

## Do trauma history and PTSD symptoms influence addiction relapse context?

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### Abstract

Exposure to traumatic events is common among individuals with substance use disorders (SUD), although not all go on to develop PTSD. We compared SUD treatment outcomes and relapse features in three groups of male veterans receiving SUD treatment: (1) those without trauma exposure (SUD-only;  $n = 68$ ), (2) those with PTSD (SUD-PTSD;  $n = 32$ ), and (3) those with trauma exposure but no PTSD (SUD-trauma;  $n = 34$ ). Veterans were assessed regarding psychiatric symptoms, substance use, and relapse features quarterly for 1 year. The groups did not differ on length of abstinence, relapse prevalence or severity. SUD-PTSD and SUD-trauma reported more depression, anxiety, PTSD, and total psychiatric symptoms prior to relapse than SUD-only. SUD-PTSD and SUD-trauma also endorsed more PTSD, and total symptoms following relapse than SUD-only. PTSD symptoms were associated with greater risk of relapse in intrapersonal and negative physiological contexts. Understanding relapse contexts for those experiencing PTSD symptoms can help us to understand one mechanism whereby those with both PTSD and SUD have a poorer clinical course.

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**Keywords:** Trauma; PTSD; Relapse context; Comorbidity

### 1. Introduction

The rate of posttraumatic stress disorder (PTSD) among individuals in treatment for substance use disorders (SUD) treatment has been reported to be 30–59% (Stewart et al., 2000). Treatment outcomes tend to be worse for individuals with comorbid SUD-PTSD, and they tend to experience more psychiatric symptoms and intrapersonal distress than patients with either disorder alone (Najavits et al., 1998; Ouimette et al., 1998). Relapse tends to occur sooner among patients with PTSD and SUD compared with SUD only (Brown et al., 1996). SUD patients with PTSD tend to have worse compliance with aftercare (Brady et al., 1994), and more frequent inpatient treatment (Brown et al., 1995). SUD patients who receive treatment for their PTSD are less likely to relapse than those who do not (Ouimette et al., 2003). The reason why comorbid patients tend to have worse outcomes is not entirely clear. The self-medication hypothesis posits

that individuals with PTSD use substances out of a belief that substance use will reduce the distressing effects of PTSD symptoms (Chilcoat and Breslau, 1998). In this case, PTSD-related symptoms may act as a cue that triggers relapse.

Individuals who have experienced a psychological trauma but do not meet diagnostic criteria for PTSD often suffer similar functional impairment, health problems, and increased healthcare utilization as those with PTSD (Arnow, 2004; Dickinson et al., 1999; Horwath et al., 1994; Narrow et al., 2002; Norman et al., 2007; Stein et al., 1997). Some argue that such findings support a continuous view of post-traumatic psychiatric sequelae, where any PTSD symptoms are viewed as a stress response to trauma along a continuum, with full PTSD being the most severe response (Ruscio et al., 2002). As many as 89% of SUD patients report having experienced a traumatic event in their lifetime (Farley et al., 2004) and substance use is 1.5–5.5 times more prevalent in individuals with trauma histories than without (National Research and Council, 1996). Unfortunately, inability to meet criteria for a PTSD diagnosis can act as a barrier to receiving effective treatment for posttraumatic psychiatric sequelae (Al-Saffar et al., 2004) and is associated with less use of mental health services than is full PTSD (Grubaugh et al., 2005). Although course of treatment for SUD patients with PTSD has

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been well studied, little is known about trauma exposed SUD patients without PTSD. Because these individuals are highly prevalent in SUD treatment settings, it is important to understand their course of treatment.

One important area that may impact course of treatment is relapse context. The literature shows that for SUD patients with comorbid PTSD, physiological arousal in general (Coffey et al., 2002) and physiological arousal specifically in response to memories of the traumatic event (Steindl et al., 2003) act as cues that increase cravings or trigger relapse. In addition, some literature suggests that events that may trigger memories of prior traumatic events (e.g., a sexual encounter for someone who has been previously sexually assaulted) may also act as a relapse cue (Stewart et al., 2000). Little is known about relapse contexts for trauma exposed individuals without PTSD, although a spectrum view of PTSD would suggest that contexts would be similar.

