



Does body mass index moderate the association between posttraumatic stress disorder symptoms and suicidal ideation in Iraq/Afghanistan veterans?



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ABSTRACT

Suicide, PTSD, and obesity co-occur at high rates among returning veterans, yet limited research exists regarding the relationship among these variables. Self-report and diagnostic interview data from a longitudinal study of Iraq and Afghanistan veterans ($N=130$) enrolled in VA healthcare examined these inter-relations. As hypothesized, body mass index (BMI) significantly moderated the association between PTSD and suicidal ideation such that the association between PTSD and suicidal ideation was strongest among individuals with a high BMI. Programs that focus on health promotion, trauma treatment, and weight management should continue to monitor suicide risk.

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1. Introduction

Despite concerted suicide prevention efforts by the Department of Veterans Affairs (VA), recent suicide data indicate that veterans of all eras are at increased risk for death by suicide (U.S. Department of Veterans Affairs, 2013). Rates of suicide among United States veterans who served in Iraq and Afghanistan are estimated to be as high as 33.1 per 100,000 veterans (Kang et al., 2015) compared to 13.0 per 100,000 in the general population (Xu et al., 2016). Multiple risk factors for suicidal behavior have been identified among veterans, including suicidal ideation (Jakupcak et al., 2009), posttraumatic stress disorder (PTSD), depression (Bryan and Corso, 2011; Kimbrel et al., 2014; Pietrzak et al., 2010), decreased social support (DeBeer et al., 2014), and physical health conditions, such as obesity (Heneghan et al., 2012), all of which are significant problems that veterans returning from Iraq and

Afghanistan face. Veterans of the wars in Iraq and Afghanistan represent 13% of all living veterans (Department of Veterans Affairs, 2015), making this a significant public health problem.

PTSD diagnosis and PTSD symptoms among Iraq and Afghanistan-era veterans are associated with high rates of suicidal ideation and suicide attempts (DeBeer et al., 2014; Jakupcak et al., 2009; Bryan and Corso, 2011; Marshall et al., 2001; Bryan, 2015). Indeed, Iraq and Afghanistan veterans diagnosed with PTSD are at a 4-fold risk of suicidal ideation (Jakupcak et al., 2009), which is of great concern as veterans of these wars have elevated rates of PTSD. A recent meta-analysis of 33 studies examining more than 4.9 million Iraq and Afghanistan-era veterans established the prevalence of the PTSD among these veterans at 23% (Fulton et al., 2015), compared to 6.8% in the general population (Kessler et al., 2005). Given both the high incidence of PTSD among returning veterans, coupled with the increased risk for suicide among Iraq and Afghanistan-era veterans with PTSD, it is crucial to better understand factors that influence the association between PTSD and suicide risk, including physical health risk factors.

PTSD is linked to co-occurring physical health conditions, including obesity (body mass index (BMI) > 30 kg/m²; Dobie et al.,

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2004), which is a major public health concern, affecting 34.9% of the general population (Ogden et al., 2014). Slightly higher rates (36.2%) of obesity are observed in veteran populations, although rates elevate to 40.4% in the presence of co-occurring PTSD (Das et al., 2005; Nelson, 2006; Vieweg et al., 2007). Further, an additional 34.1% of male veterans are overweight (BMI 25 kg/m² to 29.99 kg/m²; Das et al., 2005), and these individuals are at risk for developing obesity. PTSD is more strongly associated with obesity than depression (Scott et al., 2008; Pagoto et al., 2012). Male veterans across eras with PTSD have significantly higher BMI compared to veterans without PTSD (Vieweg et al., 2007). Other studies indicate that lifetime PTSD increases odds of obesity in veterans of all eras, and that this association is particularly strong in veterans over 60 years of age (Smith et al., 2015). PTSD results in alterations to the hypothalamic-pituitary-adrenocortical axis (HPA), which may be one possible mechanism by which obesity risk is increased (Mastorakos and Zapanti, 2004; Pagoto et al., 2012). Further, chronic exposure to stress may lead to metabolic syndrome, which is a cluster of symptoms that includes obesity (Heppner et al., 2009; Brunner et al., 2002). Veterans who have deployed to combat zones have no doubt experienced this chronic exposure to stress, thus increasing their risk of developing metabolic syndrome (Blanchard et al., 2006).

Currently, research investigating the relationship between BMI and suicide is mixed (see Klinkitzke et al., 2013 for a review). The literature supports an increase in risk for suicidal ideation in obese men and women (Carpenter et al., 2000; Dutton et al., 2013). However, the relationship between BMI and suicide attempts and death by suicide is more complex. Obese women, individuals with extreme obesity, and obese individuals with psychiatric illnesses, such as major depression and bipolar disorder, have increased risk of suicide attempts compared to normal weight individuals (Carpenter et al., 2000; Gomes et al., 2010; Dong et al., 2006). Elovainio et al. (2009) likewise found a positive relationship between BMI and suicide risk in men. However, adding to the complexity of these relationships, other studies have found no relationship (Stack and Lester, 2007), or an inverse relationship between BMI and suicide attempts in men (Carpenter et al., 2000) and BMI and death by suicide (Magnusson et al., 2006; Mukamal et al., 2007; 2010). Among veteran samples, a trend towards higher BMI being associated with lower incidence of death by suicide was reported in one sample (McCarthy et al., 2014).

