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PTSD and Obesity in Younger and Older Veterans: Results from the Mind Your Heart Study

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Abstract

Posttraumatic stress disorder (PTSD) is increasingly recognized as a relatively common condition that is associated with poor health, including obesity. With a sizable proportion of the population approaching older adulthood, it is important to understand PTSD health associations in the context of age. Participants were recruited from two Veterans Administration medical centers and included 380 patients age 60 and over and 365 under age 60. PTSD diagnosis was determined by the Clinician Administered PTSD Scale. BMI was trichotomized into normal/under (< 24.9), overweight (25.0–29.9), and obese (≥ 30.0). Models were run in the total sample, as well as stratified by age group, and adjusted for demographics, depression, antipsychotic medication use, and physical activity. Current PTSD was associated with greater likelihood of overweight and obesity in the total sample, and lifetime PTSD was associated with significantly increased odds of obesity. In the stratified models, current and lifetime PTSD were associated with increased likelihood of overweight and obesity in the older group only. Results suggest that PTSD is associated with risk for overweight and obesity, an effect that may be particularly strong in older adults. These findings support the importance of examining PTSD and potential health correlates across the life course.

Keywords

posttraumatic stress disorder; aging; stress; overweight; BMI; physical health; military

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1. Introduction

Posttraumatic stress disorder (PTSD) has been associated with increased risk for a number of adverse health conditions, including the development of major chronic diseases, such as cardiovascular disease and cancer (Kang et al., 2006; Kubzansky et al., 2007; Sareen et al., 2007; Boscarino, 2008), both leading causes of death and disability. As such, the identification of potentially modifiable mechanisms linking PTSD and these and other chronic conditions is needed. Obesity represents a significant public health problem that is strongly associated with increased disease burden and mortality (Malnick and Knobler, 2006), and early studies in the area have found evidence that PTSD confers heightened risk for obesity for some groups (Scott et al., 2008; Perkonig et al., 2009; Pagoto et al., 2012; Maguen et al., 2013; Mitchell et al., 2013; Kubzansky et al., 2014). Examining PTSD–obesity risk associations in groups at increased risk for PTSD could advance understanding of the potential mechanisms by which PTSD undermines health over the long term. Moreover, with a sizable proportion of the population approaching older adulthood, it is important to understand the health implications of PTSD across the life course. Further examinations of these associations in veteran populations, in particular, is warranted, as this is a population that has relatively high rates of PTSD, with recent studies estimating that 14% of returning veterans meet diagnostic criteria (Schell and Marshall, 2008), a rate 10% higher than the current estimated prevalence in the U.S. adult population (Kessler et al., 2005). The present study sought to examine associations between PTSD and overweight/obesity in younger and older veterans.

To date, a small but growing number of studies have observed significant associations between obesity and mental health conditions in adult populations (Simon et al., 2006; Scott et al., 2008; Perkonig et al., 2009). In a study that examined relative associations between obesity and mood and anxiety disorders, the strongest risk association for obesity was found for PTSD (Scott et al., 2008). Further support for the association between PTSD and obesity was found in a nationally representative sample of U.S. adults, where one-third of the sample with past year PTSD were obese, compared to 24.1% of participants with no history of PTSD (Pagoto et al., 2012).

Importantly, the association between PTSD and obesity has been shown to be stronger for some groups, such as women and certain ethnic minority groups (Scott et al., 2008; Perkonig et al., 2009; Mitchell et al., 2013). However, limited focus has been placed on how age may be a factor in the strength of the relationship between PTSD and risk for obesity. The only study to our knowledge to include age comparisons in risk associations was conducted by Scott and colleagues (2008), which examined the increased risk for obesity associated with anxiety and mood disorders generally. Results suggested that anxiety disorders may confer a stronger risk for obesity in older age groups. Specifically, while anxiety disorder presence was not associated with obesity in adults under the age of 25, there was a significant association for each of the older groups (25–44, 45–64, and 65 and over), and the highest risk association was found for the 65 and over group. This is an important understudied area, as obesity appears to be particularly compromising to the health of older adults (Villareal et al., 2005). In addition to yielding increased risk for a broad range of physical conditions, obesity has been found to be strongly associated with

lower health-related quality of life with respect to health perceptions as well as several related domains among older adults, including physical functioning, role limitations due to physical health, bodily pain, and energy/fatigue (Patterson et al., 2004; Yan et al., 2004; Villareal et al., 2005).

