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## Alcohol and Drug Abuse Among U.S. Veterans: Comparing Associations with Intimate Partner Substance Abuse and Veteran Psychopathology

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### Abstract

This study examined the relative influences of PTSD, other psychopathology, and intimate partner alcohol and drug use on substance-related problems in U.S. veterans (242 couples,  $N = 484$ ). Hierarchical regression analyses revealed that partner alcohol and drug use severity explained more variance in veteran alcohol use and drug use (20% and 13%, respectively) than did veteran PTSD, adult antisocial behavior, or depression symptoms combined (6% for veteran alcohol use; 7% for veteran drug use). Findings shed new light on the influence of relationship factors on veteran alcohol and drug use and underscore the importance of couples-oriented approaches to treating veterans with comorbid PTSD and substance abuse.

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Research on alcohol and drug use among veterans has focused largely on the roles of trauma exposure, posttraumatic stress disorder (PTSD), and other psychopathology in the etiology and maintenance of these problems. Another line of research in the field of couples and family psychology has emphasized the importance of relationship variables in substance-related problems. The objective of this study was to attempt to integrate these historically independent lines of research by examining the relative strengths of association between PTSD, comorbid psychopathology, partner drug and partner alcohol abuse and substance-related problems among U.S. military veterans.

Psychiatric epidemiology studies have repeatedly found higher rates of substance-related disorders among veterans compared to the general population (Kulka et al., 1990; Eisen et al., 2004; Thomas, Wilk, Riviere, McGurk, Castro, & Hoge, 2010). Trauma exposure and PTSD have been identified as significant contributors to these problems and evidence suggests that when PTSD and substance-related disorders co-occur, PTSD usually predates the onset of the substance abuse (Kessler, 2000; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Najavits, Weiss, & Shaw, 1999). PTSD severity has been found to be positively correlated with substance use severity (McFall, Mackay, & Donovan, 1992; Stewart, Conrod, Pihl, & Dongier, 1999; Brown, Stout, Gannon-Rowley, 1998) and veterans diagnosed with PTSD have been estimated to be over twice as likely to abuse alcohol compared to veterans without the disorder (Jakupcak, Tull, McDermott, Kaysen, Hunt, & Simpson, 2010). Conversely, high rates of PTSD have been observed in samples of veterans

with alcohol and/or drug abuse diagnoses (e.g., Seal, Cohen, Waldrop, Cohen, Maguen, & Ren, 2011).

PTSD is not unique, however, in conferring risk for substance-related disorders. To the contrary, studies have identified links between drug and alcohol abuse and a wide range of mood and anxiety disorders (e.g., Conway, Compton, Stinson, & Grant, 2006; Wolitzky-Taylor, Bobova, Zinbarg, Mineka, & Craske, 2012). Antisocial personality disorder (ASPD) and other traits of the externalizing spectrum (Krueger, Markon, Patrick, Benning, & Kramer, 2007) also frequently co-occur with substance-related disorders and accumulating evidence suggests that differential patterns of association may exist between drug versus alcohol abuse and other classes of psychiatric comorbidity. Specifically, alcohol abuse and dependence has been linked to a wide array of comorbidities spanning both the internalizing (i.e., the anxiety and unipolar mood disorders; e.g., Cloninger, 1987; Hussong, Jones, Stein, Baucom, & Boeding, 2011) and externalizing spectra (e.g., Krueger et al., 2007). In contrast, a growing number of studies suggest that problems in the domain of illicit drug use may be more strongly linked to antisocial personality disorder, impulsivity, and other characteristics of the externalizing spectrum than to problems in the internalizing domain (e.g., Miller, Vogt, Mozley, Kaloupek, & Keane, 2006; Vrieze, Perlman, Krueger, & Iacono, 2012). To further clarify the nature of the possible differential associations between substance-related disorders and other types of psychopathology, we compared the relative strengths of association of drug and alcohol abuse/dependence with PTSD and its common comorbidities, depression and antisocial personality disorder (the latter representing prototypical markers of internalizing and externalizing, respectively).

