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Personality Assessment Inventory Internalizing and Externalizing Structure in Veterans with Posttraumatic Stress Disorder: Associations with Aggression

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Abstract

Posttraumatic stress disorder (PTSD) is associated with aggressive behavior in veterans, and difficulty controlling aggressive urges has been identified as a primary postdeployment readjustment concern. Yet only a fraction of veterans with PTSD commit violent acts. The goals of this study were to (1) examine the higher-order factor structure of Personality Assessment Inventory (PAI) scales in a sample of U.S. military veterans seeking treatment for PTSD; and (2) to evaluate the incremental validity of higher-order latent factors of the PAI over PTSD symptom severity in modeling aggression. The study sample included male U.S. Vietnam ($n = 433$) and Iraq/Afghanistan ($n = 165$) veterans who were seeking treatment for PTSD at an outpatient Veterans Affairs (VA) clinic. Measures included the Clinician Administered PTSD Scale, the PAI, and the Conflict Tactics Scale. The sample was randomly split into two equal subsamples (n 's = 299) to allow for cross-validation of statistically derived factors. Parallel analysis, variable clustering analysis, and confirmatory factor analyses were used to evaluate the factor structure, and regression was used to examine the association of factor scores with self-reports of aggression over the past year. Three factors were identified: internalizing, externalizing, and substance abuse. Externalizing explained unique variance in aggression beyond PTSD symptom severity and demographic factors, while internalizing and substance abuse did not. Service era was unrelated to reports of aggression. The constructs of internalizing versus externalizing dimensions of PTSD may have utility in identifying characteristics of combat veterans in the greatest need of treatment to help manage aggressive urges.

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PTSD; aggression; veterans; internalizing; externalizing

INTRODUCTION

Violence amongst service members returning from combat has been described since the beginning of recorded history (Shay, 1994; Tuchman, 1987), and research confirms that violence and aggression are significant concerns among contemporary combat veterans (Elbogen, Wagner, et al., 2010; Forbes & Bryant, 2013; Macmanus et al., 2013; Wright, Foran, Wood, Eckford, & McGurk, 2012). Several studies have documented high rates of aggression among Vietnam combat veterans with posttraumatic stress disorder (PTSD) (Beckham, Feldman, Kirby, Hertzberg, & Moore, 1997; Beckham, Moore, & Reynolds, 2000), and a recent study found that Vietnam veterans, their spouses, and clinicians identified problems with anger as the highest priority among several potential psychiatric concerns, including anxiety, depression, and alcohol problems (Biddle, Elliott, Creamer, Forbes, & Devilly, 2002). Concerns about aggression are common among Iraq and Afghanistan era veterans as well: a study of 1,397 U.S. Iraq era veterans suggested that as many as 67% reported threatening others or engaging in aggressive behavior within the past month (Wright et al., 2012). Further, veterans of these conflicts have high rates of PTSD (Hoge et al., 2004), and PTSD has been found to be robustly associated with anger (Calhoun et al., 2002; Crawford, Calhoun, Braxton, & Beckham, 2007), intimate partner violence (Byrne & Riggs, 1996; Jordan et al., 1992; Orcutt, King, & King, 2003; Taft, Street, Marshall, Dowdall, & Riggs, 2007; Taft, Watkins, Stafford, Street, & Monson, 2011), and general interpersonal violence (Beckham, Feldman, & Kirby, 1998; Begic & Jokic-Begic, 2001; Elbogen, Fuller, et al., 2010; Freeman & Roca, 2001; Hartl, Rosen, Drescher, Lee, & Gusman, 2005; Jakupcak et al., 2007; McFall, Fontana, Raskind, & Rosenheck, 1999; Taft, Vogt, Marshall, Panuzio, & Niles, 2007), particularly in military samples (Taft et al., 2011).

Despite consistent associations between PTSD, combat deployment, and aggression in veterans, the majority of veterans with PTSD are not violent. In a recent nationally representative sample of U.S. military veterans who served since September 11, 2001, 20% of those with probable PTSD at baseline reported having committed an act of severe violence within the past year, compared to 6.5% of those without PTSD (Sullivan & Elbogen, 2014). A similar study in the U.K. used national criminal records to identify risk factors for committing a violent offense amongst male military personnel deployed to Iraq or Afghanistan. Although the adjusted hazard ratio for violent offense among those with (vs. without) PTSD in this sample was 2.20, only 8.6% of service members with PTSD had been apprehended for a violent offense (Macmanus et al., 2013). Coupled with the high rate of comorbidity associated with PTSD (Bogenschutz & Nurnberg, 2000), these findings suggest that there may be considerable heterogeneity in the clinical presentation of veterans with PTSD, and that identifying those at greatest risk for violence may be critical to effectively tailoring treatment and allocating treatment resources.

Some researchers have suggested that examining the specific symptom profiles within PTSD may yield information regarding violence risk. Specifically, hyper-arousal symptoms of PTSD have often been found to be more predictive of aggression than avoidance or re-experiencing symptoms (Barrett, Mills, & Teesson, 2011; Elbogen, Fuller, et al., 2010; Macmanus et al., 2013; McFall et al., 1999; Taft et al., 2007), although the findings in this regard have been mixed and are often not straightforward (Hellmuth, Stappenbeck, Hoerster, & Jakupcak, 2012; Savarese, Suvak, King, & King, 2001).

Other researchers have suggested that some of the variability in the clinical presentation of PTSD may be explained by comorbid psychopathology or by personality variables (Forbes, Creamer, Hawthorne, Allen, & McHugh, 2003; Forbes, Elhai, Miller, & Creamer, 2010; Krueger, Caspi, & Moffitt, 2000; Markon, Krueger, Bouchard, & Gottesman, 2002; Miller, 2003; Miller & Resick, 2007; Miller et al., 2012). From this perspective, broad-based measures of psychopathology and personality may be useful in assessing comorbid psychiatric symptoms that explain variance in behavioral difficulties such as aggression among help-seeking patients with PTSD. Indeed, the use of broadband measures of psychopathology have been recommended as part of best practices in the assessment of PTSD to aid in the identification of comorbid psychiatric symptoms (Keane, Wolfe, & Taylor, 1987).

Given significant overlap between common forms of psychopathology, some have suggested that there may be “latent liability factors” (Krueger & Markon, 2006a) underlying frequently comorbid conditions (Krueger, Caspi, Moffitt, & Silva, 1998; Krueger & Markon, 2006a, b; Krueger, Markon, Patrick, & Iacono, 2005). One such model has posited the existence of overarching, distinct but correlated higher-order latent dimensions labeled internalizing and externalizing, that broadly shape the directionality of the expression of distress or pathology (Krueger et al., 2000; Krueger & Markon, 2006a, b). Empirical support has been found for the utility of a dimensional model of internalizing/externalizing psychopathology (Markon, 2010) in studies using both diagnostic interviews as well as multi-dimensional measures of psychopathology (Kendler, Davis, & Kessler, 1997; Krueger, 1999) with samples ranging from undergraduate students (Hopwood & Moser, 2011) to incarcerated offenders (Ruiz & Edens, 2008). In these studies, internalizing disorders share a tendency toward expressing distress inwardly and are manifested by depression and anxiety disorders, while the externalizing dimension is defined by a tendency to express psychopathology outwardly and is manifested by anti-social personality characteristics, substance abuse and problems with inhibition and impulsivity (Hopwood & Moser, 2011; Kendler et al., 1997; Krueger, 1999; Krueger et al., 1998; Ruiz & Edens, 2008).