1.1 Hypotheses

The present study examined associations between PTSD and both overweight and obesity risk in a sample of veterans from the Mind Your Heart Study (Turner et al., 2013), a study of the effects of PTSD on physical health. Associations were examined in the overall sample, as well as in models stratified by older (age 60 and over) and younger veterans. Both current and lifetime PTSD were expected to be associated with increased odds of overweight and obesity in the total sample. We hypothesized that PTSD would confer a relatively stronger risk for overweight and obesity in the older sample. Given that PTSD has been found to be associated with depression (O'Donnell et al., 2004; Ginzburg et al., 2010), demographic characteristics (Scott et al., 2008), antipsychotic medication use (Mohamed and Rosenheck, 2008), and physical inactivity (Zen et al., 2012), all of which have potential implications for obesity risk, statistical models adjusted for these covariates.

2. Methods

2.1 Participants and procedure

Patients were recruited between February 2008 and June 2010 from outpatient clinics affiliated with two San Francisco area Department of Veterans Affairs (VA) Medical Centers: San Francisco VA Medical Center and the VA Palo Alto Health Care System. Patients were excluded if they planned on leaving the area in three years or did not have contact information for follow-up. Potential patients were also excluded if they were unable to walk one block or had a myocardial infarction in the prior six months, as a cardiac exercise treadmill test was conducted in this study. All patients provided written informed consent and appropriate institutional review boards approved the research protocol. Overall, 1020 patients were assessed for eligibility. One hundred and four patients (10.2%) were found ineligible, primarily due to lacking contact information for follow-up (n=82). Of the remaining 916 eligible patients, 170 (18.6%) declined to participate or did not complete enrollment procedures such that 746 patients were ultimately enrolled in the study. Participants' ages ranged from 24 to 91, and the average age was 58.5. Approximately half (52%) of the sample was age 60 or over (N = 378). The vast majority of participants were male (94%). Additional sample characteristics are presented in Table 1. Ten patients were excluded from these analyses because they did not complete full PTSD assessments or because the supervising study psychologist had concerns about the accuracy of the PTSD diagnosis and one patient was excluded for extensive missing data.

2.2 Measures

2.2.1 PTSD—We evaluated current and lifetime PTSD with the Clinician Administered PTSD Scale (CAPS) using criteria from the Diagnostic and Statistical Manual of Mental Disorders IV (American Psychiatric Association, 2000). The CAPS is the most widely used structured interview for diagnosing PTSD (Blake et al., 1995; Weathers et al., 2001) and has

excellent test-retest reliability ($r = 0.92\text{--}0.99$) and internal consistency ($\alpha = 0.80\text{--}0.90$) (Weathers et al., 2001). We used the “1,2” CAPS rule of at least a score of 1 for frequency and 2 for intensity to establish positivity for a specific symptom. Participants were also asked to indicate the year that they began to experience PTSD symptoms. Responses were subtracted from the year that data were collected to determine the number of years since symptom onset.

2.2.2 Overweight and obesity—Body Mass Index (BMI) was calculated using height and weight measurements conducted by trained study staff. Values were trichotomized into normal/underweight (<24.99), overweight ($25\text{--}29.99$), and obese (≥ 30).