Another, largely independent, line of research has emphasized the role of marital and intimate relationship factors in the etiology and maintenance of substance-related disorders. Research has shown strong concordance for substance-related disorders between spouses (e.g., Du Fort, Bland, Newman, & Boothroyd, 1998; Low, Cui, & Merikangas, 2007; Knight, 2011) and some studies indicate that one partner's substance abuse tends to encourage substance abuse in the other over time (Leonard & Das Eiden, 1999; Leonard & Homish, 2005; Leonard & Mudar, 2004). Relationship factors also influence treatment outcomes. For example, men in treatment for alcohol abuse have been found to be at greater risk for relapse if their spouse also drinks (Moos, Brennan, Fondacaro, Moos, 1990; McAweeney, Zucker, Fitzgerald, Puttler, & Wong, 2005) and similar processes have been shown to contribute to the maintenance of drug related disorders (Leonard & Homish, 2005; Tracy, Kelly, & Moos, 2005). Finally, studies that have examined the concordance between partners for a wider array of psychiatric diagnoses suggest that these associations may be unique to substance-related disorders. Specifically, Low et al. (2007) compared spousal concordance for substance-related disorders versus anxiety disorders and found that while there was a high degree of spousal concordance for substance-related disorders (i.e., more than one-third of the spouses of patients with substance abuse/dependence also had a lifetime history of substance abuse/dependence) there was no evidence for spousal concordance for the anxiety disorders. This study provided a novel opportunity to reexamine this issue in a large sample of trauma-exposed veterans and their intimate partners.

The primary aim of this study was to examine the relative influences of PTSD, other psychopathology, and intimate partner alcohol and drug use on substance-related problems among veterans. On the basis of the foregoing literature review, we hypothesized that partner drug and alcohol abuse severity would be associated with veteran drug and alcohol abuse severity, as would veteran PTSD. We also compared the patterns of comorbidity associated with drug versus alcohol abuse in veterans and predicted that drug abuse would be most strongly associated with adult antisocial behavior whereas alcohol abuse would

evidence a non-specific pattern of association with PTSD, depression, and antisocial behavior.

## Method

### Participants and Procedure

Two hundred ninety-eight couples enrolled in the study at one of two U.S. Department of Veterans Affairs medical centers after being recruited via flyers, mailings, and referrals. Study eligibility required that one member of the couple be a veteran who had been cohabitating with his/her intimate partner for the 12 months prior to study enrollment, and that the veteran endorsed a history of exposure to a traumatic event meeting *DSM-IV* PTSD Criterion A. Data for 11 couples who enrolled in the study were omitted from analyses for the following reasons: three voluntarily withdrew before completing the study protocol, two were found ineligible after being consented, and six were terminated by study staff because one or both members of the couple were unable to conform his or her behavior to protocol requirements. Of the remaining 287 couples ( $n = 484$ ), 242 completed all measures of interest and were included in the data analyses reported below. Overall, there were no significant demographic differences with respect to age, race, or ethnicity between those who were included in the analyses compared to those who were not (details available from first author). Individuals excluded from analyses had significantly higher mean scores on alcohol abuse/dependence severity ( $M = 1.56$ ,  $SD = 3.43$ ) compared to those who were included in analyses ( $M = .48$ ,  $SD = 2.03$ ;  $t(535) = 3.46$ ,  $p < .001$ ); no other significant group differences emerged across variables included in analyses for this study.

The majority of couples were married (82.2%) and 56.2% of participants were veterans. The veterans were predominantly male ( $n = 217$ , 89.7%) and partners were primarily female ( $n = 224$ , 92.6%). Veterans ranged in age from 24 to 74 years ( $M = 52.9$ ,  $SD = 10.8$ ) and their spouses were between 19 and 75 years ( $M = 50.7$ ,  $SD = 10.9$ ). Self-reported race and ethnicity of the sample was predominantly White, not Hispanic (81.6%), 9.3% was Black, 9.3% was American Indian or Alaskan Native, 1.7% was Asian, 0.8% was Hawaiian or Pacific Islander, and 6.4% reported unknown racial origin (demographic categories were not mutually exclusive so totals exceed 100%). Hispanic or Latino ethnicity was endorsed by 20% of the sample. Most of the couples' relationships were longstanding: 40.9% reported being together for more than 20 years and another 40.1% had been together between 5–20 years. Eighty-seven percent of the sample had earned at least a high school degree or equivalent and 26.3% earned a bachelor's or graduate degree. Among the veterans, reported eras of military service were: 11% World War II, 41.5% Vietnam War, 16.5% Operation Desert Storm, 14.3% Operation Iraqi Freedom or Operation Enduring Freedom, 0.7% Korean War, and 17% other eras. Seventy-five percent of veterans reported combat exposure.

