Journal of Affective Disorders 208 (2017) 392–398

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Predictors of suicidal ideation among active duty military personnel with posttraumatic stress disorder

Carmen P. McLean[a], Yinyin Zang[a,*], Laurie Zandberg[a], Craig J. Bryan[b,c], Natalie Gay[a], Jeffrey S. Yarvis[d], Edna B. Foa[a], the STRONG STAR Consortium[1]

[a] Department of Psychiatry, University of Pennsylvania, Philadelphia, PA, United States
[b] National Center for Veterans Studies, Salt Lake City, UT, United States
[c] Department of Psychology, University of Utah, Salt Lake City, UT, United States
[d] Headquarters, Carl R. Darnall Army Medical Center, Fort Hood, TX, United States

ARTICLE INFO

Keywords:
Posttraumatic stress disorder
Suicide
Depression
Trauma
Cognitions

ABSTRACT

Background: Given the alarming rate of military suicides, it is critical to identify the factors that increase risk of suicidal thoughts and behaviors among active duty military personnel.
Methods: This study examined a predictive model of suicidal ideation among 366 treatment-seeking active duty military personnel with posttraumatic stress disorder (PTSD) following deployments to or near Iraq or Afghanistan. Structural equation modeling was employed to examine the relative contribution of combat exposure, social support, PTSD severity, depressive symptoms, guilt, and trauma-related cognitions on suicidal ideation.
Results: The final structural equation model had a highly satisfactory fit [χ^2 (2) =2.023, p=.364; RMSEA =.006; CFI =1; GFI =.998]. PTSD severity had an indirect effect on suicidal ideation via trauma-related cognitions. Depression had a direct positive effect on suicidal ideation; it also had an indirect effect via trauma-related cognitions and interpersonal support. Among participants who had made a previous suicide attempt, only depression symptom severity was significantly linked to suicidal ideation.
Limitations: Data are cross-sectional, precluding causal interpretations. Findings may only generalize to treatment seeking active duty military personnel with PTSD reporting no more than moderate suicidal ideation.
Conclusions: These findings suggest that depression and trauma-related cognitions, particularly negative thoughts about the self, play an important role in suicidal ideation among active duty military personnel with PTSD. Negative cognitions about the self and interpersonal support may be important targets for intervention to decrease suicidal ideation.

1. Introduction

The rate of suicide in the United States Army has nearly doubled since the initiation of Operations Enduring Freedom (OEF), Iraqi Freedom (OIF), and New Dawn (OND; Luxton et al., 2012), surpassing the civilian suicide rate for the first time in 2008 (Kuehn, 2010). It is estimated that one active duty US military service member dies by suicide approximately every 36 h (Kinn et al., 2011). Some evidence

Abbreviations: ABS, Aftermath of Battle Subscale; ADF, asymptotically distribution free; BDI-II, Beck Depression Inventory-II; BSS, Beck Scale for Suicide Ideation; CES, Combat Experiences Subscale; DRRI, Deployment Risk and Resilience Inventory; DSM-IV-TR, *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*; ISEL-12, Interpersonal Support Evaluation List – 12; OEF, Operation Enduring Freedom; OIF, Operation Iraqi Freedom; OND, Operation New Dawn; PSS-I, Posttraumatic Stress Scale – Interview; PTCI, Posttraumatic Cognitions Inventory; PTSD, posttraumatic stress disorder; SEM, structural equation modeling; SI, suicidal ideation; TRGI, Trauma Related Guilt Inventory; WRAIR, Walter Reed Army Institute of Research (WRAIR) Military Vertical & Horizontal Cohesion Scales

* Corresponding author.
E-mail address: yinyinz@mail.med.upenn.edu (Y. Zang).

