



# 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 ( $\leq 24.9$ ), overweight (25.0–29.9), and obese ( $\geq 30.0$ ). 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.

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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

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(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 (under age 60) 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

**Table 1**  
Sample characteristics.

| Characteristic                       | Total      | Under age 60 | Age 60 and over |
|--------------------------------------|------------|--------------|-----------------|
|                                      | N=735      | N=355        | N=380           |
| <b>Sex, no. (%)<sup>a</sup></b>      |            |              |                 |
| Male                                 | 691 (94.3) | 321 (90.4)   | 370 (97.9)      |
| Female                               | 42 (5.7)   | 34 (9.6)     | 8 (2.1)         |
| <b>Ethnicity</b>                     |            |              |                 |
| White/Caucasian <sup>a</sup>         | 424 (60.5) | 160 (46.8)   | 264 (73.5)      |
| Black/African American <sup>a</sup>  | 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)        |
| <b>BMI</b>                           |            |              |                 |
| Normal/under weight ( $\leq 24.99$ ) | 172 (23.4) | 94 (26.5)    | 78 (20.5)       |
| Overweight (25–29.99)                | 299 (40.7) | 131 (36.9)   | 168 (44.2)      |
| Obese ( $\geq 30$ )                  | 264 (35.9) | 130 (36.6)   | 134 (35.3)      |
| <b>Current PTSD diagnosis</b>        |            |              |                 |
| PTSD                                 | 231 (31.5) | 102 (28.7)   | 129 (34.1)      |
| No PTSD                              | 502 (68.5) | 253 (71.3)   | 249 (65.9)      |
| <b>Lifetime PTSD diagnosis</b>       |            |              |                 |
| PTSD                                 | 342 (46.7) | 162 (45.6)   | 180 (47.6)      |
| No PTSD                              | 391 (53.3) | 193 (54.4)   | 198 (52.4)      |
| <b>Depression by PHQ-9</b>           |            |              |                 |
| Depression                           | 221 (30.3) | 117 (33.3)   | 104 (27.4)      |
| No depression                        | 509 (69.7) | 234 (66.7)   | 275 (72.6)      |
| <b>Antipsychotic use</b>             |            |              |                 |
| Yes                                  | 66 (9.0)   | 39 (11.0)    | 27 (7.1)        |
| No                                   | 667 (91.0) | 315 (89.0)   | 352 (92.9)      |

<sup>a</sup> Indicates significant difference ( $p < .05$ ) between the Under Age 60 group and the Age 60 and over group.

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 ( $r=0.92-0.99$ ) and internal consistency ( $\alpha=0.80-0.90$ ) (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. Meeting diagnostic criteria requires positivity of at least one reexperiencing symptom, three avoidance and numbing symptoms, and two hyperarousal symptoms. Participants were also asked to indicate the year that they began to experience PTSD

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