2.2.3 Covariates—We used the 9-item Patient Health Questionnaire (PHQ-9) to determine depressive diagnosis. This self-report instrument measures the frequency of depressive symptoms corresponding to the 9 symptom criteria in the DSM-IV. A standard cut-point of ≥ 10 is used to define depression and has demonstrated excellent validity when compared with a mental health interview with a sensitivity of 88% and a specificity of 88% (Kroenke et al., 2001). Antipsychotic medication use was assessed via self-report. A single-item measure used in prior research on mental health and cardiovascular-related outcomes was used to assess physical activity (Whooley et al., 2008). Participants indicated their current level of physical activity during the past month (including activities such as “15–20 minutes of brisk walking, swimming, general conditioning, or recreational sports”) using the following 0–5 scale: *Not at all active*, *A little active (1 to 2 times a month)*, *Fairly active (3 to 4 times per month)*, *Quite active (1 to 2 times a week)*, *Very active (3 to 4 times a week)*, *Extremely active (5 or more times a week)*. Higher scores indicated more physical activity. Importantly, prior research has demonstrated that self-report is an accurate, reliable, and valid method of assessing physical activity (Ainsworth et al., 1993; Bowles et al., 2004; Aadahl et al., 2007; Jackson et al., 2007; Kurtze et al., 2008).

2.3 Analyses—Descriptive statistics were calculated on all study variables, and younger (under age 60) and older (age 60 and over) veterans were compared on study variables using chi-square tests and independent samples t-tests, as appropriate. Multivariate logistic regression analyses were estimated to predict overweight and obesity for the total sample, as well as for younger and older veterans separately. For current as well as lifetime PTSD, risk associations for overweight and obesity were modeled with adjustment for covariates that might be viewed as potentially confounding the relationship between PTSD and BMI. Specifically, models were estimated for the total and age group-stratified samples adjusting for demographic characteristics (i.e., sex and ethnicity) as well as depression, antipsychotic medication use, and physical activity. The reference group for both overweight and obesity was the normal/underweight group.

To evaluate the robustness of study findings, a series of sensitivity analyses were conducted. Because there was a relatively small number of women and Hispanic/Latino participants, supplementary sensitivity analyses were conducted to compare the pattern of results for models with and without these groups. In addition, given that partial PTSD has been shown to also be associated with impairment in health and functioning (Sayer et al., 2010), an additional set of analyses was conducted to determine if including individuals with partial

PTSD with the PTSD group would alter study findings for the models tested. In addition to meeting described criteria for partial PTSD (Blanchard et al., 1994), we also required that these participants exhibit diagnostic symptoms meeting a total CAPS score of greater than 40 (Weathers et al., 2001). Finally, sensitivity analyses were also conducted to determine if the pattern of results observed would change by including number of years since onset of PTSD symptoms as a covariate in the models on the total sample.

3. Results

3.1 Descriptive statistics and bivariate associations

Table 1 presents descriptive statistics for primary study variables and covariates for the total sample, as well as for younger and older veterans separately. Older veterans were less likely to be female ($\chi^2 = 20.0$, $df = 1$, $p < 0.001$), more likely to be White ($\chi^2 = 52.7$, $df = 1$, $p < 0.001$), and less likely to be Black ($\chi^2 = 44.2$, $df = 1$, $p < 0.001$). With respect to self-reported physical activity over the last month, older ($M = 2.64$; $SD = 1.67$) and younger veterans ($M = 2.56$; $SD = 1.53$) did not significantly differ, $t(722) = -0.62$, $p = 0.538$. As expected, the number of years since initial onset of PTSD symptoms was significantly greater for the older veterans ($M_{years} = 39.2$; $SD = 14.1$) than the younger veterans ($M_{years} = 23.3$; $SD = 14.0$), $t(526) = -13.03$, $p < 0.001$. There were no differences between older and younger veterans on BMI categories, current or lifetime PTSD diagnosis, depression diagnosis, or antipsychotic medication use.

