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Modeling PTSD Symptom Clusters, Alcohol Misuse, Anger, and Depression as They Relate to Aggression and Suicidality in Returning Veterans

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Abstract

Suicidal ideation (SI) and aggression are common correlates of Posttraumatic Stress Disorder (PTSD) among Iraq and Afghanistan War veterans. The existing literature has established a strong link between these factors, but a more nuanced understanding of how PTSD influences them is needed. The current study examined the direct and indirect relationships between PTSD symptom clusters and SI and general aggression (without a specified target) via depression, alcohol misuse, and trait anger. Participants were 359 (92% male) Iraq/Afghanistan War veterans. Path analysis results suggest that the PTSD numbing cluster was directly ($\beta=.28$, $p<.01$.) and indirectly ($\beta=.17$, $p=.001$) related to SI through depression and the PTSD hyperarousal cluster was indirectly related to SI through depression ($\beta=.13$, $p<.001$). The PTSD re-experiencing cluster was directly related to aggression ($\beta=.17$, $p<.05$), whereas the PTSD numbing and hyperarousal clusters were indirectly related to aggression through trait anger ($\beta=.05$, $p<.05$; $\beta=.20$, $p<.001$). These findings suggest that adjunct treatments aimed at stabilizing anger, depression, and alcohol misuse may help clinicians ameliorate the maladaptive patterns often observed in returning Veterans. These results also point to specific manifestations of PTSD and co-occurring conditions that may inform clinicians in their attempts to identify at-risk veterans and facilitate preventative interventions.

Keywords

Iraq and Afghanistan War Veterans; Suicide risk; Aggression; PTSD; Depression; Alcohol misuse

Posttraumatic Stress Disorder (PTSD) is the most common mental health disorder diagnosed in veterans returning from the Iraq and Afghanistan Wars (Hoge et al., 2006; Sayers et al., 2009). Two of the most salient and maladaptive correlates of PTSD are suicidal ideation and aggression (Jakupcak et al., 2009; Kang & Bullman, 2008; Panagioti et al., 2009; Pietrzak et al., 2010; Taft et al., 2007). Iraq and Afghanistan war veterans reporting symptoms of PTSD are more likely to report suicidal ideation (Jakupcak et al., 2009) and to perpetrate aggressive acts compared to veterans without PTSD (Fontana & Rosenheck, 1995; Teten et al., 2010). Some research has asserted that suicidality and interpersonal aggression can also be characterized as inwardly or outwardly directed aggression (Dyer et al., 2009; Novacco & Chemtob, 2002). Indeed, suicidality and aggression share many common precipitating factors including anger, depression, anxiety, substance use, and PTSD (Jakupcak et al., 2007; Jakupcak et al., 2009; Lemaire & Graham, 2010; Taft et al., 2007). Currently, our understanding of how suicidal ideation and aggression can be differentiated, and therefore, more effectively managed, in clinical contexts is limited because prior studies have not investigated these factors concurrently within Iraq and Afghanistan war veterans. Doing so is an integral step toward better understanding PTSD components that may be common to both suicidal ideation and aggression. It is also essential to improving clinicians' capacity to effectively assess veterans' treatment needs, as clinicians are employed with the difficult task of preventing these problems while also addressing trauma-related symptoms (Elbogen et al., 2010; Martin, Ghahramanlou-Holloway, Lou, & Tucciarone, 2009).

A four factor structure representing trauma-related re-experiencing, avoidance, numbing, and hyperarousal symptoms has garnered strong empirical support (King, Leskin, King, & Weathers, 1998; Yufik & Simms, 2010). Because this framework captures specific components of trauma-related sequelae, these symptom clusters may differentially inform suicidal ideation and aggression. In an effort to better identify the circumstances under which veterans may be at risk for these dangerous problems, the current study examined PTSD symptom clusters and their direct and indirect relationships with suicidal ideation and aggression via depression, alcohol misuse, and trait anger.