Within the final sample, 42.6% ( $n = 103$ ) of the veterans and 14.9% ( $n = 36$ ) of the spouses met criteria for a current diagnosis of PTSD and 64.9% ( $n = 157$ ) of veterans and 33.5% ( $n = 81$ ) of spouses met criteria for a lifetime diagnosis of PTSD. Index Criterion A events (i.e., on which the PTSD assessment was based) were determined through clinical interview; 29.5% participants endorsed combat-related trauma, 10.3% sudden death of a friend or loved one, 7.8% childhood sexual trauma, 6.4% physical assault, 8.7% motor vehicle or other accident, and 3.5% adult sexual trauma. Various other types of trauma (e.g., natural disaster or serious accident) were endorsed by less than 4% of the sample. In addition, the percentage of veterans meeting criteria for other diagnoses in this study was: 7.4% for adult ASPD and 23.15% for depression. Fourteen percent of veterans endorsed symptoms of alcohol abuse in the past month and 9.1% reported any drug abuse in the past month. For partners, 3.3% met criteria for adult ASPD and 11.2% for depression. Six percent reported

symptoms of alcohol abuse and 5% reported drug abuse in the past month. Finally, of those with current PTSD, 16.5% of veterans and 3% of partners met full DSM-IV criteria for a current substance use disorder.

The study was approved and reviewed annually by the appropriate Institutional Review Board and research committees at VA Boston Healthcare System, New Mexico VA Healthcare System and the Boston University Medical Campus. The procedure involved administration of a series of self-report measures and structured diagnostic interviews to both members of each couple independently.

## Measures

The Clinician Administered PTSD Scale (CAPS; Blake et al, 1995) was used to assess the frequency and severity of the 17 *DSM-IV* (APA, 1994) PTSD symptoms. Current and lifetime PTSD diagnostic status was determined according to *DSM-IV* criteria using a validated scoring rule (i.e., at least one reexperiencing symptom, three avoidance and numbing symptoms, and two hyper arousal symptoms scored with a frequency of one or greater and an intensity of two or greater). Dimensional severity scores were calculated by summing the frequency and intensity ratings (each range from 0–4) for each of the 17 items (range 0–136). All CAPS interviews in this study were video-recorded and 23% were selected at random and scored by a second rater for quality control purposes and to evaluate inter-rater reliability. Inter-rater agreement was  $\kappa = .84$  for current PTSD diagnosis status and for current PTSD severity (intra class correlation coefficient = .99).

The Structured Clinical Interview for DSM-IV (SCID-IV; First, Gibbon, Spitzer, & Williams, 1994) was used to assess current Axis I disorders. The ASPD module of the Structured Clinical Interview for DSM-III-R Personality Disorders (SCID-II; Spitzer & Williams, 1985), a widely used, semi-structured PD interview was administered to assess adult Antisocial Personality Disorder (ASPD) symptoms. Each symptom was scored using a 0 = *not present*, 1 = *subthreshold*, and 2 = *clinically-significant* scale. To obtain dimensional data for each diagnosis, all symptoms within a module were administered and “skip-out” rules ignored. Inter-rater reliability was evaluated using 21% of the SCID interviews. Agreement was high for dimensional severity scores: the mean intra-class correlation coefficient was .95 and ranged from .86 for alcohol abuse to .99 for social phobia.

## Data Analysis

We first used paired samples *t*-tests to compare veterans and spouses across the primary study variables and then evaluated the pattern of bivariate correlations among the psychiatric symptom variables. The primary analyses were hierarchical regression analyses that estimated the relative contributions of veteran psychopathology and partner substance abuse on veteran alcohol and drug abuse severity. Dimensional scores reflecting the sum of symptom scores within a given diagnosis were used for all analyses (e.g., drug use severity was defined as the sum of all symptoms across all SCID drug abuse categories). Predictors of veteran drug and alcohol abuse were modeled in separate equations. In both models, veteran ASPD severity was entered in step one, veteran major depression severity was entered in step two, veteran PTSD severity was entered in step three, and partner substance use severity was included in the fourth and final step (e.g., partner alcohol abuse was used in the model predicting veteran alcohol abuse). We entered ASPD first because the comorbidity literature suggests that it would be strongest psychopathology predictor of drug and alcohol use. PTSD was the last psychopathology variable entered into the equation so that this step of the analysis would provide an estimate of incremental variance accounted for by this variable relative to the other two psychopathology variables. Finally, partner alcohol/drug use was entered last in each equation because it was the primary variable of

interest. Age, income, race/ethnicity and education were included in preliminary analyses but when none of these variables contributed significantly to either model they were dropped from subsequent analyses. Missing data was minimal. Eight spouses did not complete the antisocial personality disorder assessment (relevant only to Table 1) and one veteran was missing a drug abuse severity score. We used all available information for paired-sample *t*-tests so the *n* for these analyses differed slightly across variables; missing cases were deleted listwise for regression analyses (the default in SPSS) and this resulted in *n* = 242 for analyses predicting alcohol abuse/dependence and *n* = 241 for analyses predicting drug abuse/dependence.