3.2 Hypothesis testing

Results for the logistic regression analyses (Table 2), which adjusted for sex, ethnicity, depression, antipsychotic medication use, and physical activity, show that current PTSD was associated with significantly increased odds of both overweight and obesity in the total sample, whereas lifetime PTSD was only associated with significantly increased odds of obesity. Among the included covariates, physical activity was found to be associated with significantly decreased odds of obesity in the models that tested for current as well as lifetime PTSD. In the age group-stratified models, current PTSD was associated with significantly increased odds of overweight and obesity in the age 60 and over group only. Lifetime PTSD was also associated with significantly increased odds of both overweight (OR = 2.46; CI = 1.21, 4.99) and obesity (OR = 3.78; CI = 1.81, 7.90) for the age 60 and over group only. Among the covariates, depression was found to be associated with significantly increased odds of obesity in the models that tested for current PTSD as well as lifetime PTSD for the younger age group only. Physical activity was found to be associated with decreased odds of obesity for both age groups.

Sensitivity analyses revealed that excluding women and Hispanic/Latino participants had no effect on the pattern of results observed. In addition, including participants meeting criteria for partial PTSD with the PTSD group did not alter the study findings. Finally, sensitivity analyses revealed that including number of years since onset of PTSD symptoms as a covariate for the total sample did not impact the pattern of results observed. In sum, sensitivity analyses revealed that the pattern of results for the total and stratified models were robust to potential effects related to the relatively small number of women and

Hispanic/Latino participants in the sample, as well as the effects of partial PTSD and duration of symptomatology.

4. Discussion

Findings from the present study build on the current literature by further documenting associations between PTSD and obesity, as well as considering age in these risk associations. Results for the total sample were consistent with other studies documenting the association between anxiety disorders—specifically PTSD—and obesity (Simon et al., 2006; Scott et al., 2008; Perkonig et al., 2009; Pagoto et al., 2012; Maguen et al., 2013; Mitchell et al., 2013). However, the analysis of age group-stratified models yielded novel findings, as this is the first study to our knowledge to examine relative risk associations for overweight and obesity as a function of PTSD in older and younger adults separately. While PTSD was found to confer significantly increased risk for obesity in the total sample of veterans, results from the models stratified by age group suggest that the association may be particularly strong for older adults. Specifically, PTSD, both current and lifetime, was associated with significantly increased risk for overweight and obesity for older adults only. Neither current nor lifetime PTSD were found to be associated with significantly increased risk of overweight or obesity in the younger group.

As the population is aging rapidly, it is important to identify potential mechanisms linking stress reactions, such as PTSD, and physical health outcomes. Obesity represents one modifiable risk factor through which traumatic stress exposure may undermine health, functioning, and quality of life over the long term. Given that higher BMI levels and obesity (BMI ≥ 30) are associated with impairment of physical health and functioning in both older men and women (Patterson et al., 2004; Yan et al., 2004), the results of the present study suggest that one important risk pathway by which PTSD undermines physical health could be via increasing body weight. While rates of PTSD and obesity in the present study did not differ between the two age groups, the PTSD-obesity risk association was higher among the older cohort.

There are several potential explanations for why PTSD was found to be significantly associated with overweight and obesity in only the older age group, including differences in the relative strength of the sources of resilience available to younger adults versus their older counterparts. Older adults may have physical limitations, health problems, or cognitive impairment that inhibit their ability to exercise, and decreases in psychological or social support may thwart behaviors that promote a healthy weight. In addition, it is possible that these physical and psychosocial issues may make older adults more vulnerable to physical complications of PTSD and other-stress related disorders (Coakley et al., 1998; Averill and Beck, 2000; van Zelst et al., 2006). Further, older adults with PTSD seem to be less likely to utilize mental health care due to a need to address salient physical health concerns (Averill and Beck, 2000; van Zelst et al., 2006), which could lead to continued distress. Underlying biological processes could also be associated with PTSD-obesity risk in older adults. In addition to the link between traumatic stress, PTSD, and dysfunctional HPA-axis regulation (Sherin and Nemeroff, 2011), as well as between obesity and abnormal HPA-axis function (Bjorntorp and Rosmond, 2000; Pasquali et al., 2006), aging has been shown to play a

significant role in HPA-axis regulation, with older age causing a multitude of irregularities (Veldhuis et al., 2013). Given that our sample of veterans over age 60 had the greatest PTSD-obesity risk, examining these and other potential risk mechanisms linking PTSD and weight gain, such as further study of age-related changes in biomarkers of the stress response (Piazza et al., 2010), may elucidate physiological explanations for greater PTSD-related physical health decrements among older adults.