A two-dimensional internalizing/externalizing model could provide a useful framework from which to examine the co-occurring psychiatric symptoms associated with PTSD. Indeed, given that PTSD is characterized by high rates of comorbidity (Brady, Killeen, Brewerton, & Lucerini, 2000), some have suggested that the disorder may be better conceptualized within a dimensional rather than categorical framework (Krueger & Markon, 2006a). Previous efforts to apply an internalizing/externalizing model of psychopathology to the presentation of patients with PTSD have most commonly utilized a categorical approach based on cluster analytic methods to identify subgroups of patients who are higher or lower

on internalizing or externalizing behavior (see, e.g., Forbes, Creamer, Allen, et al., 2003; Forbes et al., 2010; Miller, Greif, & Smith, 2003; Miller, Kaloupek, Dillon, & Keane, 2004; Miller & Resick, 2007). While these studies have supported the internalizing/externalizing distinction as a useful heuristic for studying the structure of posttraumatic psychopathology, they are limited by a reliance on cluster-analytic models which are not optimal for examining higher order factor structure of psychopathology thought to be dimensional (Miller, Fogler, Wolf, Kaloupek, & Keane, 2008).

Thus, the current study builds upon past research by examining the internalizing/externalizing structure of psychopathology displayed by veterans seeking help for PTSD. Psychopathology was assessed with the Personality Assessment Inventory (PAI), one of the most commonly administered objective measures of psychopathology and personality (Piotrowski, 2000). The PAI was designed to assess a broad range of pathological constructs (Morey, 1996), and previous studies have demonstrated support for a two-dimensional internalizing/externalizing model to organize PAI scales (Hopwood & Moser, 2011; Ruiz & Edens, 2008). We planned to examine the internal factor structure of psychopathology as measured by the PAI within a large sample of veterans seeking help for PTSD using both exploratory and confirmatory data analytic techniques. It was predicted that a two-dimensional model of internalizing and externalizing would provide the best representation of the distress exhibited by veterans seeking help for PTSD.

As an extension of previous work, we also planned to examine the incremental validity of higher-order latent PAI dimensions in the evaluation of aggression. Given the high rates of aggression and violence among combat veterans, identifying those veterans who have the most difficulty controlling violent behavior will be critical in facilitating their community reintegration. Using a broad measure of psychopathology to capture internalizing and externalizing dimensions may have utility in the assessment of violence, but such a measure would need to explain additional variance beyond information easily obtained within the assessment process (Hunsley & Meyer, 2003). Thus, we tested whether dimensional factors from the PAI would explain unique variance in violence beyond both PTSD symptom severity and demographic factors known to be related to aggression. It was predicted that the externalizing dimension from the PAI would be uniquely related to violence reports.

MATERIALS AND METHODS

Participants

The study sample was drawn from an archival dataset of 598 help-seeking veterans who were evaluated at an outpatient Veterans Affairs (VA) PTSD specialty clinic from 1999 to 2008. Patients were interviewed using the Clinician-Administered PTSD Scale (CAPS) (Blake et al., 1995) and completed the full PAI and other measures as part of their standard diagnostic evaluation over three consecutive clinic visits. IRB approval for use of these data for research purposes was obtained. Male veterans who served during Vietnam ($n = 433$) or in Iraq or Afghanistan ($n = 165$) were included in the analyses.

Vietnam veterans were older than Iraq/Afghanistan veterans (55.2 (4.1) years vs. 33.4 (9.3) years, respectively). Approximately half (47%) of the sample identified themselves as

Caucasian, and a significantly greater percentage of the Vietnam veterans than Afghanistan/Iraq veterans identified themselves as minorities ($\chi^2(1) = 8.5, P < .01$). Vietnam veterans and Iraq/Afghanistan veterans did not differ significantly on scores on the Combat Exposure Scale (CES) or the CAPS. Mean CES score (Keane et al., 1989) was 21.63 (10.51), which corresponds to a moderate level of combat exposure. CAPS scores were available for 564 of the participants; the mean score was 76.46 (23.08), corresponding to a severe level of PTSD symptomatology (Weathers, Keane, & Davidson, 2001). Vietnam veterans did not differ significantly from Iraq/Afghanistan veterans on either the scaled or the frequency aggression scores of the Violence Subscale of the Conflict Tactics Scale (CTS).

Measures

Violence Subscale of the Conflict Tactics Scale (CTS) (Straus, 1979)—The Violence subscale consists of 8 items of the CTS (Straus, 1979) that measure physical aggression including slapping, kicking, biting, hitting, beating up, threatening with a gun or knife, or using a gun or knife on someone. Participants were asked to rate these behaviors for occurrence in the past year on the following scale: 0 (never), 1 (once), 2 (twice), 3 (3–5 times), 4 (6–10 times), 5 (11–20 times), and 6 (more than 20 times). The measure was scored in two ways. To create the frequency score, the midpoints were assigned to each of the latter four categories and the items were summed. Following previous research using the this measure, including the National Vietnam Veterans Readjustment Study (Kulka et al., 1990), the frequency score was categorized on the following 5-point ascending scale: 1 (low) = 0 violent acts; 2 (medium–low) = 1–2; 3 (medium) = 3–5; 4 (medium–high) = 6–12, and 5 (high) greater than or equal to 13 (Jordan et al., 1992). The Violence subscale of the CTS has demonstrated coefficient α s ranging from .62 to .88, and the CTS has good evidence for its construct validity (Straus, 1979). The measure was found to be reliable in this sample (coefficient $\alpha = .95$).

Demographic information—Demographic information included age, race (minority/non-minority), socioeconomic status (SES) based on the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975), and service era (Vietnam vs. Iraq/Afghanistan).

The Combat Exposure Scale (CES) (Keane et al., 1989)—Combat exposure was measured with the CES, a well-validated 7-item scale measuring exposure to combat-related traumatic experiences such as, “Were you ever under enemy fire?” and “How often were you in danger of being injured or killed (e.g. pinned down, overrun, ambushed, near miss, etc.)?” Veterans rate each item according to a 5-point Likert scale with anchors such as “No/None/Never” (0) to “51+ times/76% or more/7 months or more” (4). This measure has been found to have sound psychometric properties including excellent stability and good internal consistency (coefficient $\alpha = .85$) (Keane et al., 1989). The coefficient α of this sample was .87.