Based on past research (Jakupcak et al., 2007; McFall et al., 1999; Norstrom & Pape, 2010; Orcutt et al., 2005; Savarese et al., 2001), we hypothesized that numbing and hyperarousal symptom clusters, alcohol misuse, and trait anger would be associated with aggression. Alcohol misuse, trait anger, and depression were chosen as potential influencing variables in this investigation based on literature indicating that they are highly prevalent in this population and particularly clinically relevant. The presence of these problems often necessitates heightened attention during the course of treatment in order to facilitate treatment engagement and completion and minimizing the risk for dangerous distress behaviors (Garcia, Kelley, Rentz, & Lee, 2011; Lu, Duckart, O'Mally, & Dobscha, 2011; Trusz, Wagner, Russo, Love, & Zatnick, 2011). Although depression has consistently been shown to be a robust predictor of suicidal ideation in Iraq and Afghanistan war veterans

(Jakupcak et al., 2009; Pietrzak et al. 2010), the remaining literature regarding suicidal ideation is less clear. Some studies have indicated that the PTSD numbing cluster is most relevant to suicidal ideation (Guerra & Calhoun, 2010), while other research has found that re-experiencing symptoms play a more significant role (Nye & Bell, 2007). Similarly, alcohol misuse is often considered to put some veterans at increased risk for suicidal ideation (Panagioti et al., 2009; Pietrzak et al., 2010), although recent studies have not supported this relationship (Kang & Bullman, 2008; Ilgen et al., 2010). As a result of these conflicting results, we expected both re-experiencing and numbing symptom clusters, along with depression and alcohol misuse, to be associated with suicidal ideation in the proposed model.

Methods

Participants

The sample was composed of Iraq and Afghanistan war veterans ($N = 653$; 91% male) presenting to the Deployment Health Clinic of the VA Puget Sound Health Care System between 2004 and 2009. All participants completed assessments during their intake appointments to this clinic. Reason for seeking treatment was not assessed by the intake packets and, in an effort to reduce barriers to mental health services, all veterans presenting to this service were screened for physical and mental health problems following their return from military deployment. Veterans were then offered brief medical and/or mental health interventions to stabilize symptoms, or referred to appropriate clinics in order to address long-term treatment needs. The use of de-identified clinic data from the assessment packets for research purposes was approved by the Institutional Review Board and Research & Development Committee of VA Puget Sound Health Care System.

In order to focus on clinical levels of PTSD most germane to treatment settings, the sample was limited to those who reported subthreshold ($n = 135$) or threshold PTSD ($n = 224$) for a total sample of 359. Differences in primary demographic characteristics between those included versus excluded ($n = 294$) were examined using chi-square analyses for comparisons of gender and race/ethnicity and ANOVAs for comparisons of age. Participants excluded from analyses did not differ from those included on gender, $\chi^2(1) = .704, p = .40$, race/ethnicity, $\chi^2(5) = 9.24, p = .10$, or age, $F(1, 617) = 4.02, p = .81$.

Participants included in the analyses were predominantly male (92%), White (65%), married (42%), had a mean age of 30.6 ($SD = 8.0$) years, and served in the U.S. Army (69%) while deployed to Iraq or Afghanistan. The majority of participants graduated high school (96%) and were employed full-time (51%). Twenty percent of these participants reported an annual combined household income between \$0 and \$14,999, 25% reported between \$15,000 and \$24,999, 20% between \$25,000 and \$34,999, 14% between \$35,000 and \$49,999, and 18% \$50,000 and above.