It is worth noting that while a significant PTSD-obesity risk association was not found among the veterans under age 60, one of the covariates, depression, was associated with significantly increased risk for obesity in the younger group only. However, the two age groups did not differ with respect to rates of depression, just as they did not differ in rates of obesity or PTSD. These findings suggest the need to consider mental and physical health comorbidities for patients diagnosed with conditions that could be or are likely to be stress-related.

Study findings should be interpreted in light of potential limitations. First, the cross-sectional nature of the data limits our ability to make causal inferences regarding the associations under study. Related to this point, the temporal proximity of proposed effects cannot be confirmed. While we believe that PTSD led to increased risk for obesity, which is consistent with the order of effects found in a recent longitudinal study (Perkonig et al., 2009), it could also be that obesity increased vulnerability to the effects of stress on mental health. It is also possible that an unmeasured variable common to both PTSD and weight—beyond depression, measured demographics, antipsychotic medication use, and physical activity, which were accounted for in the present analyses—would partially explain the risk associations that we observed. In addition, though we did examine lifetime as well as current PTSD, and controlled for number of years since symptom onset in supplementary sensitivity analyses, a longitudinal design would provide further insight regarding the role of symptom chronicity in PTSD-obesity associations by facilitating the disentanglement of the effects of age from symptom duration. While these consequences related to the cross-sectional design are limitations, the study had several key strengths, including the clinician administered assessments for PTSD symptoms, as well as our having height and weight measurements conducted by trained study staff, rather than relying on self-report.

Another limitation and opportunity for further study can be seen in our study population, which consisted predominately of male veterans recruited from VA medical centers. In conjunction with evaluating age as a risk factor for stress-related physical health ailments, the role of gender in the association between obesity risk and PTSD is crucial to examine. While there is growing evidence that PTSD is associated with heightened risk for obesity in women (e.g., Perkonig et al., 2009; Mitchell et al., 2013; Kubzansky et al., 2014), this association has been more elusive in male samples. For example, in Pagoto and colleagues' (2012) study, PTSD was found to be significantly associated with overweight in men, but not obesity. While the small number of women in our study prevented us from fully examining gender differences, our findings indicate risk for both overweight and obesity among a predominantly male sample. Therefore, outcomes from the present study, combined with established literature, indicate a need to further examine PTSD-obesity associations in both men and women across the life course.

In addition to further study of the relative risk associations with respect to PTSD and physical health problems, more research is needed to uncover specific mechanisms underlying why PTSD is associated with obesity and other health-compromising conditions and behaviors. Further research in this area could elucidate potentially common mediators, such as self-medicating and difficulty with impulse control, as well as the aforementioned psychosocial challenges that individuals with PTSD can face. This is important not only to advance understanding of the potential health complications of traumatic stress exposure and PTSD, as well as other stress reactions (e.g., depression), but to also develop interventions to target modifiable risk mechanisms, which could interrupt the link between PTSD and physical health sequelae.

Findings from the present study suggest the need for not only further study in this area, but also the development and refinement of interventions, especially for older adults, to reduce PTSD-associated risks for overweight and obesity (e.g., programs to promote physical activity and health education). For example, a recent review of the effectiveness of MOVE!, a weight management program implemented throughout VHA medical centers, found that veterans with PTSD lost less weight than veterans with no mental health conditions in analyses that adjusted for sociodemographic and health status differences (Hoerster et al., 2014). Thus, there appears to be a need to tailor and further examine these types of programs for those suffering with PTSD specifically to ensure that they enhance overall health and wellness for these individuals, and potentially reduce the likelihood of physical health decrements in the wake of stress for older adults.