Our goal was to evaluate the characteristics of relapse for SUD patients with trauma histories who did and did not have PTSD. Specifically, we examined whether addiction treatment outcomes and psychiatric symptoms surrounding initial post-treatment substance use episodes differed for substance abusers without trauma history (SUD-only), with PTSD (SUD-PTSD), and with trauma history but not PTSD (SUD-trauma). We hypothesized that: (1) SUD-trauma and SUD-PTSD would have worse posttreatment substance use outcomes than SUD-only; (2) SUD-trauma and SUD-PTSD would have greater psychiatric symptoms surrounding initial substance use episodes than SUD-only; and (3) SUD-trauma and SUD-PTSD would be more likely to relapse in the contexts of physiological arousal and negative intrapersonal states than SUD-only.

## 2. Methods

### 2.1. Participants

Participants were patients enrolled in abstinence-based alcohol and drug treatment and dual diagnosis mental health programs at the VA San Diego Healthcare System participating in a larger study of substance dependence and comorbid Axis I disorders described in prior publications (Tate et al., 2004; Tomlins et al., 2006). The study was approved by the VA and the IRB of the University of California, San Diego. For the current analyses, participants who met criteria for one or more substances use disorders were selected from the study to provide three groups: (1) individuals who denied exposure to trauma (SUD-only), (2) individuals who reported exposure to a trauma that would meet DSM-IV criterion A1 for PTSD but who did not meet full criteria for current or lifetime PTSD (SUD-trauma), and (3) individuals who met current DSM-IV criteria for PTSD (SUD-PTSD).

A total of 252 veterans met study inclusion criteria and gave informed consent. Thirty participants were dropped prior to completion of the intake assessment (8 left inpatient treatment early against medical advice, 3 were discharged early due to evidence of intoxication, 19 refused to complete the intake following consent). The complete Relapse Contextual Cue interview was not assessed with the initial 35 participants, and as this is a focus of our analyses, these participants were

excluded. Eleven additional participants provided no follow-up data (3 refused participation at follow-up assessment, 4 were lost to follow-up, 3 died, and 1 participant was incarcerated for an extended portion of the year). Of the remaining 176 participants, 20 were women. We conducted analyses with males only due to the small percentage of women. The majority of women (65%) were diagnosed with PTSD (versus 24% of men) and only one woman in the SUD and SUD-Trauma categories relapsed. Women also differed from men on type of trauma experienced (combat versus non-combat) and on substance use disorder diagnoses. An additional 22 participants were excluded with incomplete or inconsistent data (11 had incomplete follow-up assessments, 6 had discrepancies between participant and collateral interviews, and the trauma description portion of the intake assessment was missing for 5 participants who could not be coded for the current study). Diagnostic interviews were conducted to assess lifetime and current PTSD. No participants met criteria for lifetime PTSD in the absence of current PTSD.

The current study included 134 male veterans. Most of the sample was Caucasian, divorced or separated, and unemployed at intake (Table 1). No significant demographic differences were observed between participants who remained abstinent for the follow-up year versus those who drank alcohol or used drugs. SUD-only, SUD-trauma, and SUD-PTSD groups did not significantly differ on most demographics (age, marital status, education, employment status), but did differ on ethnicity,  $\chi^2(6, N = 134) = 18.13, p = .006$ . Thirty-four percent of SUD-PTSD participants were Caucasian compared to 59% of SUD-trauma and 74% of SUD-only participants. Post hoc anal-

Table 1

Participant demographic and mental health disorder characteristics by relapse status ( $N = 134$ )

	Abstaining group $n = 52$	Relapse group $n = 82$
Age (years)	$M = 44.4$ (S.D. = 8.9)	$M = 44.4$ (S.D. = 8.7)
Marital status		
Married	11.5%	17.0%
Divorced, widowed, separated	65.4%	61.0%
Never married	23.1%	22.0%
Ethnicity		
African-American	19.2%	19.5%
Caucasian	57.8%	62.2%
Hispanic	11.5%	14.6%
Other	11.5%	3.7%
Education (years)	$M = 13.5$ (S.D. = 2.2)	$M = 13.2$ (S.D. = 1.9)
Currently employed	11.5%	13.4%
BSI General Severity Index at intake	$M = 1.10$ (S.D. = .86)	$M = 1.20$ (S.D. = .93)
Trauma category		
SUD-only	35.3%	64.7%
SUD-trauma	38.2%	61.8%
SUD-PTSD	46.9%	53.1%
Combat related trauma	37.0%	33.3%
Alcohol dependence	84.6%	91.5%
Marijuana dependence	13.5%	18.3%
Stimulant dependence	30.8%	32.9%