Measures

PTSD symptoms were measured using the PTSD Checklist Military Version (PCL-M; Weathers et al, 1993). Using a 5-point scale, this 17-item measure assesses the risk for

PTSD diagnosis by determining the frequency and severity of PTSD symptoms defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV;* American Psychiatric Association, 1994) experienced over the course of the past month, with global scores ranging from 17 to 85. The PCL-M cannot be used to diagnose PTSD in the absence of a clinical interview, and is only suggestive of risk of PTSD diagnosis. Previous research has established a conservative cutoff point of 50 for risk of meeting full diagnostic criteria for combat veterans (Forbes et al, 2001). The present study also included individuals with scores between 35 and 49, classified as risk for meeting subthreshold PTSD diagnostic criteria. Subthreshold PTSD symptomatology has been shown to elevate risk for suicidality and aggression relative to veterans with scores reflective of no or only limited levels of PTSD (Jakupcak et al., 2007; Jakupcak et al., 2011; Marshall et al., 2001; Yarvis & Scheiss, 2008). Four PTSD symptom clusters were created in accordance with recommendations by King et al. (1998); averages of the respective items were created for re-experiencing, avoidance, numbing, and hyperarousal symptom clusters, ranging from 1 to 5. This sample demonstrated adequate to strong internal consistency for the total PCL-M (Cronbach's $\alpha = .90$) and for the symptom clusters of re-experiencing, avoidance, numbing, and hyperarousal (Cronbach's alphas are .86, .77, .82, and .75, respectively).

Trait anger was assessed using the 10-item Trait Anger Scale (Spielberger et al., 1983), a subscale of the State-Trait Anger Expression Inventory (Spielberger, 1988) with strong psychometric properties (Spielberger et al., 1983). Participants were asked to use a 4-point scale ranging from 1 (*almost never*) to 4 (*almost always*) to rate the degree to which they react to situations and people in an angry fashion. Responses are summed for a global score. In the current study, internal consistency for the Trait Anger Scale was good (Cronbach's $\alpha = .88$).

Aggression was measured using three items adapted from the National Vietnam Adjustment Study (see McFall et al., 1999). Participants were asked to indicate whether or not (i.e., yes/no) they threatened the use of violence with or without a weapon, or engaged in a physical fight within the past four months. Participants who endorsed at least one of these behaviors were categorized as aggressive. In the current study, internal consistency for the aggression items was adequate (Cronbach's $\alpha = .54$) and comparable to observations in prior studies (Jakupcak et al., 2007; McFall et al., 1999).

Depression and suicidal ideation were assessed using the depression subscale of the Patient Health Questionnaire (PHQ; Spitzer et al., 1999). The PHQ-9 depression subscale measures the endorsement of nine symptoms of depression defined by the DSM-IV diagnostic criteria (American Psychiatric Association, 1994). Participants responded to a 4-point scale (i.e., 0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every day) to indicate the frequency with which each symptom was experienced during the prior two weeks. The eight items excluding suicidal ideation were summed for a total depression severity score, with good internal consistency ($\alpha = .88$). The item used to assess suicidal ideation reads, "Over the last 2 weeks, how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way". Single item versions of the PHQ to screen for suicidality have received empirical support within VA populations (Corson, Gerrity, &

Dobscha, 2004; Williams et al., 2004). This item was dichotomized to reflect the presence or absence of suicidal ideation.

Alcohol misuse also was assessed with the PHQ-5 (Spitzer et al., 1999). The five items assessing alcohol misuse on the PHQ-5 have demonstrated strong psychometric properties in past studies (Jakupcak et al., 2007; Nunnally, 1967). Participants who reported any alcohol consumption were asked to indicate whether or not they experienced any of the five symptoms of alcohol abuse as defined by DSM-IV diagnostic criteria (American Psychiatric Association, 1994). Internal reliability was adequate for this subscale (Cronbach's $\alpha = .75$).

Data Analysis

Path analyses were conducted with MPlus 5 (Muthén & Muthén, 1998–2010) to examine the direct and indirect relationships between PTSD symptom clusters and suicidality and aggression. All direct paths between PTSD symptoms clusters and suicidal ideation and aggression and indirect paths through alcohol misuse, trait anger, and depression were included in the model. A test of the direct and indirect effects was examined. Additionally, the disturbances among the PTSD symptom clusters and between suicidal ideation and aggression were correlated given the strong interrelations observed. Because the risk variables were dichotomous, probit regression coefficients were calculated for all variables regressed on suicidal ideation and aggression, and can be interpreted as the amount of change in the dependent variable (i.e., suicidal ideation and aggression) for a one-unit change in the independent variable.