Clinician-Administered PTSD Scale (CAPS) (Blake et al., 1995)—The CAPS is a structured clinical assessment of DSM-IV PTSD symptom frequency and intensity that was originally validated in veterans, but that has demonstrated strong reliability and validity across a wide range of populations and has become the “gold standard” for PTSD

assessment (Weathers et al., 2001). The CAPS has been shown to have excellent reliability (alphas ranging from .73 to .85 for the three symptom clusters) and excellent convergent and discriminant validity, and to be sensitive to clinical change (Weathers et al., 2001). Using the CAPS the clinician rates both the frequency and intensity of each DSM-IV PTSD symptoms on separate five-point (0–4) rating scales. For the frequency ratings, a score of 0 reflected “never/none/none of the time”, and a score of 4 reflected “daily or almost every day/most or all (more than 80%)/most or all of the time (more than 80%)”. For the intensity ratings, a score of 0 reflected “none”, and a score of 4 reflected “extreme/incapacitating/overwhelming”. The interview was administered to each participant by a licensed clinical psychologist or by a trainee under the direct supervision of a licensed clinical psychologist. Kappa rating among interviewers in the clinic was .94 across a series of 5 training tapes. A PTSD symptom was considered present on the CAPS based on a rule of frequency >1 and a severity >2 (Blake et al., 1995), which has been shown to have good diagnostic utility (Weathers et al., 2001). The coefficient alphas calculated for this sample were as follows: cluster B $\alpha = .85$; cluster C $\alpha = .86$; cluster D $\alpha = .80$.

Personality Assessment Inventory (PAI) (Morey, 1991)—The PAI is a 344-item self-administered, objective personality test that includes 4 validity scales, 11 clinical scales, 5 treatment consideration scales, and 2 interpersonal scales. The content of these scales is non-overlapping (Morey, 1991). Internal consistency has been established across samples, with α scores of the full scales ranging from .77 to .86 (Morey, 1996). The analyses presented here used the 11 clinical scales and the Aggression and Suicidal Ideation treatment scales. Valid profiles meeting the following criteria (Morey, 1991; Rogers, Sewell, Morey, & Ustad, 1996) were included in analyses: Infrequency scale $T \leq 75$; Inconsistency scale $T \leq 73$; Rogers Discriminant Function $T \leq 70$; and Positive Impression scale $T \leq 75$.

RESULTS

Following the precedent of other investigators (Ruiz & Edens, 2008), the 11 clinical scales of the PAI along with the Suicidal Ideation and Aggression scales were included for scale reduction. Consistent with other research (Hopwood & Moser, 2011), T -scores were calculated using the PAI census-matched standardization sample (Morey, 1991). The mean of the T -scores across the 13 scales was 66.86 ($SD = 7.02$). Scale means and intercorrelations are reported in Table I. Comparison of raw score standard deviations from the present sample with those from the standardization sample yielded no evidence of range restriction.

The sample was randomly divided into two even subsamples ($n = 299$) to validate results of exploratory analyses conducted on the first subsample by using confirmatory factor analyses on the second subsample. The subsamples were not significantly different with regard to age, $t(596) = -0.24$, $P = .81$, period of service, $\chi^2(1) = 0.08$, $P = .78$, number of minorities, $\chi^2(1) = 0.17$, $P = .68$, socioeconomic status, $t(593) = 0.63$, $P = .53$, combat exposure, $t(587) = -1.01$, $P = .31$, or mean PAI scale elevation, $t(596) = -0.02$, $P = .98$. Parallel analysis (Horn, 1965) was conducted using Kabacoff's (Kabakoff, 2003) SAS macro to determine the number of factors to extract. One thousand iterations were specified and the 95th-percentile estimate was used for significant loadings. This indicated a three-factor solution.

Variable clustering via PROC VARCLUS was used as a substitute for exploratory factor analysis. Variable clustering entails iteratively splitting clusters of variables into discrete subgroups that are highly correlated, thereby forming coherent scales (Pasta & Suhr, 2004). Because each cluster is derived from a different set of variables, they are typically not orthogonal (Liau, Tan, & Khoo, 2011). In fact, variable clustering is analogous to an oblique principal component analysis. The three-cluster solution suggested three scales that explained 65% of the variance. One scale appeared to reflect a tendency toward externalizing distress and included the following subscales: Mania, Antisocial Features, Aggression, Paranoia, and Borderline Features. A second scale appeared to reflect a tendency toward internalizing distress and included the following subscales: Depression, Anxiety, Anxiety-Related Disorders, Somatization, Schizophrenia, and Suicidal Ideation. The third scale reflected substance abuse and contained the Alcohol Problems and Drug Problems subscales. The externalizing and internalizing scales were most highly correlated among the three, $r = .61$, $P < .001$; however, the substance abuse scale was also correlated with both the internalizing ($r = .32$, $P < .001$) and externalizing ($r = .40$, $P < .001$) scales. Cluster loadings are presented in Table II. Four of the scales, Paranoia, Borderline, Schizophrenia, and Antisocial Features, demonstrated potential cross-loading.

Confirmatory factor analysis (CFA) was then used to validate the three-dimensional model in subsample 2 and compare it with a two-factor model in which alcohol and drug abuse items load on the externalizing factor. Models were specified in Mplus 7.0 using a robust maximum likelihood estimator to account for the non-normal distributions of the items. In each, factor intercorrelations were specified. Acceptable model fit was based on published recommendations (Hoyle, 1995; Hu & Bentler, 1999): comparative fit index (CFI) $.90$, root mean square error of approximation (RMSEA) $.05$, and standardized root mean residual (SRMR) $< .08$. To accommodate the non-normal data, the Satorra–Bentler scaled chi-square test of difference was used to compare nested models (Curran, West, & Finch, 1996). The initial three-factor model did not yield an acceptable fit, CFI = $.892$, RMSEA = $.108$ (90% confidence interval [CI] = $.11$ – $.13$), SRMR = $.062$, and $\chi^2(61) = 274.907$, $P < .01$, although it was superior to the two-factor model, $\chi^2(2) = 44.613$, $P < .001$. In a revised model, cross-loadings for the Borderline, Paranoia, Antisocial, and Schizophrenia scales were specified. In addition, the following error terms were correlated after examination of the standardized residual covariances: Mania with Depression, Schizophrenia with Paranoia, Antisocial with Mania, and Suicide with Anxiety-Related Disorders, Depression, and Mania. A chi-square test of difference indicated that the revised model was superior to the original model, $\chi^2(9) = 149.39$, $P < .001$, and provided an adequate fit, CFI = $.975$, RMSEA = $.057$ (90% CI = $.040$ – $.073$), SRMR = $.037$, and $\chi^2(52) = 101.661$, $P < .001$ (see Fig. 1).