## Results

Paired samples *t*-tests revealed that veterans, on average, produced higher scores on symptoms of adult ASPD, major depression, PTSD and alcohol abuse (see Table 1). Drug abuse severity scores did not differ significantly between veterans and partners.

Bivariate correlations among study measures are listed in Table 2. The results of the two hierarchical regression models predicting veteran current alcohol and drug abuse severity are shown in Table 3. Both analyses revealed a significant main effect of veteran adult antisocial behavior symptoms in Step 1 that accounted for 2% of the variance in alcohol abuse severity and 7% of the variance in drug abuse severity. Depression symptom severity, entered in Step 2, explained an additional 2% of the variance in alcohol abuse but did not explain any incremental variance in drug abuse severity. Current PTSD was entered in the third step of each model and explained an additional 2% of the variance in current alcohol use severity beyond the prior steps. In contrast, current PTSD severity did not explain significant incremental variance in drug abuse. Finally, when partner alcohol and drug abuse were entered in the final step of their respective models, these variables accounted for an additional 20% and 13% of the variance in veteran alcohol abuse and drug abuse, respectively. Collinearity statistics fell within the acceptable range for both models (alcohol model tolerance range = .47 – .99; drug model tolerance range = .47 – .99).

## Discussion

The primary aim of this study was to compare the relative influence of PTSD, other forms of psychopathology, and intimate partner alcohol and drug use on substance-related problems in veterans. Hierarchical regression analyses revealed that partner alcohol and drug use explained more variance in veteran alcohol and drug use, respectively, than did veteran symptoms of antisocial behavior, depression, and PTSD combined. Though novel in the PTSD literature, these findings are consistent with prior research suggesting that intimate partners tend to mirror each other's substance abuse (Du Fort et al., 1998; Knight, 2011; Low et al., 2007; McLeod, 1993, 1995) and a prior study that showed partner substance abuse to be a stronger predictor of an individual's substance-related problems than that person's own mood symptoms (Leonard & Homish, 2008). To our knowledge, no prior study has compared the relative influence of veteran PTSD and other psychopathology to the effect of the partner's substance abuse on veteran alcohol and drug use.

There are a number of possible mechanisms by which partner substance use might promote use on the part of the veteran. It may serve as a conditioned stimulus that cues a craving response on the part of the veteran (Niaura, 2000) and/or provide a shared activity that enhances relationship satisfaction (Fals-Stewart, Birchler, & O'Farrell, 1999). Indeed, couples who are discordant for alcohol tend to show lower levels of marital satisfaction (Homish & Leonard, 2007) and are more likely to divorce (Ostermann et al., 2005). In addition, although not a primary focus of this study, findings showed that partners of



veterans showed higher levels of psychiatric symptomatology, especially PTSD, than the general population. This raises the possibility that partner substance abuse serves as a proxy for other forms of distress which underlie substance-related problems in the relationship. Clearly, the association between partners' substance abuse reflects an interactive phenomenon involving reciprocal influences, and though our data cannot speak to the underlying mechanisms for this concordance, findings point to substance use in the relationship as an important target for intervention efforts with veterans. They also underscore the importance of assessing trauma history, PTSD and other psychopathology in both partners in future research and clinical work with veteran couples.

This study also provided an opportunity to clarify the nature of associations between drug and alcohol abuse, PTSD, and other types of psychopathology. Analyses revealed that adult antisocial behavior, depression, and PTSD were all significantly associated with veteran alcohol abuse, indicating a heterogeneous pattern of alcohol abuse comorbidity. In contrast, adult antisocial behavior was the only significant psychopathology predictor of veteran drug abuse which suggests that illicit drug use may be more specifically linked to characteristics of the externalizing spectrum, including social deviance and impulsivity (e.g., Chen et al., 2011; Miller et al., 2006; Vrieze et al., 2012).