With a sizable proportion of the population approaching older adulthood, it is important to understand PTSD–health associations in the context of age. The present study builds on the current literature by examining associations between PTSD and overweight and obesity in younger and older veterans, a population at heightened risk for PTSD (Schell and Marshall, 2008), and thus at increased risk for physical health problems. Our findings that PTSD confers particularly strong risk for overweight and obesity for older adults underscore the importance of examining PTSD and associated outcomes across the life course. Higher BMI levels have been shown to have deleterious effects on the physical health and well-being of older adults (Patterson et al., 2004; Yan et al., 2004; Villareal et al., 2005). Combined with the present findings and other studies documenting associations between PTSD and obesity (Simon et al., 2006; Scott et al., 2008; Perkonig et al., 2009; Maguen et al., 2013; Mitchell et al., 2013; Kubzansky et al., 2014), this suggests that obesity may represent an important mechanism by which PTSD undermines physical health. With older adults facing a myriad of stress-inducing experiences, it is crucial to not only treat the mental health symptoms themselves, but to also be cognizant of physical health complications of stress and stress reactions.

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Highlights

- We examined associations between PTSD and overweight/obesity in younger and older veterans from two Veterans Administration medical centers.
- Logistic regression models were run in the total sample and in age group-stratified samples.
- PTSD was associated with increased odds of overweight and obesity in the total sample and in the older sample, but not the younger sample.
- It is important to consider age in risk associations involving PTSD and health.

Table 1

Sample characteristics.

Characteristic	Total	Under Age 60	Age 60 and Over
	N =735	N =355	N =380
Sex, No. (%) ^a			
Male	691 (94.3)	321 (90.4)	370 (97.9)
Female	42 (5.7)	34 (9.6)	8 (2.1)
Ethnicity			
White/Caucasian ^a	424 (60.5)	160 (46.8)	264 (73.5)
Black/African American ^a	157 (22.4)	113 (33.0)	44 (12.3)
Asian/Pacific Islander	65 (9.3)	36 (10.5)	29 (8.1)
Hispanic/Latino	55 (7.8)	33 (9.6)	22 (6.1)
BMI			
Normal/under weight (< 24.99)	172 (23.4)	94 (26.5)	78 (20.5)
Overweight (25–29.99)	299 (40.7)	131 (36.9)	168 (44.2)
Obese (≥ 30)	264 (35.9)	130 (36.6)	134 (35.3)
Current PTSD Diagnosis			
PTSD	231 (31.5)	102 (28.7)	129 (34.1)
No PTSD	502 (68.5)	253 (71.3)	249 (65.9)
Lifetime PTSD Diagnosis			
PTSD	342 (46.7)	162 (45.6)	180 (47.6)
No PTSD	391 (53.3)	193 (54.4)	198 (52.4)
Depression by PHQ-9			
Depression	221 (30.3)	117 (33.3)	104 (27.4)
No depression	509 (69.7)	234 (66.7)	275 (72.6)
Antipsychotic Use			
Yes	66 (9.0)	39 (11.0)	27 (7.1)
No	667 (91.0)	315 (89.0)	352 (92.9)

^a indicates significant difference ($p < .05$) between the Under Age 60 group and the Age 60 and over group.

Table 2

Association of PTSD with overweight or obesity by age group adjusted for demographics^a and covariates^b.