[1] The STRONG STAR Consortium group authors include (listed alphabetically): **Brett T. Litz, Ph.D.,** Massachusetts Veterans Epidemiological Research Center, VA Boston Healthcare System, Department of Psychiatry, Boston University School of Medicine, and Department of Psychology, Boston University, Boston, Massachusetts; **Jim Mintz, Ph.D.,** Department of Psychiatry and Department of Epidemiology and Biostatistics, University of Texas Health Science Center at San Antonio, San Antonio, Texas; **Alan L. Peterson, Ph.D., A.B.P.P.,** Department of Psychiatry, University of Texas Health Science Center at San Antonio, Office of Research and Development, South Texas Veterans Health Care System, and Department of Psychology, University of Texas at San Antonio, San Antonio, Texas; **John D. Roache, Ph.D.** , Department of Psychiatry, University of Texas Health Science Center at San Antonio, San Antonio, Texas; **Elna Yadin, Ph.D.,** Department of Psychiatry, University of Pennsylvania, Philadelphia, Pennsylvania; and **Stacey Young-McCaughan, R.N., Ph.D.,** Department of Psychiatry, University of Texas Health Science Center at San Antonio, San Antonio, Texas.

http://dx.doi.org/10.1016/j.jad.2016.08.061
Received 16 June 2016; Accepted 24 August 2016
Available online 23 November 2016
0165-0327/

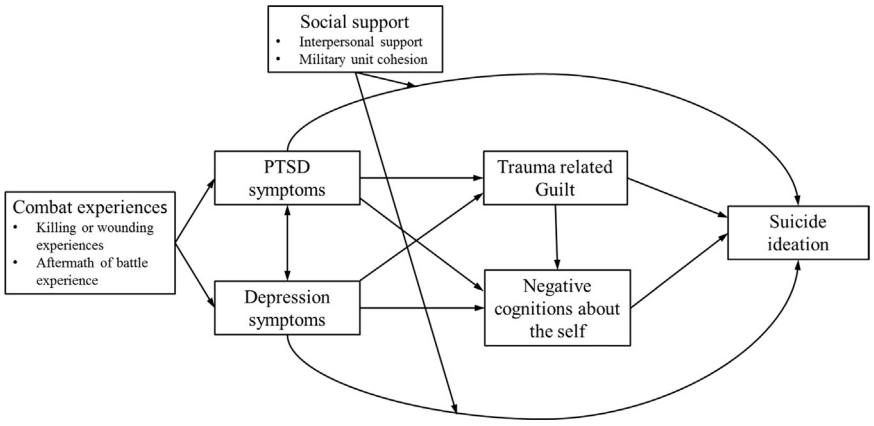

Fig. 1. Hypothesized SEM model. SEM, structural equation modeling; PTSD, posttraumatic stress disorder.

suggests that military suicide rates have stabilized or decreased in the last few years, but there is considerable variation from year to year and across military branches (Franklin, 2015). This suicide rate among military personnel has raised great public and professional concern and has prompted a call for research to identify risk factors for suicide in this population.

Posttraumatic stress disorder (PTSD) is associated with increased risk for suicidal thoughts and behaviors in the general population (Tarrier and Gregg, 2004) and in active duty military samples (Bryan and Corso, 2011; Nock et al., 2014) and Iraq and Afghanistan veterans (Guerra and Calhoun, 2011; Jakupcak et al., 2011). PTSD is also associated with more severe suicidal ideation (SI) in deployed military personnel (Bryan et al., 2013a, 2013b) and combat veterans (Butterfield et al., 2005; Rudd et al., 2011) and with attempted suicide (Nad et al., 2008) and death by suicide (Boscarino, 2006; Drescher et al., 2003) in combat veterans. Moreover, PTSD is highly prevalent among military personnel: studies show that 5–20% of US military personnel returning from deployments in support of OIF/OEF have symptoms of PTSD (Institute of Medicine, 2014). Depression, which is frequently comorbid with PTSD (Galatzer-Levy et al., 2013), is also associated with suicide risk in active duty military samples (Bryan et al., 2013c; Bush et al., 2011). Some studies (e.g., Lemaire and Graham, 2011) but not all (e.g., Guerra and Calhoun, 2011) indicate that suicide risk is higher among OEF/OIF veterans with both depression and PTSD than those with either disorder alone.

