



PTSD and obesity in the Detroit neighborhood health study[☆]

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ABSTRACT

Objective: Posttraumatic stress disorder (PTSD) has been associated with adverse health consequences, including overweight, obesity and cardiovascular disease. African Americans, particularly women, have among the highest rates of overweight and obesity in the U.S. compared to other racial groups. High rates of violence exposure in urban African Americans may lead to the development of PTSD and increase risk for overweight and obesity. The current study investigated the comorbidity of lifetime PTSD and overweight/obesity in a population-based African American, urban sample.

Method: Data were from 463 African American male and female participants of the Detroit Neighborhood Health Study. Multivariable logistic regression models estimated the impact of lifetime PTSD on risk for overweight and obesity.

Results: The prevalence of obesity was significantly higher among women (60.9%) than men (33.1%; $P < .001$). In sex-stratified models, after controlling for demographic variables, PTSD was associated obesity (odds ratio=4.4, 95% confidence interval: 1.3, 14.3) only among women.

Conclusions: PTSD was associated with obesity, after controlling for confounding variables, among African American women. Results underscore the contribution of PTSD to obesity among African American women and the importance of addressing the physical health correlates of women with PTSD.

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Posttraumatic stress disorder (PTSD), which develops following exposure to a traumatic event [1], has been associated with adverse health conditions, including overweight and obesity [2], a leading cause of death in the U.S. [3]. African American women have among the highest rates of obesity in the U.S. [4]. Higher rates of adverse life events experienced by African Americans compared to European Americans may partially account for disparities in rates of overweight and obesity and cardiovascular health conditions [5,6]. The role of adversity in the development of obesity may be particularly salient to urban African American populations who experience high rates of violence exposure [7], which itself has been associated with obesity [8].

We hypothesized that PTSD may be associated with obesity in urban African Americans. Cross-sectional associations have been observed between PTSD, increased body mass index (BMI) and obesity-related conditions [9–11]. Weiss et al. [11] found that PTSD was significantly associated with metabolic syndrome in an inner-city African American sample. An investigation of a U.S. nationally

representative sample found that PTSD was associated with obesity only for women in sex-stratified models [10]. A prospective study found that PTSD contributed to obesity among women but not men in a German sample [12]. A recent study [13] found that PTSD prospectively increased risk of overweight and obesity in the Nurses' Health Study II cohort.

We are not aware, however, of any investigation that has assessed the relation between PTSD and overweight/obesity in an urban, population-based sample of African American women and men. This paper aimed to fill that gap.

1. Method

1.1. Participants

Data were analyzed from a subsample of the Detroit Neighborhood Health Study (DNHS), a longitudinal investigation of a predominantly African American adult sample in urban Detroit [7]. The current investigation included 179 African American men and 284 African American women with BMI data.

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1.2. Measures

A modified version of the PTSD Checklist–Civilian Version (PCL-C; Ref. [14]) was used to assess lifetime PTSD symptoms [1]. Lifetime PTSD cases endorsed ≥ 1 re-experiencing, ≥ 3 avoidance/numbing and ≥ 2 hyperarousal items at a level of “moderately” or higher in reference to either the worst or random traumatic event. The diagnostic interview showed good validity against the Clinician-Administered PTSD Scale (Refs. [15,16]).

Covariates included due to potential associations with PTSD and/or BMI were the average number of cigarettes smoked and alcoholic drinks consumed per day in the past month, age, income and education [3,17–20]. BMI was calculated from measured height and weight.

1.3. Procedure

As described elsewhere [7,16], DNHS data collection began in 2008; each wave consisted of a 40-min phone interview, for which participants received US\$25 compensation. An in-person sample collection included measured height and weight, for which participants also received US\$25. The institutional review board (IRB) of the University of Michigan approved the parent study; the IRB of VA Boston Healthcare System approved the current investigation.

1.4. Statistical analyses

The DNHS used stratified sampling with replacement; a strata variable was used to account for this design. PROC SURVEYFREQ, in SAS 9.3, was used to calculate variable frequencies and Wald chi-square tests. Multivariable logistic regression analyses were estimated using PROC SURVEYLOGISTIC, with BMI polychotomized into normal/underweight (≤ 24.99), overweight (25.00–29.99) and obese (≥ 30.00 ; Ref. [21]). A crude model (Model 1) testing the association between lifetime PTSD and overweight/obesity was computed; Model 2 controlled for age, education, income level and marital status. Model 3 included these covariates, number of traumas and alcohol/tobacco use. All models were stratified by sex.