yses found significant differences between the SUD-PTSD and SUD-only groups,  $\chi^2(3, N=100)=15.67, p=.001$ , and differences approaching significance between the SUD-trauma and SUD-only groups,  $\chi^2(3, N=102)=7.36, p=.06$ ). All participants met criteria for at least one substance use disorder; 68 denied trauma exposure (SUD-only), 34 reported trauma history but did not have PTSD (SUD-trauma), and 32 met criteria for PTSD (SUD-PTSD). Among SUD-trauma participants, 82.4% met Criterion A. All participants reported a traumatic event that would meet criterion A1, but not all experienced fear, helplessness, or horror. However, all who experienced a traumatic event were included since we were interested in assessing the impact of trauma history, regardless of reaction to the trauma. 82.4% met Criterion B (re-experiencing/re-living), 50.0% met C (avoidance/numbing), 61.8% met D (hyperarousal), 67.6% met E (>1 month duration), and 23.5% met F (functional impairment/distress).

## 2.2. Procedures

Charts of consecutive admissions were screened for potential participants. Patients were then approached to further assess appropriateness for research participation. If patients met DSM-IV (American Psychiatric Association, 1994) criteria for current alcohol, marijuana, or stimulant dependence, had recent alcohol and/or drug use (past 90 days), and endorsed the goal of future abstinence, they were selected for the study. Patients with intravenous opioid dependence were excluded because a common treatment component, pharmacotherapy interventions (methadone, LAAM) was not available at this facility. Patients were excluded if they lived too far away to complete follow-up procedures, lacked contact information, could not read English, or had cognitive difficulties impairing event recall.

Approximately 2 weeks after last alcohol or drug use, patients completed a series of structured interviews to assess sociodemographic characteristics, recent alcohol and drug use (past 90 days), and lifetime and current Axis I psychiatric diagnoses. Telephone contacts at 1, 2, 4, and 5 months posttreatment assessed current drinking and substance use. In-person follow-up interviews at 3, 6, 9, and 12 months following intake assessed the quantity and frequency of alcohol and drug use, contextual features and psychiatric symptoms before and after relapse. Participants were compensated US\$ 30 for each in-person interview. A research assistant also interviewed a collateral contact person identified by the participant regarding the participant's recent use of substances at each quarterly follow-up.

## 2.3. Measures

**2.3.1. Diagnostic assessment: semi structured assessment for the genetics of alcoholism, lifetime version (SSAGA).** The SSAGA is a standardized psychiatric interview used to assess alcohol and drug abuse/dependence and other mental health disorders using DSM-IV criteria including PTSD. The SSAGA has demonstrated good psychometric properties (Bucholz et al., 1994; Hesselbrock et al., 1999). The probe used to assess for trauma exposure was "Have you ever experienced something

that is both very uncommon and so horrible that it would be distressing to almost anyone, such as substantial military combat, rape, seeing someone killed, etc.?" A brief description of the trauma(s) was made in the assessment for later review by a VA clinical psychologist. Following the initial probe, participants were asked about their response to the trauma, followed by questions addressing each of the DSM-IV criteria items.

**2.3.2. Brief symptom inventory (BSI).** The BSI (Derogatis and Melisaratos, 1983) is a widely used self-report measure of psychological symptoms. Participants respond to each of the 53 listed symptoms (e.g., feeling easily annoyed or irritated, trouble concentrating, thoughts of death or dying, feeling uneasy in crowds) based on the level of discomfort experienced during the prior week on a five point scale, ranging from 0 (not at all) to 4 (extremely). The General Severity Index is the mean of the summed responses (range 0–4) and is reported in this study as an indicator of general psychological distress at treatment entry.

**2.3.3. Substance use: timeline follow back (TLFB).** The TLFB (Sobell and Sobell, 1992) was used to assess daily alcohol and drug use utilizing a calendar-assisted structured interview (Ehrman and Robbins, 2006; Fals-Stewart et al., 2000). The TLFB has demonstrated reliability with substance treatment samples and psychiatric patients (Carey, 1997; Fals-Stewart et al., 2000). To increase validity of this assessment, random toxicology screens were performed on 20% of participants and collateral sources were interviewed. Toxicology, collateral and participant reports of substance use were reviewed, and substance use was assumed if indicated by any source. No cases required exclusion due to conflicting participant and toxicology data; in five instances, a collateral reported use that the participant denied. As we could not assess contextual features and psychiatric symptoms for substance use episodes denied by a participant, these five cases were excluded from analyses. Using the data from the TLFB, participants were classified as abstinent ( $n=52$ ; 38.8%) or having used substances for the follow-up year, and the number of days to initial use (length of abstinence) was calculated. Severity of substance use in the 30 days following initial use was operationalized in two ways: frequency of use (number of days using alcohol and/or drugs) and for alcohol only, quantity of use (mean number of drinks per drinking day).

