common, the odds ratio is still a valid measure of association. Furthermore, this is the first study to examine perceived racism and passive emotional responses to racism in relation to increased abdominal fat.

### Conclusions

Our study adds to the evidence that stress has adverse effects on health. Given the surprising inverse association between perceived racism and WHR, it is clear that more research is needed to understand how African American women experience and cope with racism. Studies with more extensive psychometric measures are needed, as are longitudinal studies, perhaps beginning during the formative years. Our measure of perceived racism relied on a willingness of

the respondent to acknowledge and report experiences of racism. Being able to acknowledge and report racism may reflect psychological responses integral to a healthy physiological response. ■

### About the Authors

*At the time of the study, Anissa I. Vines, June Stevens, and Irva Hertz-Picciotto were with the Department of Epidemiology, School of Public Health, University of North Carolina, Chapel Hill. Donna D. Baird was with the Epidemiology Branch, National Institute of Environmental Health Sciences, Research Triangle Park, NC. Kathleen C. Light was with the Department of Psychiatry, School of Medicine, University of North Carolina, Chapel Hill. Maya McNeilly was in private practice in clinical psychology and was also with Duke University, Durham, NC.*

*Requests for reprints should be sent to Anissa I. Vines, Department of Epidemiology, University of North Carolina, Chapel Hill, CB#7400, Chapel Hill, NC 27516 (e-mail: avines@email.unc.edu).*

### Contributors

A.I. Vines originated the study, conducted the analyses, interpreted the data, and prepared the article. D.D. Baird provided access to the data. J. Stevens provided obesity expertise. I. Hertz-Picciotto contributed to all aspects of the study. K.C. Light provided the stress expertise. M.D. McNeilly provided expertise in perceived racism as a chronic stressor and coping mechanisms. All authors contributed to the origination of the study, interpretation of findings, and preparation of the article.

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### Human Participant Protection

This study was approved by the University of North Carolina's institutional review board.

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