2. Results

2.1. Descriptives

See Table 1. Participants' mean age was 56.7 years. A significantly higher proportion of women than men were obese ($\chi^2 = 35.2$, $df = 1$,

Table 1
Sample characteristics

	Women (n=284)		Men (n=169)	
	Frequency	%	Frequency	%
Education				
College or graduate degree	58	20.4	26	15.4
Some college	96	33.8	54	32.0
High school graduate/general educational development	88	31.0	59	34.9
<High school	42	14.8	30	17.8
Income ^a				
\geq US\$50,000	45	15.9	32	18.9
US\$25,000–49,999	68	23.9	40	23.7
US\$10,000–24,999	88	31.0	42	24.9
<US\$10,000	57	20.1	43	25.4
Lifetime PTSD	75	26.4	32	18.9
Overweight	68	23.9	58	34.3
Obese	173	60.9	56	33.1

Note: only the subsample of DNHS participants with BMI data is included in these analyses. Overweight=BMI of 25.00–29.99; obese=BMI \geq 30.00.

^a Thirty-eight participants, including 26 women and 12 men, were missing income data.

$P < .001$). A marginally significantly higher proportion of women than men reported lifetime PTSD ($\chi^2 = 3.5$, $df = 1$, $P = .06$).

2.2. PTSD–obesity comorbidity

In Model 1, there was a marginally significant association between lifetime PTSD and obesity [odds ratio (OR)=2.3, 95% confidence interval (CI): 1.0, 5.5] but not overweight (OR=1.5, 95% CI: 0.5, 4.0) among women. PTSD was not associated with overweight (OR=1.2, 95% CI: 0.5, 3.0) or obesity (OR=1.0, 95% CI: 0.4, 2.6) among men. These associations were not statistically significant in Model 2 for women (OR_{overweight}=2.0, 95% CI: 0.6, 6.4; OR_{obesity}=2.5, 95% CI: 0.9, 7.2) or men (OR_{overweight}=0.8, 95% CI: 0.3, 2.7; OR_{obesity}=0.7, 95% CI: 0.2, 2.7). In the final model (see Table 2), PTSD was not associated with overweight (OR=0.9, 95% CI: 0.2, 3.4) or obesity (OR=1.0, 95% CI: 0.2, 3.8) among men or with overweight (OR=2.9, 95% CI: 0.7, 11.4) among women. However, PTSD was associated with obesity (OR=4.4, 95% CI: 1.3, 14.3) among women.

3. Discussion

Over half of the women in our population-based sample of African Americans were obese, compared to nearly one-third of men. Among women but not men, PTSD was associated with obesity after adjusting for covariates.

Results were consistent with previous findings that African American women are at high risk for overweight and obesity [4]. PTSD was associated with obesity among women but not men, consistent with prior studies of predominantly white European and American samples [10,12]. Several possible mechanisms could explain this observation: PTSD may adversely affect health behaviors such as diet and exercise, leading to subsequent obesity; common biological/genetic vulnerability could increase risk for both conditions; or a third, unidentified, confounding variable could be responsible for their association.

The current study has several limitations, including the relatively small sample, which may have limited power to detect significant findings. Further, the Detroit-based sample limits generalizability to other populations. The cross-sectional design precludes making inferences about causality and prevents adjustment for time-varying confounders such as depression. Nonetheless, this study provides important information regarding the association between PTSD and obesity among urban, African American women who may be more likely to be exposed to violence. Strengths include the population-based sample, use of structured interview data and BMI assessments based on in-person measures.

Findings contribute to a growing body of evidence that PTSD is associated with a number of health problems. Future studies should investigate the impact of longitudinal patterns of PTSD symptomatology

Table 2
Multivariable regression models of overweight and obesity

	African American Women only (N=284)		African American Men only (N=169)	
	Overweight OR (95% CI)	Obese OR (95% CI)	Overweight OR (95% CI)	Obese OR (95% CI)
No. of cigarettes smoked in past 30 days	1.0 (0.9, 1.0)	1.0 (0.9, 1.0)	0.9 (0.8, 1.0)	0.9 (0.8, 1.0)
No. of alcoholic drinks in past 30 days	0.8 (0.5, 1.1)	0.6 (0.4, 0.9)	1.1 (0.9, 1.3)	1.0 (0.7, 1.4)
No. of lifetime traumatic stressors	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	0.9 (0.8, 1.0)
PTSD				
No lifetime history	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)
Lifetime history	2.9 (0.7, 11.4)	4.4 (1.3, 14.3)	0.9 (0.2, 3.4)	1.0 (0.2, 3.8)

Models also controlled for age, income and education (results available upon request).

as well as psychophysiological and biological/genetic mechanisms of the comorbidity of PTSD and obesity among men and women.

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