**2.3.4. Contextual features of substance use episodes: contextual cue assessment.** Psychiatric symptoms and contextual features associated with initial use episodes were assessed with participants with at least one relapse episode ( $n=82$ ; 61.2%). Based on the procedure and taxonomy developed by Marlatt and Gordon (1985), detailed contextual descriptions and dating of initial substance use episodes were obtained using the Contextual Cue Assessment interview (Tomlinsen et al., 2006; McCarthy et al., 2005; Tate et al., 2004). This assessment was modified to allow for identification of multiple precursors to substance use episodes in response to research findings (Heather et al., 1991; Longabaugh et al., 1996). Patients were queried about the presence and severity of 12 mental health symptoms experienced immediately before and after initial substance use episodes

(1–3 h). Symptoms were grouped into three factor-analytically confirmed content domains: depression (depressed mood, sleep difficulties, appetite/somatic complaints, memory/concentration problems), anxiety (anxious mood, irritability, fear/avoidance, repetitive thoughts/behaviors), and psychotic symptoms (hallucinations, flashbacks, psychotic cognitions, paranoia). Symptom counts were calculated for each domain (range 0–4), as well as for total number of psychiatric symptoms (range 0–12; see Tomlinsen et al., 2006). Additionally, a PTSD domain was computed including symptoms of sleep difficulties, anxiety, memory/concentration, irritability, fear/avoidance, repetitive thoughts/behaviors and flashbacks (range 0–7).

#### 2.4. Data analysis plan

Logistic regression analyses were used to test whether trauma category predicted posttreatment substance use. ANOVAs were conducted to compare severity of posttreatment substance use (days using and mean drinks per drinking day) and length of abstinence among the groups based on trauma category. Analyses involving length of abstinence and severity variables included only participants who resumed substance use for two reasons: (1) to separately examine initiation versus severity of substance use once initiated, and (2) inclusion of abstainers dramatically skews distributions. After excluding abstainers, the number of days using and drinks per drinking day were positively skewed and log transformations were performed; transformed variables met required statistical assumptions.

A priori planned contrasts ANOVAs were conducted to test whether psychiatric symptoms varied as a function of diagnostic category. Differences were assessed between having a trauma history or not (SUD-only versus SUD-trauma and SUD-PTSD) and between trauma history without PTSD (SUD-trauma) and meeting full criteria for PTSD (SUD-PTSD). Logistic regression was used to examine whether trauma category and psychiatric symptoms predicted relapse context.

### 3. Results

#### 3.1. Substance use outcomes

Results of logistic regressions indicate that the three groups did not differ in likelihood of initiating alcohol or drug use in the follow-up year. Results of ANOVAs showed that the groups did not differ in length of abstinence prior to relapse. ANOVAs showed that trauma category was not predictive of severity of substance use outcomes (Table 2). Analyses conducted using both the transformed and non-transformed substance use severity variables were the same.

#### 3.2. Immediate contextual features

Participants relapsed most frequently in temptation contexts involving enhanced emotional states, testing personal control, and giving in to temptation (99%). Negative intrapersonal contexts (e.g., frustration/anger, fear, depression, boredom) were commonly reported (63%) as well as contexts involving social

pressure (52%). Negative interpersonal contexts (31%) and negative physiological contexts (23%) were least likely to be reported.  $\chi^2$  tests were used to determine whether the frequency of these relapse contexts were different between diagnostic groups. No group differences were detected.