To examine the incremental validity of the internalizing, externalizing, and substance abuse factors from the revised model, factor scores were calculated based on the regression weights of each of the items using the entire sample ($N = 598$). These were closely correlated with factor scores tallied from unweighted items (all r s = $.97$) but better reflected the latent structures that they represented. The three factor scores were then submitted to two regression models, one predicting scaled scores of aggression ($M = 3.13$, $SD = 1.64$) via ordinary least squares regression, the other aggression frequency ($M = 14.25$, $SD = 22.75$)

via negative binomial regression (see Tables IIIa and IIIb). In all analyses age, period of service, minority status, SES, combat exposure, and total CAPS score were controlled. SES was found to be significantly associated with both the aggression scaled score and the aggression frequency score. Minority status was significantly associated with the aggression frequency score but not with aggression scaled score. Neither internalizing nor substance abuse was uniquely associated with either aggression score, whereas externalizing was associated with both. PTSD severity as measured by the CAPS was significantly related to aggression measures. However, using Meng, Rosenthal, and Rubin's (1992) method for comparing correlated standardized regression coefficients, we found that the externalizing factor of the PAI was significantly more strongly associated with aggression than was the total CAPS score: scaled aggression score difference, $z = 7.279$, $P < .001$.

DISCUSSION

The purpose of this study was twofold: (1) To examine the higher-order factor structure of the PAI in a sample of U.S. military veterans seeking treatment for PTSD; and (2) To evaluate the incremental validity of the statistically derived factors in explaining reports of aggression beyond PTSD symptom severity and demographic factors. Consistent with previous work (Hopwood & Moser, 2011; Ruiz & Edens, 2008), we identified an *internalizing factor* that included the PAI depression, anxiety, anxiety-related disorders, somatization, schizophrenia, paranoia, and borderline features clinical scales and the suicidal ideation treatment scales; and an *externalizing factor* that included the PAI mania, antisocial features, paranoia, and borderline features clinical scales, and the aggression treatment scale. In contrast to previous studies (Hopwood & Moser, 2011; Ruiz & Edens, 2008) we also identified a separate *substance abuse factor* that included the PAI alcohol problems and drug problems scales (see Fig. 1). The factors scores were correlated, but only the externalizing factor was uniquely related to self-report of aggression over the past year. Though previous research has provided support for applying an internalizing/externalizing distinction to understanding heterogeneity in the presentation of patients with PTSD (Miller, 2003; Miller et al., 2003, 2004, 2008, 2012), to our knowledge this is the first report to (1) assess the internalizing/externalizing dimensions of posttraumatic stress and associated comorbidity as measured by the PAI and (2) demonstrate the incremental contribution of externalizing psychopathology in the measurement of aggressive behavior.

Consistent with previous research (Hopwood & Moser, 2011; Ruiz & Edens, 2008), the PAI Anxiety Related Disorders Scale which contains the Traumatic Stress subscale (i.e., Anxiety-Related Disorders Traumatic Experiences [ARD-T]) loaded on the internalizing dimension. This replicates previous findings that PTSD as a diagnostic category tends to load on an internalizing factor with other disorders associated with heightened negative affect such as depression (Miller et al., 2008).

The externalizing factor derived from the PAI scales demonstrated a significantly stronger association with aggression than did the total score on the Clinician Administered PTSD Scale (CAPS). Our findings support the need for the inclusion of broadband measures of psychopathology in the assessment context of PTSD. Administering measures such as the PAI can provide useful collateral qualitative and quantitative information to supplement

what has already been learned through structured clinical interviews for PTSD, as well as providing a framework within which clinicians can consider how their clinical impression of patients' personalities are likely to interact with PTSD to increase or decrease the general risk for aggression. As more formal risk assessment tools for violence are developed, symptoms associated with the broader constructs of internalizing and externalizing characteristics should be included to provide information beyond what is predicted by the diagnosis of PTSD alone.

Our findings may have implications for treatment as well. The greater variance explained by the externalizing factor than by CAPS score in our model of aggression suggests that veterans with PTSD and a tendency toward externalizing behaviors might benefit from supplementary treatment that specifically targets problems with behavioral disinhibition. Currently available empirically supported treatments for PTSD such as Prolonged Exposure Therapy (PE) and Cognitive Processing Therapy (CPT) were developed as extensions of treatments for anxiety and depression, and these approaches have been demonstrated to be particularly effective in addressing the characteristically internalizing symptoms associated with PTSD such as avoidance, numbing, anxiety, and depression (Foa, Steketee, & Rothbaum, 1989). Yet high levels of pre-treatment externalizing problems have been found to predict poorer outcomes in PE and CPT (Chemtob, Novaco, Hamada, & Gross, 1997; Foa, Riggs, Massie, & Yarczower, 1995; Forbes et al., 2003b; Rizvi, Vogt, & Resick, 2009), and there is little data to suggest that either of these approaches specifically reduce externalizing symptoms such as anger and aggression (Resick et al., 2008; Turner, Beidel, & Frueh, 2005). As such, identifying those veterans with PTSD and high levels of externalizing may allow for treatment focusing on developing skills to improve deficits in regulation of physiological, emotional, and behavioral hyper-arousal.

Our identification of a distinct third substance abuse factor within this sample of veterans with PTSD was unexpected and may have clinical and theoretical implications. In subtype models of PTSD, substance abuse has typically been conceptualized as characteristic of the externalizing subtype (Miller et al., 2003, 2008), and previous studies forcing a two-factor model of broad adult psychopathology have found alcohol and drug problems to be associated with the externalizing factor (Hopwood & Moser, 2011; Ruiz & Edens, 2008). Yet, substance abuse is common among individuals with PTSD (Jacobsen, Southwick, & Kosten, 2001) as well as among those suffering from characteristically "internalizing" disorders such as depression and anxiety (Coyne, Fechner-Bates, & Schwenk, 1994; Najt, Fusar-Poli, & Brambilla, 2011). A recent examination of the latent structure of comorbidity in combat veterans identified substance-related disorders as cross-loading on both the externalizing and internalizing dimensions (Miller et al., 2008). An alternative formulation to identifying substance abuse as an exclusive manifestation of "externalizing" psychopathology might be to consider it a reflection of the severity of psychopathology, with the patterns of symptom expression in comorbid PTSD and substance abuse varying with individual differences in externalizing behavior and inhibitory control. From this perspective, an individual with PTSD who demonstrates high levels of externalizing might be expected to misuse substances in the context of impulsive, reckless, and self-destructive behavior, whereas someone with a greater tendency toward internalizing may be more likely to engage in substance abuse predominately as part of an overall pattern of avoidance. In

terms of violence risk, therefore, substance abuse may be expected to affect the likelihood of aggression in an individual with PTSD consistent with his or her overall tendency toward behavioral disinhibition and externalizing distress.

The above formulation is consistent with the results of a seminal study by Savarese et al. (2001) which found that alcohol differentially increased or diminished the association between PTSD symptoms and spousal physical aggression in veterans depending upon the individual's pattern of drinking. In a sample of 376 male Vietnam combat veterans and their spouses, a direct, positive association was observed between PTSD hyperarousal cluster symptoms and spousal abuse. Consistent with an anticipated disinhibitory effect of alcohol on aggression, veterans with a tendency to binge drink (i.e., to consume high volumes of alcohol on a single occasion) were at a higher risk for perpetrating spousal physical abuse than those who did not binge drink, and the incidence of abuse among this subgroup increased with the severity of hyperarousal symptoms. Yet among veterans with PTSD who regularly used alcohol but who did *not* binge drink, the opposite pattern emerged. Among these frequent, low volume drinkers, no association existed between hyperarousal cluster symptoms and spousal violence, such that alcohol use seemed to *diminish* the association between hyperarousal symptoms of PTSD and aggression in this group. Thus, in this sample of Vietnam combat veterans, it appears that alcohol use functioned as a third, separate liability factor that interacted with negative affect and inhibitory control to affect the behavioral outcome of spousal violence (Savarese et al., 2001). When considered with our findings, these results support the need for integrated treatment of substance abuse and PTSD to most effectively address important behavioral outcomes such as aggression.