At present, research is needed that moves beyond *whether* PTSD is associated with suicidal thoughts and behaviors to examine *how* PTSD is associated with SI. One possibility is that PTSD increases SI through associated negative perceptions about the meaning of the trauma. This notion is consistent with evidence that even when controlling for severity of combat exposure, guilt is significantly associated with PTSD severity in veterans (Henning and Frueh, 1997). In active duty military personnel, guilt predicted greater SI above and beyond the effects of PTSD, depression, and their interaction (Bryan et al., 2013a, 2013b). Moreover, guilt has been found to fully mediate the relationships of PTSD and depression with SI in active duty and veteran samples (Bryan et al., 2015b, 2013a, 2013b). These studies suggest that PTSD and depression increase the severity of SI via cognitive-affective processes that are more proximally related to SI than PTSD or depression. Related to the construct of guilt are negative trauma-related cognitions, which include negative cognitions about the self (e.g., "I'm incompetent"), negative cognitions about the world (e.g., "the world is a dangerous place"; "no one can be trusted"), and self-blame (e.g., "the event [trauma] happened because of the sort of person I am"; Foa et al., 1999). Although research has consistently shown strong associations between negative trauma-related cognitions and PTSD severity, no published study has examined the relationship between PTSD, negative trauma-related cognitions, and SI (Mueser et al., 2008; Zalta et al., 2014; Zoellner et al., 2011).

The stress of combat exposure has been hypothesized to increase suicide risk (e.g., Selby et al., 2010). While combat exposure has not been found to predict death by suicide in current and former military personnel (LeardMann et al., 2013) and OEF/OIF veterans (e.g., Reger et al., 2015), a recent meta-analysis found that certain types of combat exposure are associated with suicidal thoughts and behaviors in active duty military personnel and veterans (Bryan et al., 2015b). In particular, exposure to the grotesque aftermath of battle and death (e.g., seeing dead bodies or body parts, exposure to devastated communities and prisoners of war) and acts of killing were associated with suicidal thoughts and behaviors among military personnel, while other forms of combat exposure (e.g., firing a weapon at enemy combatants, disarming explosive devices) were not (Bryan et al., 2015b). Much less is known, however, about how these specific types of combat experiences relate to SI among military personnel with PTSD.

In contrast to risk factors such as guilt and exposure to killing and death, perceived social support has been associated with decreased suicidal ideation, suggesting it functions as a protective factor in OEF/OIF veterans (Jakupcak et al., 2010; Lemaire and Graham, 2011; Pietrzak et al., 2011). However, the protective effect of social support was found to be lower in those with PTSD than those without PTSD, highlighting the need to examine the relationship between social support and SI in treatment-seeking soldiers (Jakupcak et al., 2010). Because military personnel may derive social support from civilian family and friends as well as members of their unit, an examination of social support resources should include both military unit cohesion and general interpersonal social support.

The purpose of the current study was to examine the relative contribution of combat exposure, social support, PTSD, depression, trauma-related cognitions, and guilt on SI among active duty military personnel seeking treatment for PTSD. As depicted in Fig. 1, based on previous research, we hypothesized that: (1) combat exposure (specifically, exposure to the aftermath of battle and killing) would show both a direct relationship with SI and an indirect relationship with SI through PTSD and depressive symptoms; (2) PTSD and depressive symptoms would each show both a direct relationship with SI and an indirect effect on SI through guilt; and (3) the effect of PTSD and depressive symptoms on SI would be moderated by social support. In addition, we hypothesized that the effects of PTSD and depression on SI would be accounted for by negative trauma-related cognitions.

Finally, we sought to test this model among those with and without a history of suicide attempts. Several studies show that factors similar to guilt and negative trauma-related cognitions, such as self-blame and self-criticism, differentiate those with SI-only from those who have acted upon suicidal thoughts (Bryan et al., 2014). In fact, it has been proposed that these types of negative self-perceptions account for the