Among the advantages of MPlus is the use of maximum likelihood estimation procedures, which can effectively handle the non-systematic missing data in the current dataset (Kline, 2005). Only 2.2% of the sample had any missing data. We used WLSMV (weighted least squares with robust standard errors and mean- and variance-adjusted chi-square) as an estimator, and assessed overall model fit by examining the Model Chi-Square statistic, which can be erroneously significant with large sample sizes such as the one included in the current study (Kline, 2005). Other fit indices were also examined, including the root mean square error of approximation (RMSEA), which indicates a reasonable fit with values around .08 (Browne & Cudeck, 1993), and the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), which indicate reasonably good fit with values greater than .90 (Hu & Bentler, 1999).

Results

Approximately one third of our final sample reported suicidal ideation (32.3%), at least one act of physically aggressive behavior (31.8%), and at least one alcohol-related problem (34.3%). 16.4% of the sample reported suicidal ideation only, 15.9% reported aggressive behavior only, and 15.9% reported both suicidal ideation and aggressive behavior. Ninety-eight (27.7%) participants endorsed less severe physical aggression (i.e., threatening without a weapon) while 68 (18.9%) participants endorsed more severe physical aggression (i.e., physical fight and threatening with a weapon). Average scores for PTSD symptom clusters,

alcohol misuse, trait anger, and depression are shown in Table 1. Table 2 presents the bivariate correlations among all study variables.

The overall path analysis model fit the data well, $\chi^2(2) = 7.97, p = .02$, CFI = .98; TLI = .90; RMSEA = .09. The significant paths from the full model are presented in Figure 1. The standardized coefficients of the direct and indirect relations between PTSD symptom clusters and suicidal ideation and aggression are shown in Table 3. The PTSD numbing cluster was directly and indirectly related to suicidal ideation through depression, indicating that PTSD numbing was associated with suicidal ideation whether or not other symptoms of depression were present. The PTSD hyperarousal cluster was indirectly related to suicidal ideation through depression, suggesting that hyperarousal was only related to suicidal ideation when other symptoms of depression were endorsed. There were direct associations between PTSD re-experiencing symptoms and alcohol misuse and veterans' aggressive behavior. Those with more re-experiencing symptoms and those with alcohol problems were more likely to report aggressive behavior. Numbing and hyperarousal symptoms were only associated with aggression when veterans endorsed higher levels of trait anger. Although the PTSD avoidance cluster was significantly and negatively associated with trait anger, which was significantly associated with aggression in the path analysis, this indirect path was non-significant overall.

Discussion

This investigation is the first to link the perspectives of two emerging literatures specific to returning Iraq and Afghanistan war veterans: one that focuses on the relationship between PTSD and suicidal ideation, and another that focuses on the relationship between PTSD and aggressive behavior. The purpose of this study was to illuminate how the specific features of PTSD, in combination with other common clinical characteristics, are differentially related to both suicidal ideation and aggression. Results indicate that aggression was directly related to PTSD re-experiencing symptoms and alcohol misuse while suicidal ideation was directly related to PTSD numbing symptoms. Additionally, the PTSD numbing and hyperarousal clusters were related to suicidal ideation and aggression through distinct pathways involving depression and trait anger, respectively. Although re-experiencing and avoidance symptoms are often considered hallmark characteristics of PTSD, these results underscore the role that numbing and hyperarousal symptoms play in PTSD-related impairments (Lunney & Schnurr, 2007; Pietrzak, Goldstein, Malley, Rivers, & Southwick, 2010). In light of the likely overlap between PTSD hyperarousal symptoms and aggression, the PCL-M item within the hyperarousal subscale assessing angry outbursts was removed and the original model was rerun. Although the PTSD hyperarousal cluster no longer predicted alcohol misuse, all other significant paths remained significant, including the indirect effect of hyperarousal on aggression through trait anger, lending strength to the findings presented here.