The results of this study must be considered in light of several limitations. First, while all three fit indices (CFI, SRMR, and RMSEA confidence interval) were in the acceptable range, the chi-square remained significant and the RMSEA confidence interval straddled 0.05. Because the RMSEA confidence interval straddled 0.05, we could not conclusively reject the hypothesis that the model *was not* a close fit, nor could we reject the hypothesis that the model *was* a close fit (i.e., MacCallum, Brown, & Sugawara, 1996). However, the observation that scores on the externalizing factor predicted 65% of the variance in aggression scores provides some additional external validity for the overall adequacy of the model.

Second our sample consisted of veterans seeking help for PTSD and thus cannot be generalized to other trauma exposed and PTSD samples. While Vietnam and Afghanistan/Iraq era veterans were not found to differ on combat exposure, PTSD symptom severity, or aggression, the tendency for Vietnam veterans to score higher on both the internalizing and the substance abuse factors suggests that important differences may exist between the cohorts. Third, the current sample was comprised exclusively of male veterans. Thus, we could not investigate the factorial invariance of the internalizing, externalizing, and substance abuse factors between genders. Interestingly, PTSD is associated with aggression in both males and female veterans, but that the targets of the aggressive behavior may differ (Dutra, de Blank, Scheiderer, & Taft, 2012; Kirby et al., 2012; Sullivan & Elbogen, 2014). Fourth, given that we reduced data from PAI profiles to underlying dimensional factors following the approach of Ruiz and Edens (2008) our results are not directly comparable to

other studies that have used cluster-analytic methods to classify participants as belonging to either an “internalizing,” “externalizing,” or “low pathology” subtypes of PTSD (e.g., Forbes, Creamer, Allen, et al., 2003; Miller et al., 2004; Miller & Resick, 2007). It would be helpful in future research to compare the utility of these approaches as they relate to relevant outcomes among individuals with PTSD. Finally, in future research collateral reports of aggression would strengthen the veracity of the current findings.

As the wars in Iraq and Afghanistan have come to a close, service members separating from the military are increasingly facing challenges reintegrating to the community. One of these challenges is overcoming problems with anger, aggression, and violence, especially among those suffering with PTSD. The current study adds to the knowledge base that can assist mental health professionals assess and manage risk in veterans. Dimensional externalizing factor scores derived from the PAI demonstrated significant incremental validity in explaining reports of violence beyond PTSD symptom severity and known demographic risk factors including socioeconomic status. Future longitudinal research should examine the predictive validity of internalizing/externalizing dimensions in the assessment of violence risk.

References

- Barrett EL, Mills KL, Teesson M. Hurt people who hurt people: Violence amongst individuals with comorbid substance use disorder and post traumatic stress disorder. *Addictive Behavior*. 2011; 36:721–728. S0306-4603(11)00076-1.
- Beckham JC, Feldman ME, Kirby AC. Atrocities exposure in Vietnam combat veterans with chronic posttraumatic stress disorder: Relationship to combat exposure, symptom severity, guilt, and interpersonal violence. *Journal of Traumatic Stress*. 1998; 11:777–785. doi:0.1023/A:1024453618638.
- Beckham JC, Feldman ME, Kirby AC, Hertzberg MA, Moore SD. Interpersonal violence and its correlates in Vietnam veterans with chronic posttraumatic stress disorder. *Journal of Clinical Psychology*. 1997; 53:859–869.10.1002/(SICI)1097-679(199712)53:8<859::AID-JCLP11>3.0.CO;2-J [PubMed: 9403389]
- Beckham JC, Moore SD, Reynolds V. Interpersonal hostility and violence in Vietnam combat veterans with chronic posttraumatic stress disorder: A review of theoretical models and empirical evidence. *Aggression and Violent Behavior*. 2000; 5:451–466.
- Begic D, Jokic-Begic N. Aggressive behavior in combat veterans with post-traumatic stress disorder. *Military Medicine*. 2001; 166:671–676. [PubMed: 11515314]
- Biddle D, Elliott P, Creamer M, Forbes D, Devilly GJ. Self-reported problems: A comparison between PTSD-diagnosed veterans, their spouses, and clinicians. *Behaviour Research and Therapy*. 2002; 40:853–865. [PubMed: 12074378]
- Blake DD, Weathers FW, Nagy LM, Kaloupek DG, Gusman FD, Charney DS, Keane TM. The development of a Clinician-Administered PTSD Scale. *Journal of Traumatic Stress*. 1995; 8:75–90. [PubMed: 7712061]
- Bogenschutz MP, Nurnberg HG. Theoretical and methodological issues in psychiatric comorbidity. *Harvard Review of Psychiatry*. 2000; 8:18–24. [PubMed: 10824294]
- Brady KT, Killeen TK, Brewerton T, Lucerini S. Comorbidity of psychiatric disorders and posttraumatic stress disorder. *Journal of Clinical Psychiatry*. 2000; 61(Suppl 7):22–32. [PubMed: 10795606]
- Byrne CA, Riggs DS. The cycle of trauma; relationship aggression in male Vietnam veterans with symptoms of posttraumatic stress disorder. *Violence and Victims*. 1996; 11:213–225. [PubMed: 9125790]