	Under Age 60			Age 60 and Over		
	OR (CI 95%)	Obese BMI (30)	Overweight BMI (25–29.99)	OR (CI 95%)	Obese BMI (30)	Overweight BMI (25–29.99)
Current PTSD Model						
Sex	0.49 (0.19, 1.19)	0.64 (0.27, 1.52)	0.92 (0.32, 2.65)	0.11 (0.01, 1.09)	1.09 (0.39, 3.06)	0.30 (0.04, 2.03)
Black ethnicity	0.91 (0.56, 1.50)	1.11 (0.67, 1.83)	1.20 (0.63, 2.28)	0.81 (0.34, 1.93)	1.66 (0.87, 3.14)	0.53 (0.20, 1.38)
Hispanic/Latino ethnicity	1.92 (0.83, 4.42)	1.48 (0.61, 3.58)	2.62 (0.88, 7.78)	1.77 (0.43, 7.31)	2.21 (0.71, 6.90)	1.06 (0.24, 4.78)
Asian/P.I. ^c ethnicity	0.59 (0.30, 1.14)	0.72 (0.37, 1.42)	0.93 (0.38, 2.28)	0.41 (0.15, 1.11)	0.91 (0.36, 2.32)	0.61 (0.22, 1.69)
Depression	0.96 (0.57, 1.62)	1.64 (0.98, 2.74)	1.35 (0.65, 2.76)	0.74 (0.34, 0.65)	2.21 (1.09, 4.48) ^d	1.31 (0.59, 2.92)
Antipsychotic use	0.94 (0.45, 1.96)	1.06 (0.51, 2.19)	1.11 (0.45, 2.77)	0.94 (0.26, 3.46)	0.75 (0.29, 1.94)	2.17 (0.61, 7.70)
Physical activity	0.89 (0.78, 1.01)	0.80 (0.70, 0.91) ^d	0.92 (0.76, 1.11)	0.87 (0.72, 1.05)	0.82 (0.68, 0.99) ^d	0.77 (0.64, 0.94) ^d
Current PTSD	1.72 (1.01, 2.90) ^d	1.75 (1.03, 2.97) ^d	0.98 (0.47, 2.06)	2.90 (1.30, 6.49) ^d	0.99 (0.47, 2.06)	3.15 (1.38, 7.15) ^d
Lifetime PTSD Model						
Sex	0.51 (0.21, 1.27)	0.67 (0.28, 1.57)	1.02 (0.36, 2.91)	0.13 (0.01, 1.30)	1.16 (0.42, 3.22)	0.36 (0.05, 2.49)
Black ethnicity	0.88 (0.54, 1.45)	1.07 (0.65, 1.77)	1.16 (0.61, 2.22)	0.72 (0.30, 1.73)	1.63 (0.86, 3.09)	0.44 (0.17, 1.17)
Hispanic/Latino ethnicity	1.89 (0.82, 4.33)	1.47 (0.61, 3.56)	2.50 (0.84, 7.45)	1.72 (0.42, 7.08)	2.15 (0.69, 6.74)	0.99 (0.22, 4.53)
Asian/P.I. ^c ethnicity	0.60 (0.31, 1.17)	0.77 (0.39, 1.53)	0.84 (0.34, 2.11)	0.45 (0.17, 1.22)	0.86 (0.34, 2.23)	0.72 (0.26, 2.01)
Depression	1.07 (0.64, 1.80)	1.64 (0.98, 2.74)	1.60 (0.78, 3.28)	0.75 (0.34, 1.68)	2.42 (1.20, 4.91) ^d	1.16 (0.52, 2.60)
Antipsychotic use	0.95 (0.46, 1.98)	1.05 (0.51, 2.16)	1.14 (0.46, 2.86)	0.86 (0.23, 3.20)	0.76 (0.30, 1.98)	1.88 (0.53, 6.71)
Physical activity	0.89 (0.78, 1.01)	0.80 (0.70, 0.91) ^d	0.91 (0.76, 1.11)	0.87 (0.72, 1.05)	0.82 (0.67, 0.99) ^d	0.78 (0.64, 0.95) ^d
Lifetime PTSD	1.27 (0.80, 2.01)	1.65 (1.03, 2.65) ^d	0.68 (0.35, 1.31)	2.46 (1.21, 4.99) ^d	0.81 (0.42, 1.57)	3.78 (1.81, 7.90) ^d

^a Reference group for sex: males; reference group for ethnicity: White/Caucasian

^b Reference group for overweight and obese: normal/underweight group (BMI <24.99). CI=confidence interval.

^c P.I. = Pacific Islander.

^d $p < 0.05$.