Although alcohol misuse and suicidal ideation were correlated in our preliminary analyses, they were not related in the context of other variables in this study. Contrary to results from other studies (Ilgen et al., 2010; Kang & Bullman, 2008), our finding may be an effect of the relatively small number of alcohol problems reported by this sample. The associations

between PTSD, alcohol misuse, and suicidal ideation needs further investigation. Although avoidance was associated with trait anger, it did not have a direct or indirect association with aggressive behavior in the current study. Further exploration of the possible indirect association between avoidance and aggression through trait anger is warranted.

The emergence of distinct pathways between PTSD symptom clusters and suicidal ideation and aggression emphasizes the value of raising clinicians' awareness of the differing etiologies that contribute to each of these problems. Some literature has identified internalizing and externalizing types of PTSD (e.g. Miller, 2003) and others have acknowledged the common origins shared by SI and aggression (Dyer et al., 2009; Novacco & Chemtob, 2002). However, our data indicate that some veterans experience both suicidal ideation and aggression. These data cannot distinguish whether veterans might transition from experiencing suicidal ideation only to aggression only to experiencing them concurrently, or what factors might precipitate those transitions, due to the cross-sectional nature of these data as well as the different time frame of the measures administered. The fact that some of the veterans in our sample experienced both suicidal ideation and aggression highlights the need for future studies to explore these relationships further.

Disentangling these complicated relationships and facilitating the knowledge base through which clinicians conduct risk assessments and treatment planning may help them evaluate and stabilize targeted symptoms and prevent suicidal ideation and aggression associated with PTSD symptoms (Elbogen et al., 2010; Fontana & Rosenheck, 1995; Jakupcak & Varra, 2010; Pietrzak et al., 2010). Taking the pathways demonstrated by this study into consideration may aid some clinicians in creating or adjusting treatment plans, particularly among more complicated cases. For example, Taylor et al. (2001) found that prominent PTSD numbing and anger symptoms at pre-treatment were associated with partial response to cognitive behavioral therapy for PTSD. Under the circumstances where the combinations of features associated with suicidal ideation or aggression demonstrated here are present, integrating techniques from modalities such as Dialectical Behavior Therapy or Cognitive Behavioral Therapy may be of use. Perhaps utilizing adjunct interventions to manage suicidal ideation, depression, and anger may help to stabilize suicidality and aggression prior to initiating trauma-focused therapies, which could possibly improve treatment outcome for some veterans (Britton et al, 2011; Chemtob et al., 1997; Harned et al., 2010; Jakupcak & Varra, 2010).

Limitations

Several factors limit the extent to which these results may be generalized. The sample was comprised of veterans who were seeking post-deployment VA care within an integrated clinic and the reason for treatment-seeking was not captured within this data set; as such, findings may not generalize to veterans not enrolled in VA care, those not reporting military-related traumas, or those who are seeking specialized VA treatment. Although we attempted to run the model with the full sample of veterans for whom we had data (i.e., including those reporting PCL-M scores that fell below subthreshold for PTSD diagnosis risk), the model fit was poor and therefore uninterpretable. Therefore, these results may only

generalize to those representing threshold and subthreshold levels of PTSD symptomatology.

All data were collected via self-report measures as opposed to structured diagnostic interviews, and therefore may be subject to self report bias. Further, PCL-M scores are suggestive, but not necessarily indicative of PTSD diagnosis in the absence of a clinical interview. The cross-sectional nature of this study and the fact that veterans reported on suicidal ideation and aggression in slightly different time frames prohibits us from determining causal relationships between variables. Future studies would benefit from modeling these relationships over time. Other influential factors (e.g., trauma history and severity, social isolation, stigma, personal coping styles) may contribute to explaining these problems (Ilgen et al., 2010; Pietrzak et al., 2010; Pietrzak et al., 2010) and were not measured in the present study.