- Calhoun PS, Beckham JC, Feldman ME, Barefoot JC, Haney T, Bosworth HB. Partners' ratings of combat veterans' anger. *Journal of Traumatic Stress*. 2002; 15:133–136.10.1023/A:1014808008142 [PubMed: 12013064]
- Chemtob CM, Novaco RW, Hamada RS, Gross DM. Cognitive-behavioral treatment for severe anger in posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*. 1997; 65:184–189. [PubMed: 9103748]
- Coyne JC, Fechner-Bates S, Schwenk TL. Prevalence, nature, and comorbidity of depressive disorders in primary care. *General Hospital Psychiatry*. 1994; 16:267–276. [PubMed: 7926703]
- Crawford EF, Calhoun PS, Braxton LE, Beckham JC. Validity of the Personality Assessment Inventory Aggression scales and Violence Potential index in veterans with PTSD. *Journal of Personality Assessment*. 2007; 88:90–98.10.1080/00223890709336839
- Curran PJ, West SG, Finch JF. The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*. 1996; 1:16–29.
- Dutra L, de Blank G, Scheiderer E, Taft C. Correlates of female veterans' perpetration of relationship aggression. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2012; 4:323–329.10.1037/a0026849
- Elbogen EB, Fuller S, Johnson SC, Brooks S, Kinneer P, Calhoun PS, Beckham JC. Improving risk assessment of violence among military veterans: An evidence-based approach for clinical decision-making. *Clinical Psychology Review*. 2010; 30:595–607. S0272-7358(10)00049-8. [PubMed: 20627387]
- Elbogen EB, Wagner HR, Fuller SR, Calhoun PS, Kinneer PM, Beckham JC. Correlates of anger and hostility in Iraq and Afghanistan war veterans. *American Journal of Psychiatry*. 2010; 167:1051–1058. appi.ajp.2010.09050739. [PubMed: 20551162]
- Foa EB, Riggs DS, Massie ED, Yarczower M. The impact of fear activation and anger on the efficacy of exposure treatment for posttraumatic stress disorder. *Behavior Therapy*. 1995; 26:487–499.
- Foa EB, Steketee GS, Rothbaum B. Behavioral/cognitive conceptualizations of posttraumatic stress disorder. *Behavior Therapy*. 1989; 20:155–176.
- Forbes D, Bryant RA. When the violence of war comes home. *Lancet*. 2013; 381:883–884.10.1016/S0140-6736(13)60635-2S0140-6736(13)60635-2 [PubMed: 23499029]
- Forbes D, Creamer M, Allen N, Elliott P, McHugh T, Debenham P, Hopwood M. MMPI-2 based subgroups of veterans with combat-related PTSD: Differential patterns of symptom change after treatment. *Journal of Nervous and Mental Disease*. 2003; 191:531–537.10.1097/01.nmd.0000082181.79051.83 [PubMed: 12972856]
- Forbes D, Creamer M, Hawthorne G, Allen N, McHugh T. Comorbidity as a predictor of symptom change after treatment in combat-related posttraumatic stress disorder. *Journal of Nervous and Mental Diseases*. 2003; 191:93–99.10.1097/01.NMD.0000051903.60517.98
- Forbes D, Elhai JD, Miller MW, Creamer M. Internalizing and externalizing classes in posttraumatic stress disorder: A latent class analysis. *Journal of Traumatic Stress*. 2010; 23:340–349.10.1002/jts.20526 [PubMed: 20564366]
- Freeman TW, Roca V. Gun use, attitudes toward violence, and aggression among combat veterans with chronic posttraumatic stress disorder. *Journal of Nervous and Mental Disease*. 2001; 189:317–320. [PubMed: 11379976]
- Hartl TL, Rosen C, Drescher K, Lee TT, Gusman F. Predicting high-risk behaviors in veterans with posttraumatic stress disorder. *Journal of Nervous and Mental Disease*. 2005; 193:464–472. 00005053-200507000-00006. [PubMed: 15985841]
- Hellmuth JC, Stappenbeck CA, Hoerster KD, Jakupcak M. Modeling PTSD symptom clusters, alcohol misuse, anger, and depression as they relate to aggression and suicidality in returning U.S. veterans. *Journal of Traumatic Stress*. 2012; 25:527–534.10.1002/jts.21732 [PubMed: 23073972]
- Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine*. 2004; 351:13–22.10.1056/NEJMoa040603351/1/13 [PubMed: 15229303]
- Hollingshead, AB. Four factor index of social status. New Haven, CT: Yale University; 1975.

- Hopwood CJ, Moser JS. Personality assessment inventory internalizing and externalizing structure in college students: Invariance across sex and ethnicity. *Personality and Individual Differences*. 2011; 50:116–119.
- Horn JL. A rationale and test for the number of factors in factor analysis. *Psychometrika*. 1965; 30:179–185. [PubMed: 14306381]
- Hoyle, RH., editor. *Structural equation modeling: Concepts, issues, and applications*. Thousand Oaks, CA: Sage Publications, Inc; 1995.
- Hu LT, Bentler PM. Cut-off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. 1999; 6:1–55.
- Hunsley J, Meyer GJ. The incremental validity of psychological testing and assessment: Conceptual, methodological, and statistical issues. *Psychological Assessment*. 2003; 15:446–455.10.1037/1040-3590.15.4.4462003-10462-002 [PubMed: 14692841]
- Jacobsen LK, Southwick SM, Kosten TR. Substance use disorders in patients with posttraumatic stress disorder: A review of the literature. *American Journal of Psychiatry*. 2001; 158:1184–1190. [PubMed: 11481147]
- Jakupcak M, Conybeare D, Phelps L, Hunt S, Holmes HA, Felker B, McFall ME. Anger, hostility, and aggression among Iraq and Afghanistan War veterans reporting PTSD and subthreshold PTSD. *Journal of Traumatic Stress*. 2007; 20:945–954.10.1002/jts.20258
- Jordan BK, Marmar CR, Fairbank JA, Schlenger WE, Kulka RA, Hough RL, Weiss DS. Problems in families of male Vietnam veterans with posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*. 1992; 60:916–926. [PubMed: 1460153]
- Kabakoff, RI. Determining the dimensionality of data: A SAS macro for parallel analysis. Paper presented at the 28th Annual SAS Users Group International Conference; Seattle, Washington. 2003.
- Keane TM, Wolfe J, Taylor KL. Posttraumatic stress disorder: Evidence for diagnostic validity and methods of psychological assessment. *Journal of Clinical Psychology*. 1987; 43:32–43. [PubMed: 3558840]
- Keane TM, Fairbank JA, Caddell JM, Zimering RT, Taylor KL, Mora CA. Clinical evaluation of a measure to assess combat exposure. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*. 1989; 1:53–55.
- Kendler KS, Davis CG, Kessler RC. The familial aggregation of common psychiatric and substance use disorders in the National Comorbidity Survey: A family history study. *British Journal of Psychiatry*. 1997; 170:541–548. [PubMed: 9330021]
- Kirby AC, Beckham JC, Calhoun PS, Roberts ST, Taft CT, Elbogen EB, Dennis MF. An examination of general aggression and intimate partner violence in women with posttraumatic stress disorder. *Violence and Victims*. 2012; 27:777–792. [PubMed: 23155726]
- Krueger RF. The structure of common mental disorders. *Archives of General Psychiatry*. 1999; 56:921–926. [PubMed: 10530634]
- Krueger RF, Caspi A, Moffitt TE. Epidemiological personology: The unifying role of personality in population-based research on problem behaviors. *Journal of Personality*. 2000; 68:967–998. [PubMed: 11130741]
- Krueger RF, Caspi A, Moffitt TE, Silva PA. The structure and stability of common mental disorders (DSM-III-R): A longitudinal-epidemiological study. *Journal of Abnormal Psychology*. 1998; 107:216–227. [PubMed: 9604551]
- Krueger RF, Markon KE. Reinterpreting comorbidity: A model-based approach to understanding and classifying psychopathology. *Annual Review of Clinical Psychology*. 2006a; 2:111–133.10.1146/annurev.clinpsy.2.022305.095213
- Krueger RF, Markon KE. Understanding psychopathology: Melding behavior genetics, personality, and quantitative psychology to develop an empirically based model. *Current Directions in Psychological Science*. 2006b; 15:113–117.
- Krueger RF, Markon KE, Patrick CJ, Iacono WG. Externalizing psychopathology in adulthood: A dimensional-spectrum conceptualization and its implications for DSM-V. *Journal of Abnormal Psychology*. 2005; 114:537–550. 2005-15138-005. [PubMed: 16351376]