These findings should be considered in light of study strengths and limitations. The primary limitation was the cross-sectional measurement, which precluded definitive conclusions about the direction of associations among study variables. Such associations can only be inferred on the basis of logic, theory, and relevant prior evidence of temporal sequencing and causation. Our decision to model PTSD as a predictor of substance abuse measured concurrently, for example, was based on prior longitudinal evidence suggesting that when these two conditions co-occur, the onset of PTSD symptoms usually predates substance abuse onset (Kessler, 2000; Kessler et al., 1995; Najavits et al. 1999). Similarly, adult antisocial personality disorder symptoms are, by definition, thought to reflect longstanding traits. We modeled partner substance abuse as a predictor of veteran substance abuse because our aim was to compare the relative influences of veteran psychopathology with partner substance abuse on drug and alcohol abuse among veterans, but other statistical and conceptual representations of these associations are plausible and should be explored in future research. Other limitations were related to the composition of the sample that comprised trauma-exposed veterans and their cohabitating partners so it is unclear to what extent results will generalize to other types of couples or trauma populations. The base rate of current drug and alcohol abuse and dependence in this sample was also fairly low compared to some veteran samples so it is possible that other patterns of association would be found in samples with higher rates of substance-related problems. These limitations were arguably offset by the strengths of the study, which included a large sample of veterans and their intimate partners, diagnostic data derived from clinical interviews with evidence for good inter-rater reliability, and the availability of alcohol and substance abuse data from both partners.

Findings of this study are relevant to VA policies concerning substance abuse treatment and support efforts to better integrate partners into veteran treatment. They underscore the importance of addressing the relationship context in treating substance abuse among veterans and support efforts to develop and disseminate interventions involving both members of the couple. For example, Behavioral Couples Therapy engages both members of the couple and has been shown to be effective in reducing substance use and intimate partner aggression while enhancing relationship quality (see O'Farrell & Clements, 2012 for a review). Other research suggests that couples-based approaches are effective for the treatment of PTSD (Monson et al., 2011). Together, these findings suggest that couples-

based treatments may be well-suited to addressing substance-related problems among veterans.

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**Table 1**

## Symptom Severity Differences between Veterans and their Partners

Variable	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>
Adult ASPD			8.02***	233
Veteran	6.67	5.90		
Partner	3.21	4.70		
Depression			4.49***	241
Veteran	6.33	5.41		
Partner	4.45	4.88		
PTSD			10.74***	241
Veteran	42.10	29.08		
Partner	18.41	23.80		
Alcohol abuse			3.45**	241
Veteran	.72	2.57		
Partner	.22	1.22		
Drug abuse			1.11	240
Veteran	.29	1.09		
Partner	.20	.14		

*Note.* ASPD = antisocial personality disorder; PTSD = posttraumatic stress disorder. Drug abuse was a composite score reflecting the sum of any symptoms within that SCID module.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

Table 2

## Correlations for Veteran and Partner Symptom Scores

Measure	1	2	3	4	5	6	7
1. Veteran alcohol abuse							
2. Veteran drug abuse	.04						
3. Veteran adult ASPD	.15*	.27***					
4. Veteran depression	.18**	.08	.20**				
5. Veteran PTSD	.22**	.04	.11	.73***			
6. Partner alcohol abuse	.48***	.14*	.18**	.09	.09		
7. Partner drug abuse	.01	.40***	.14*	.05	.06	.11	

Note. ASPD = antisocial personality disorder; PTSD = posttraumatic stress disorder.

**Table 3**

## Hierarchical Linear Regression Analyses of Veteran Alcohol and Drug Abuse/Dependence Symptoms

Variable	Alcohol		Drug	
	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$
Step 1		.02 *		.07 ***
Veteran adult ASPD	.15 *		.27 ***	
Step 2		.02		.00
Veteran adult ASPD	.12		.26 ***	
Veteran depression	.15 *		.03	
Step 3		.02 *		.00
Veteran adult ASPD	.13 *		.26 ***	
Veteran depression	.01		.05	
Veteran PTSD	.20 *		-.03	
Step 4 (final model)		.20 ***		.13 ***
Veteran adult ASPD	.05		.21 ***	
Veteran depression	.005		.06	
Veteran PTSD	.17 *		-.05	
Partner abuse/dependence	.46 ***		.37 ***	
Total $R^2$		.26 ***		.21 ***

Note.  $n = 242$  for regressions predicting veteran alcohol abuse/dependence and 241 for analyses predicting veteran drug abuse/dependence. ASPD = antisocial personality disorder, PTSD = Posttraumatic Stress Disorder.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$