The low internal consistency demonstrated by the measure of aggression used in this study highlights the need for future research to include more sophisticated measures of aggression in veteran populations. However, we examined the individual aggression items that had enough endorsement (threatening without a weapon, and getting into a physical fight) as outcomes in the model. With one exception (i.e., that the PTSD re-experiencing cluster did not directly predict getting into a physical fight), all other direct and indirect paths were identical for both items compared to the original model. Different PTSD symptoms may be related to different types or severity of aggression, and the present study's capacity to address that question is limited by a restrictive measure of aggression. Future studies would benefit from using a more comprehensive measure of aggression in order to capture a wider range of physically and psychologically aggressive behaviors.

The association between depression and suicidal ideation was expected and may be inflated due to shared method variance as both were measured using items of the PHQ-9 depression subscale. Future studies should use a more comprehensive and distinct measure to assess suicidality in order to improve specificity of findings. Findings also need to be replicated in larger samples, with female veterans, and with veterans from other eras of service.

Conclusions

The present study's findings indicate that numbing, re-experiencing, and hyperarousal PTSD symptom clusters are most strongly associated with suicidal ideation and aggression. Numbing and hyperarousal symptom clusters distinguished these high-risk problems through pathways involving trait anger and depression while re-experiencing symptoms had a direct effect on aggression. These findings target a need identified by Elbogen and colleagues (2010) for more empirically supported frameworks that may help clinicians more effectively conduct risk assessment and decision making in their clinical work with veterans. These findings may help clinicians identify veterans who are at elevated risk for problems related to PTSD and to tailor interventions to more effectively meet their treatment needs. Adjunct interventions aimed at reducing alcohol misuse, depression, and anger in veterans at elevated risk for suicide and aggression may be useful in augmenting care for more positive treatment outcomes. Such interventions may facilitate stabilization in coordination with trauma-focused therapies for some veterans.

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Figure 1.

All significant paths shown with unstandardized probit coefficients for paths to the dichotomous outcome variables of suicidal ideation and aggression, and unstandardized regression coefficients for all other paths. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1
Means and Standard Deviations of the PTSD Symptoms Clusters, Alcohol Misuse, Trait Anger, and Depression

	Observed Range	Mean	Standard Deviation
PTSD symptom clusters			
Re-experiencing	1–5	3.14	0.99
Avoidance	1–5	3.34	1.12
Numbing	1–5	3.01	1.00
Hyperarousal	1–5	3.66	0.84
Alcohol misuse	0–5	0.63	1.17
Trait anger	1–4	2.22	0.67
Depression	0–24	13.55	6.10

Note. PTSD = posttraumatic stress disorder.

Table 2

Bivariate Correlations Among all Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Suicidal ideation									
2. Aggression	.26***								
3. PTSD re-experiencing	.21***	.24***							
4. PTSD avoidance	.19**	.19**	.64***						
5. PTSD Numbing	.42***	.22**	.43***	.49***					
6. PTSD hyperarousal	.32***	.24**	.53***	.49***	.60***				
7. Alcohol misuse	.14*	.25***	.13*	.14**	.17**	.17**			
8. Trait anger	.25***	.36***	.29***	.23***	.42***	.53***	.23***		
9. Depression	.47***	.19**	.40***	.39***	.63***	.62***	.15**	.32***	

Note. PTSD = posttraumatic stress disorder.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.

Table 3
Standardized Coefficients of the Direct and Indirect Relations Between PTSD Symptom Clusters and Suicidal Ideation and Aggression

PTSD Symptom Clusters	Suicidal Ideation				Aggression			
	Via Alcohol Misuse	Via Trait Anger	Via Depression	Direct Effect	Via Alcohol Misuse	Via Trait Anger	Via Depression	Direct Effect
Re-experiencing	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.17*
Avoidance	0.00	-0.01	0.01	-0.07	0.00	-0.05	0.00	0.03
Numbing	0.00	0.01	0.17***	0.28**	0.01	0.05*	0.00	0.04
Hyperarousal	0.01	0.03	0.13***	-0.03	0.04	0.20***	0.00	-0.10

Note. PTSD = posttraumatic stress disorder.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.