- Kulka, R.; Schlenger, W.; Fairbank, J.; Hough, R.; Jordan, B.; Marmar, CR.; Weiss, DS. Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study. New York: Routledge; 1990.
- Liau, A.; Tan, TK.; Khoo, A. Scale measurement: Comparing factor analysis and variable clustering. Paper presented at the SAS Global Forum; Las Vegas, NV. 2011.
- MacCallum RC, Browne MW, Sugawara HM. Power analysis and determination of sample size for covariance structural modeling. *Psychological Methods*. 1996; 1:130–149.
- Macmanus D, Dean K, Jones M, Rona RJ, Greenberg N, Hull L, Fear NT. Violent offending by UK military personnel deployed to Iraq and Afghanistan: A data linkage cohort study. *Lancet*. 2013; 381:907–917.10.1016/S0140-6736(13)60354-2S0140-6736(13)60354-2 [PubMed: 23499041]
- Markon KE. Modeling psychopathology structure: A symptom-level analysis of Axis I and II disorders. *Psychological Medicine*. 2010; 40:273–288.10.1017/S0033291709990183 [PubMed: 19515267]
- Markon KE, Krueger RF, Bouchard TJ Jr, Gottesman II. Normal and abnormal personality traits: Evidence for genetic and environmental relationships in the Minnesota Study of Twins Reared Apart. *Journal of Personality*. 2002; 70:661–693. [PubMed: 12322856]
- McFall M, Fontana A, Raskind M, Rosenheck R. Analysis of violent behavior in Vietnam combat veteran psychiatric inpatients with posttraumatic stress disorder. *Journal of Traumatic Stress*. 1999; 12:501–517.10.1023/A:1024771121189 [PubMed: 10467558]
- Meng X, Rosenthal R, Rubin DB. Comparing correlated correlation coefficients. *Psychological Bulletin*. 1992; 111:172–175.
- Miller MW. Personality and the etiology and expression of PTSD: A three-factor model perspective. *Clinical Psychology: Science and Practice*. 2003; 10(N4):373–393.
- Miller MW, Fogler JM, Wolf EJ, Kaloupek DG, Keane TM. The internalizing and externalizing structure of psychiatric comorbidity in combat veterans. *Journal of Traumatic Stress*. 2008; 21:58–65.10.1002/jts.20303 [PubMed: 18302181]
- Miller MW, Greif JL, Smith AA. Multidimensional Personality Questionnaire profiles of veterans with traumatic combat exposure: Externalizing and internalizing subtypes. *Psychological Assessment*. 2003; 15:205–215. [PubMed: 12847781]
- Miller MW, Kaloupek DG, Dillon AL, Keane TM. Externalizing and internalizing subtypes of combat-related PTSD: A replication and extension using the PSY-5 scales. *Journal of Abnormal Psychology*. 2004; 113:636–645. 2004-20178-014. [PubMed: 15535795]
- Miller MW, Resick PA. Internalizing and externalizing subtypes in female sexual assault survivors: Implications for the understanding of complex PTSD. *Behavior Therapy*. 2007; 38:58–71. S0005-7894(06)00069-4. [PubMed: 17292695]
- Miller MW, Wolf EJ, Reardon A, Greene A, Ofra S, McInerney S. Personality and the latent structure of PTSD comorbidity. *Journal of Anxiety Disorders*. 2012; 26:599–607.10.1016/j.janx-dis.2012.02.016S0887-6185(12)00046-1 [PubMed: 22480716]
- Morey, LC. The Personality Assessment Inventory professional manual. Odessa, FL: Psychological Assessment Resources; 1991.
- Morey, LC. An interpretive guide to the Personality Assessment Inventory. Odessa, FL: Psychological Assessment Resources; 1996.
- Najt P, Fusar-Poli P, Brambilla P. Co-occurring mental and substance abuse disorders: A review on the potential predictors and clinical outcomes. *Psychiatry Research*. 2011; 186:159–164.10.1016/j.psychres.2010.07.042S0165-1781(10)00474-9 [PubMed: 20728943]
- Orcutt HK, King LA, King DW. Male-perpetrated violence among Vietnam veteran couples: Relationships with veteran's early life characteristics, trauma history, and PTSD symptomatology. *Journal of Traumatic Stress*. 2003; 16:381–390.10.1023/A:1024470103325 [PubMed: 12895021]
- Pasta, DJ.; Suhr, D. Paper 205–29 Creating scales from questionnaires: PROC VARCLUS vs. factor analysis. Paper presented at the Proceedings of the Twenty-Ninth Annual SAS Users Group International Conference; Cary, NC. 2004.
- Piotrowski C. How popular is the Personality Assessment Inventory in practice and training? *Psychological Reports*. 2000; 86:65–66. [PubMed: 10778250]

