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Combat exposure and pain in male and female Afghanistan and Iraq veterans: The role of mediators and moderators

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ABSTRACT

Veterans experience physical health problems associated with disability and poor quality of life following combat exposure (CE). Understanding the CE-physical health relationship, specifically pain intensity and somatic pain, may inform etiological models and interventions. This study examined the CE-pain relationship, associated mediators, and gender as a moderator. 2381 veterans at the VA San Diego Healthcare System completed paper or electronic self-report measures of pain intensity and somatic pain. Analyses examined associations of pain with CE and posttraumatic stress disorder (PTSD), depression, and resilience as mediators of the CE-pain association. Moderated mediation models explored gender as a moderator of significant mediated pathways. Controlling for age, veterans with CE had significantly higher pain intensity and somatic pain, and PTSD and depression scores significantly mediated the CE-pain relationships. Gender significantly moderated the CE-pain intensity association through depression scores such that the indirect effect was stronger for female veterans relative to male veterans. CE is associated with pain intensity and somatic pain, with greater levels of PTSD and depression mediating the CE-pain link and gender moderating the depression mediated CE-pain association. Future studies should examine gender differences and mediators in the CE-pain relationships using longitudinal designs to inform etiological models and targeted pain interventions.

1. Introduction

There is a high prevalence of combat exposure (CE) in both male (82%) and female veterans (73%) who have served in Afghanistan and Iraq, and there is a growing body of evidence that CE affects physical health (Street et al., 2013). Further, examining the link between psychological trauma and pain is a major research and clinical initiative within the Veterans Affairs (VA) Healthcare System (Taylor et al., 2012). Given the increased likelihood of psychological trauma as a result of CE (Forbes et al., 2013), identifying factors that may contribute to the relationship between CE and physical health, in particular pain-related outcomes, in combat exposed veterans is of critical interest. This paper aims to support these initiatives by employing a comprehensive approach to disentangling the multiple pathways in the CE-pain relationship, including the role of posttraumatic stress disorder (PTSD) and depression.

CE is one of the strongest predictors of poor physical health in veterans (Maia et al., 2011,2011; Ramchand et al., 2015), particularly with respect to chronic pain (Nillni et al., 2014). A recent investigation showed that 67% of women and 71% of men who served in Afghanistan and Iraq endorsed chronic pain, defined as pain lasting 3 months or longer (Driscoll et al., 2015). Important dimensions of the chronic pain experience include pain intensity (average levels of pain rated on a scale from 0 “no pain at all” to 10 “pain as bad as you can imagine”), and somatic pain experiences. These disruptions in daily activities are associated with negative mood, increased isolation, and poor overall physical health, which in turn, exacerbate the chronic pain cycle (Kerns et al., 2011). Previous research suggests that the level of CE is linked to pain intensity (Vanderploeg et al., 2012), and that a CE pain relationship could be mediated by symptoms of PTSD (Nillni et al., 2014).

To better understand the pathways between CE and pain, it is essential to consider mental health and gender differences. Importantly, PTSD frequently co-occurs with depression (Kessler et al., 2005), and there is evidence to support an association between depression and pain in the general population (Rytwinski et al., 2014). Although there is a substantial body of literature on PTSD and depression as mediators in

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the CE-pain association (Nillni et al., 2014), relatively few studies have examined potential mediating factors above and beyond these mental health conditions. Research on the impact of CE among veterans emphasizes factors that *increase* risk for mental and physical health problems, with little consideration of *protective* factors such as resilience. Resilience is the ability of individuals exposed to highly stressful events, such as life threatening situations encountered in combat, to maintain healthy psychological and physical functioning (Bonanno, 2004). Research in civilian chronic pain populations has shown resilience to be associated with reduced functional impairment and lower healthcare utilization (Seery et al., 2010). In veterans, resilience is inversely correlated with depressive symptoms and suicidal ideation (Youssef et al., 2013), the functional correlates of PTSD (Green et al., 2010), and could play an important role in PTSD prevention and recovery (Eisen et al., 2014). Resiliency also may partially account for a significant CE-pain association and serve as a protective factor, warranting further study.

Gender may be crucial to consider when understanding the psychological pathways from CE to pain. There is conflicting evidence with respect to gender differences in rates of mental health conditions, specifically PTSD and depression. One recent study shows that men and women are equally likely to report PTSD symptoms (Street et al., 2013), whereas other data show that women report more severe PTSD symptoms and higher rates of probable PTSD, relative to men (Polusny et al., 2014). In line with evidence from civilian samples, female veterans are more likely than males to endorse depression (Street et al., 2013). Men and women also differ in their exposure to CE. Male veterans report higher rates of CE relative to female veterans (Polusny et al., 2014); however, some (Driscoll et al., 2015), but not all (Nillni et al., 2014) research shows that CE is associated with higher levels of pain intensity and somatic pain in female, relative to male, veterans. These studies have explored the CE-pain relationship by gender or mental health separately, rather than jointly, which may lead to inconsistencies in the current literature.