#### 3.3. Psychiatric symptoms

Using planned contrasts in ANOVA, the relation between diagnostic category and the presence of each domain of psychiatric symptoms were examined before and after the initial relapse episode. As the psychotic symptom domain was significantly skewed (a preponderance of zeros), it was dichotomized and  $\chi^2$  tests conducted. Prior to relapse, significant group differences were found for all four symptom domains and the total number of psychiatric symptoms (Table 3). SUD-trauma and SUD-PTSD scored significantly higher on depression ( $t [77] = 2.29, p = .03$ ), anxiety ( $t [77] = 2.01, p = .05$ ), the PTSD domain ( $t [77] = 2.63, p = .01$ ), and total symptoms ( $t [77] = 2.44, p = .02$ ) than SUD-only. The PTSD group (43.8%) had a higher proportion of psychotic symptom endorsement than SUD-only (11.6%) and SUD-trauma (11.6%;  $\chi^2 [2, N = 80] = 8.27, p = .02$ ). There were significant differences between SUD-trauma and SUD-PTSD on symptom counts in the PTSD domain ( $t [77] = 2.63, p = .03$ ) and total number of symptoms ( $t [77] = 2.44, p = .03$ ) with greater reported symptoms for the PTSD group.

Post-relapse group differences were found for anxiety, PTSD, psychotic symptoms and total psychiatric symptoms (Table 3). SUD-trauma & SUD-PTSD endorsed significantly more symptoms in the PTSD domain ( $t [77] = 2.92, p = .01$ ) and total symptoms after relapse ( $t [77] = 2.78, p = .01$ ) than SUD-only participants. Depression symptoms were not significantly different between trauma groups after relapse. However, the SUD-PTSD group endorsed significantly more anxiety ( $t [77] = 2.76, p = .01$ ) and total symptoms ( $t [77] = 2.23, p = .03$ ), and more symptoms in the PTSD domain ( $t [77] = 2.92, p = .01$ ) than the SUD-trauma group. The PTSD group (50.0%) had a higher proportion of psychotic symptom endorsement than SUD-only (11.6%) and SUD-trauma (14.3%;  $\chi^2 [2, N = 80] = 11.31, p = .01$ ).

#### 3.4. Psychiatric symptoms and relapse context

As psychiatric symptoms before relapse varied as a function of trauma category, we examined whether psychiatric symptoms influenced relapse context. Logistic regressions suggested that psychiatric symptom domains did predict the contexts associated with relapse. Due to item overlap between the PTSD domain and the depression, anxiety and psychotic domains, the PTSD domain was tested in a separate logistic regression. Analyses were not conducted to predict temptation contexts because of insufficient variability. Anxiety (Wald = 5.89,  $p = .02$ ; OR: 1.93) and PTSD domain symptom counts (Wald = 8.04,  $p = .01$ ; OR: 1.47) significantly predicted relapse in negative intrapersonal contexts. Greater anxiety symptoms were associated with almost two times the likelihood of relapse while PTSD domain symptom count was associated with almost a 1.5 greater likelihood

Table 2  
Substance use and mental health characteristics by trauma category ( $N=134$ )

	SUD-only ( $n=68$ )	SUD-trauma ( $n=34$ )	SUD-PTSD ( $n=32$ )
<b>Intake characteristics</b>			
BSI general severity index <sup>a</sup>	$M=.82$ (S.D. = .87)	$M=1.22$ (S.D. = .79)	$M=1.58$ (S.D. = .95) <sup>***</sup>
<b>PTSD symptom counts</b>			
Cluster B (reexperiencing: 1 required)	–	$M=2.5$ (S.D. = 1.9)	$M=4.5$ (S.D. = 1.0) <sup>***</sup>
Cluster C (avoidance/numbing: 3 required)	–	$M=2.5$ (S.D. = 2.1)	$M=5.3$ (S.D. = 1.6) <sup>***</sup>
Cluster D (arousal: 2 required)	–	$M=2.6$ (S.D. = 2.1)	$M=4.8$ (S.D. = 1.4) <sup>***</sup>
<b>Trauma type</b>			
Combat related	–	55.9%	68.7%
Childhood abuse/trauma	–	8.8%	9.4%
Victim of crime	–	5.9%	9.4%
Witness death of other	–	23.5%	9.4%
Motor vehicle accident	–	5.9%	3.1%
<b>Prescribed medication for<sup>b</sup></b>			
Anxiety <sup>c</sup>	1.8%	20.6%	18.8% <sup>**</sup>
Depression <sup>c</sup>	11.1%	35.3%	28.1% <sup>*</sup>
<b>Current mental health disorders</b>			
Major depressive disorder	19.4%	31.3%	29.0%
Other anxiety disorders	2.9%	2.9%	–0–
Antisocial personality	14.7%	20.6%	12.5%
<b>Substance use outcomes<sup>d</sup></b>			
Length of Abstinence (days)	$M=106.7$ (S.D. = 107.8)	$M=106.2$ (S.D. = 83.7)	$M=148.4$ (S.D. = 113.6)
Days drinking/using	$M=9.8$ (S.D. = 9.8)	$M=7.9$ (S.D. = 11.2)	$M=4.6$ (S.D. = 7.0)
Drinks per drinking day	$M=6.9$ (S.D. = 7.8)	$M=5.9$ (S.D. = 5.1)	$M=9.3$ (S.D. = 8.9)
<b>Substances used in initial use episode</b>			
Alcohol	86.4%	81.0%	70.6%
Marijuana	6.8%	9.6%	23.5%
Stimulants	15.9%	14.3%	17.7%