- Resick PA, Galovski TE, O'Brien Uhlmansiek M, Scher CD, Clum GA, Young-Xu Y. A randomized clinical trial to dismantle components of cognitive processing therapy for posttraumatic stress disorder in female victims of interpersonal violence. *Journal of Consulting and Clinical Psychology*. 2008; 76:243–258. 2008-03290-007. [PubMed: 18377121]
- Rizvi SL, Vogt DS, Resick PA. Cognitive and affective predictors of treatment outcome in Cognitive Processing Therapy and Prolonged Exposure for posttraumatic stress disorder. *Behaviour Research and Therapy*. 2009; 47:737–743.10.1016/j.brat.2009.06.003S0005-7967(09)00137-5 [PubMed: 19595295]
- Rogers R, Sewell KW, Morey LC, Ustad KL. Detection of feigned mental disorders on the personality assessment inventory: A discriminant analysis. *Journal of Personality Assessment*. 1996; 67:629–640.10.1207/s15327752jpa6703_15 [PubMed: 8938398]
- Ruiz MA, Edens JF. Recovery and replication of internalizing and externalizing dimensions within the personality assessment inventory. *Journal of Personality Assessment*. 2008; 90:585–592.10.1080/00223890802388574904261576 [PubMed: 18925500]
- Savarese VW, Suvak MK, King LA, King DW. Relationships among alcohol use, hyperarousal, and marital abuse and violence in Vietnam veterans. *Journal of Traumatic Stress*. 2001; 14(4):717–732.10.1023/A:1013038021175 [PubMed: 11776419]
- Shay, J. *Achilles in Vietnam: Combat trauma and the undoing of character*. New York: Simon and Schuster; 1994.
- Straus M. Measuring intrafamily conflict and violence: The Conflict Tactics Scales. *Journal of Marriage and the Family*. 1979; 41:75–88.
- Sullivan CP, Elbogen EB. PTSD symptoms and family versus stranger violence in Iraq and Afghanistan veterans. *Law and Human Behavior*. 2014; 38:1–9. 2013-15101-001. [PubMed: 23646917]
- Taft C, Kaloupek D, Schumm J, Marshall A, Panuzio J, King D, Keane T. Posttraumatic stress disorder symptoms, physiological reactivity, alcohol problems, and aggression among military veterans. *Journal of Abnormal Psychology*. 2007; 116:498–507. 2007-11737-007. [PubMed: 17696706]
- Taft C, Street AE, Marshall AD, Dowdall DJ, Riggs DS. Posttraumatic stress disorder, anger, and partner abuse among Vietnam combat veterans. *Journal of Family Psychology*. 2007; 21:270–277. 2007-09250-014. [PubMed: 17605549]
- Taft C, Vogt DS, Marshall AD, Panuzio J, Niles BL. Aggression among combat veterans: Relationships with combat exposure and symptoms of posttraumatic stress disorder, dysphoria, and anxiety. *Journal of Traumatic Stress*. 2007; 20:135–145.10.1002/jts.20197 [PubMed: 17427912]
- Taft C, Watkins LE, Stafford J, Street AE, Monson CM. Posttraumatic stress disorder and intimate relationship problems: A meta-analysis. *Journal of Consulting and Clinical Psychology*. 2011; 79(1):22–33. 2011-01388-003.
- Tuchman, B. *A distant mirror: The calamitous 14th century*. New York: Random House Publishing Group; 1987.
- Turner SM, Beidel DC, Frueh BC. Multicomponent behavioral treatment for chronic combat-related posttraumatic stress disorder: Trauma management therapy. *Behavior Modification*. 2005; 29:39–69.10.1016/j.janxdis.2010.09.006 [PubMed: 15557478]
- Weathers FW, Keane TM, Davidson JR. Clinician-administered PTSD scale: A review of the first ten years of research. *Depression and Anxiety*. 2001; 13:132–156.10.1002/da.1029 [PubMed: 11387733]
- Wright KM, Foran HM, Wood MD, Eckford RD, McGurk D. Alcohol problems, aggression, and other externalizing behaviors after return from deployment: Understanding the role of combat exposure, internalizing symptoms, and social environment. *Journal of Clinical Psychology*. 2012; 68:782–800.10.1002/jclp.21864 [PubMed: 22573513]

Fig. 1. Standardized parameter estimates with the total sample ($N = 598$). SOM, somatization; ANX, anxiety; ARD, anxiety-related disorders; DEP, depression; MAN, mania; PAR, paranoia; SCZ, schizophrenia; BOR, borderline features; ANT, antisocial features; ALC, alcohol problems; DRG, drug problems; AGG, aggression; SUI, suicidal ideation.

TABLE I

Intercorrelations and Descriptive Statistics of PAI Scales

PAI Scale	SOM	ANX	ARD	DEP	SCZ	SUI	PAR	ANT	AGG	BOR	MAN	DRG	ALC
SOM	—												
ANX	.58	—											
ARD	.48	.73	—										
DEP	.49	.74	.66	—									
SCZ	.39	.70	.64	.75	—								
SUI	.27	.42	.41	.62	.49	—							
PAR	.33	.53	.43	.55	.65	.41	—						
ANT	.10 [†]	.23	.20 ^{**}	.25	.40	.35	.47	—					
AGG	.18 ^{**}	.44	.40	.38	.47	.34	.50	.51	—				
BOR	.38	.70	.62	.69	.71	.52	.68	.56	.67	—			
MAN	.16 ^{**}	.28	.33	.12 [*]	.30	.16 [*]	.40	.52	.40	.45	—		
DRG	.13 [*]	.13 [*]	.13 [*]	.19 ^{**}	.18 [*]	.20 ^{**}	.12 [*]	.25	.09 (ns)	.24	-.00 (ns)	—	
ALC	.17 ^{**}	.25	.16 ^{**}	.23	.21 ^{**}	.24	.15 [†]	.23	.24	.28	.07 (ns)	.47	—
<i>M</i>	71.66	71.36	73.99	79.02	74.14	62.43	67.99	59.79	65.28	68.07	55.83	58.98	60.66
<i>SD</i>	14.09	12.93	12.55	14.43	15.41	17.96	13.86	11.33	14.02	11.44	10.39	13.91	16.84

Note. SOM, somatization; ANX, anxiety; ARD, anxiety-related disorders; DEP, depression; MAN, mania; PAR, paranoia; SCZ, schizophrenia; BOR, borderline features; ANT, antisocial features; ALC, alcohol problems; DRG, drug problems; AGG, aggression; SUI, suicidal ideation.

[†] $P < .10$,

* $P < .05$,

** $P < .01$ (all correlations not marked were significant at $P < .0001$).

TABLE II

Cluster Loadings Derived From Correlations Between PAI Scales and Clusters in Subsample 2

PAI Scale	Internalizing	Externalizing	Subst. Abuse
Somatization	.65	.30	.18
Anxiety	.88	.57	.22
Anxiety-related disorders	.85	.16	.52
Depression	.90	.52	.24
Schizophrenia	.84	.65	.23
Suicidal ideation	.65	.46	.26
Paranoia	.62	.75	.16
Antisocial features	.32	.78	.28
Aggression	.47	.79	.19
Borderline	.77	.87	.30
Mania	.29	.69	.03
Drug abuse	.20	.18	.86
Alcohol abuse	.26	.25	.86

Cluster loadings in bold reflect PAI scales that were identified as loading most heavily on each respective factor.

Table IIIA

Regression Model of Scaled Aggression

	Coeff. (SE)	β
Intercept	1.99** (0.72)	—
Internalizing	−0.18 (0.10)	−.11
Externalizing	0.81** (0.09)	.50
Substance abuse	−0.03 (0.07)	−.02
Age	−0.01 (0.01)	−.09
POS (OEF/OIF vs. Vietnam)	−0.34 (0.26)	−.09
Minority status	0.18 (0.12)	.05
SES	0.01** (0.01)	.10
Combat exposure	0.00 (0.01)	.00
CAPS total	0.01** (0.00)	.17

Note. POS, period of service.

**
 $P < .01$.

Table IIIB

Negative Binomial Model of Frequency of Aggression

	Coeff. (SE)	Est. Effect
Intercept	1.71 * (0.80)	5.54
Internalizing	−0.04 (0.11)	0.96
Externalizing	0.65 ** (0.10)	1.91
Substance abuse	0.05 (0.08)	1.05
Age	−0.02 [†] (0.01)	0.98
POS (OEF/OIF vs. Vietnam)	−0.52 [†] (0.27)	0.60
Minority status	0.34 ** (0.13)	1.41
SES	0.01 * (0.01)	1.01
Combat exposure	0.00 (0.01)	1.00
CAPS total	0.01 ** (0.00)	1.01
Scale	2.07 ** (0.14)	—

Note. Estimated effects were calculated by exponentiating the model coefficients. These represent the multiplicative effect of a 1-unit change in the independent variable on the number of aggressive acts reported.

[†] $P < .10$,

* $P < .05$,

** $P < .01$.