Obese individuals with psychiatric disorders are at increased risk for suicidal ideation and attempts compared to normal weight individuals with the same disorders (Mather et al., 2009; Carpenter et al., 2000; Gomes et al., 2010). Thus, those with high BMI and PTSD may be at particularly high risk for suicide. The marked increase in risk for obesity in PTSD, combined with evidence that obesity increases risk for suicidal ideation in other psychiatric disorders, makes this an important area for further study, particularly among veterans who have elevated rates of obesity, PTSD and suicide risk. The Interpersonal-Psychological Theory of Suicidal Behavior (IPTSB; Joiner, 2005) may offer insight on the potential interaction between physical and mental health factors on suicide risk. This model suggests that thwarted belongingness (i.e., feeling as though one does not belong) and perceived burdensomeness (i.e., feeling as though one is a burden on others) may influence an individuals' contemplation of suicide (Joiner, 2005). Notably, PTSD is linked to increased burdensomeness and thwarted belongingness (Silva et al., 2015). Further, higher BMI can increase feelings of burdensomeness (Dutton et al., 2013), which in turn can increase suicidal ideation (Dutton et al., 2013; Van Orden et al., 2010). Those who are obese often face discrimination and stigma in their daily lives, even from medical professionals and close family and friends (Puhl et al., 2010). Research on other stigmatized groups (e.g., sexual or racial minorities) indicates that

exposure to prejudice about one's group is associated with higher risk of suicidal ideation and attempts (Fergusson et al., 1999; Hatzenbuehler et al., 2014; Perry et al., 2012). Similarly, mortality risk increased by nearly 60% when individuals were faced with weight discrimination, and this increase was not better explained by other psychological or physical risk factors (Sutin et al., 2015). Military service members may be at increased risk for experiencing weight stigma due to unfavorable consequences for not meeting weight requirements (i.e., remedial fitness programs, discharge; Bartlett and Mitchell, 2015; Stewart et al., 2011). Due to the incidence of mental health stigma in military culture, veterans with PTSD may experience prejudice and decreased social support (Pietrzak et al., 2009), both of which can increase suicidal ideation and attempts (DeBeer et al., 2014; Fergusson et al., 1999; Perry et al., 2012).

Despite high co-occurrence and established connections among PTSD, BMI, and suicidal ideation in veterans, there is a dearth of research investigating the precise nature of the associations among these conditions. The aim of the current study was to investigate the potential impact of obesity on the association between PTSD and suicidal ideation in a sample of Iraq/Afghanistan veterans enrolled in VA health care. Understanding predictors of suicidal ideation is important due to the often-proximal relationship between suicidal ideation and behavior (Schneider et al., 2001; Angst et al., 2002). Based on the extant literature, we hypothesized that high BMI would exacerbate the effect of PTSD symptoms on suicidal ideation among Iraq and Afghanistan-era veterans. Specifically, we hypothesized that BMI level would moderate the association between PTSD symptoms and suicidal ideation such that the hypothesized positive association between PTSD symptoms and suicidal ideation would be strongest at high levels of BMI.

2. Methods

2.1. Background

Project SERVE: Pilot was a longitudinal pilot study that assessed combat experiences and post-deployment adjustment across the course of one year for a regional sample of Iraq and Afghanistan-era veterans (N=145), which began in 2009. This study is a secondary analysis of these data, focused on investigating psychiatric and functional outcomes among a sample of Iraq and Afghanistan-era veterans (N=145) enrolled in VA health care in central Texas during the baseline assessment period.

2.2. Procedures

All procedures were approved by the Central Texas Veterans Healthcare System Institutional Review Board. Letters were mailed to a random sample of identified veterans of the wars in Iraq and Afghanistan who were enrolled at the Central Texas Veterans Healthcare System. Participants were also recruited using flyers and in-service presentations to clinical staff. Potential participants called the study team if they were interested in participating. Telephone screens were conducted by trained research assistants to determine initial eligibility; these screens assessed for Iraq/Afghanistan veteran status, suicidal or homicidal ideation warranting crisis intervention, and status of psychiatric treatment. Veterans were then scheduled for a face-to-face assessment, at the outset of which written informed consent was obtained. Final eligibility was confirmed after completing study procedures, including a semi-structured diagnostic interview conducted by a qualified assessor and self-report questionnaires. A total of 1800 recruitment letters were mailed, 272 calls were received from interested veterans, and

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