Research to date suggests that there is a complex relationship between CE and pain, with equivocal results on the role of gender and little attention on the breadth of risk and protective factors, such as resilience, that may contribute to the CE-pain link. Additionally, no studies have attempted to examine mediators and gender as a moderator of the significantly mediated relationships. Given the high prevalence of CE and chronic pain in veterans, the increasingly higher rates of women in combat (Maguen et al., 2010), and the increased use of VA healthcare by women veterans (VA Healthcare Utilization, 2013), additional research is needed to disentangle the unique and combined contributions of mental health and protective factors, and gender, in the association between CE and pain. Therefore, the aims of the current study were to: 1) determine whether veterans with CE differed in pain intensity and somatic pain compared to veterans without CE, 2) examine PTSD, depression, and resilience as parallel mediators of the CE-pain association, and 3) examine the role of gender as a moderator of the significant mediated pathways. Based on the extant literature, we hypothesized that CE would be associated with higher levels of pain intensity and somatic pain, and that PTSD, depression, and resilience would significantly mediate the CE-pain relationships. Given the exploratory nature of aim 3, we did not have specific hypotheses for the moderated mediator analyses.

2. Method

2.1. Participants and procedures

The data used in this study were part of two larger cross-sectional evaluations of Afghanistan and Iraq veterans registering for healthcare at the VA San Diego Healthcare System (VASDHS) between May 1, 2009 and December 31, 2013. All Afghanistan and Iraq veterans who presented to VASDHS Member Services for enrollment were eligible to participate in the study. Participants completed a battery of self-report instruments, either on paper or electronically, as part of a clinical program to screen newly enrolling veterans for physical and mental healthcare needs. A total of 2683 veterans presented in person and completed the screening. Analyses described here focus on a subset of 2381 veterans who had complete data. The project was approved by the VASDHS Institutional Review Board and the Research and Development Committee.

2.2. Measures

2.2.1. Demographics

Demographic information included gender, age, education, race, ethnicity, and branch of service. Racial categories and ethnicity were designed to match the 2000 U.S. Census definitions for race and ethnicity (Grieco and Cassidy, 2013). Veterans who identified with more than one racial category were grouped into a mixed race category. Veterans were asked to either identify as Hispanic Latino, non-Hispanic Latino, or declined to state ethnicity.

2.2.2. Combat exposure

CE was assessed by the question, "*Did your military experience include exposure to combat*?" Respondents were then presented with a list of combat experiences such as firing at the enemy, caring for wounded, receiving small-arms fire, and seeing dead bodies. This list of combat experiences is similar to those used in previous research (Hoge et al., 2004). Those who answered yes to the initial question and at least one of the combat experiences were considered positive for CE. A total of 301 respondents had missing CE data and were not included, leaving a sample of 2381 for analysis.

2.2.3. Pain intensity

Pain intensity was assessed for the previous four weeks using a numerical rating scale from 0 to 10, anchored at "no pain at all" and "worst pain ever", respectively (Downie et al., 1978). According to VHA policy, a rating of 4 or greater is typically considered to be clinically significant pain (Cleeland et al., 2003).

2.2.4. Somatic pain

The 15-item Patient Health Questionnaire (PHQ-15) was used to measure somatic pain symptoms such as stomach pain, back pain, headaches, and trouble sleeping (Kroenke et al., 2002). Each item on the PHQ-15 is scored on a 3-point scale ranging from 0 (*not bothered at all*) to 2 (*bothered a lot*) in reference to the past month, with higher scores indicating greater somatic pain. The PHQ-15 has a high level of comparison with similar physical health measures including the World Health Organization Schedule for Somatoform Disorders Screener and the SCL-12 Hopkins Symptom Checklist (Kroenke et al., 2002). The six somatic pain items on the PHQ-15 – stomach pain, back pain, pain in arms/legs/joints, headaches, chest pain, pain or problems during sexual intercourse – were summed to create a measure of somatic pain symptoms. This somatic pain scale had a Cronbach's α of 0.68 in our sample.

2.2.5. Posttraumatic stress disorder symptoms

In compliance with the standard practice within the VA healthcare system at the time these data were collected, PTSD symptoms were assessed using the PTSD Checklist – Civilian Version (PCL-C) (US Department of Veterans Affairs National Center for PTSD, 2014). The PCL-C is a 17-item measure, with items scored on a 5-point scale indicating the degree to which respondents experienced a particular PTSD symptom over the past month. The maximum score is 85; higher scores indicate greater severity. A score of 50 is typically used to identify veterans with a positive PTSD screen (Weathers et al., 1993). The PCL-C has high internal consistency in both military and non-clinical populations (Conybear et al., 2012,2012; Wilkins et al., 2011), with a Cronbach's α of 0.97 in our sample.

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