\*  $p < .05$ .

\*\*  $p = .01$ .

\*\*\*  $p = .001$ .

<sup>a</sup> Post hoc SUD-only differed from SUD-PTSD group.

<sup>b</sup> Within past 3 months.

<sup>c</sup> Post hoc SUD-only differed from both SUD-trauma and SUD-PTSD groups, but SUD-trauma did not differ from SUD-PTSD group.

<sup>d</sup> Posttreatment substance use outcomes were calculated with only the portion of the sample that resumed substance use on at least one occasion. Days drinking/using and drinks per drinking day were calculated for the 30 days following initial substance use.

of relapse in these situations. The PTSD domain was also predictive of relapse in negative physiological ( $Wald = 4.14, p = .04$ ;  $OR: 1.30$ ) and social pressure contexts ( $Wald = 6.45, p = .01$ ;  $OR: 0.73$ ). While these symptoms were positively associated with relapse in the presence of negative physiological states, higher

PTSD domain levels seemed to reduce the chances of relapsing in social pressure contexts.

In order to test whether trauma classification influenced the relation between anxiety, PTSD domain, and these contexts, we added an interaction term to the regressions. No interaction terms

Table 3  
One-way ANOVAs for domain symptom counts and total symptoms before and after initial substance use episode by trauma category ( $N=82$ )

Source	SUD-only, $n=44$ $M$ (S.D.)	SUD-trauma, $n=21$ $M$ (S.D.)	SUD-PTSD, $n=17$ $M$ (S.D.)	$F$	$p$
Depression symptoms before relapse <sup>a</sup>	1.6 (1.2)	1.9 (1.0)	2.4 (1.3)	3.27	.04
Anxiety symptoms before relapse <sup>a</sup>	1.5 (1.0)	1.6 (0.7)	2.2 (1.2)	3.26	.04
PTSD domain before relapse <sup>a,b</sup>	2.2 (1.6)	2.6 (1.4)	3.8 (2.0)	5.27	.01
Total symptoms before relapse <sup>a,b</sup>	3.2 (2.3)	3.7 (1.7)	5.3 (2.9)	4.84	.01
Depression symptoms after relapse	1.9 (1.3)	2.3 (1.3)	2.8 (1.2)	2.62	.08
Anxiety symptoms after relapse <sup>b</sup>	1.3 (.9)	1.3 (.7)	2.2 (1.2)	5.25	.01
PTSD domain after relapse <sup>a,b</sup>	2.2 (1.5)	2.5 (1.4)	3.9(2.0)	6.93	.00
Total symptoms after relapse <sup>a,b</sup>	3.4 (2.1)	3.8 (1.8)	5.8(2.4)	7.02	.00

Note: Symptom counts for portion of the total sample ( $N=134$ ) with at least one substance use episode (61.2%,  $n=82$ ).

<sup>a</sup> SUD-only < SUD-trauma and SUD-PTSD ( $p < .05$ ).

<sup>b</sup> SUD-trauma < SUD-PTSD ( $p < .05$ ).  $df$  for all analyses (2, 79). The psychotic symptom domain was tested using  $\chi^2$  tests and not reported here.

were significant in these analyses. However, this finding must be interpreted with caution given the small *Ns* per group.

#### 4. Discussion

The goal of this study was to assess the characteristics of relapse for SUD patients with trauma histories who did not have PTSD. In a treatment-seeking sample of SUD patients, we identified a significant proportion that had trauma histories without PTSD. Although this group did not meet DSM-IV PTSD criteria, most endorsed the presence of some PTSD symptoms, with over 80% meeting criteria for at least one symptom cluster. The number of traumatized patients without PTSD and the large number of PTSD symptoms that they endorsed indicate that post-traumatic sequelae should be addressed in SUD patients, even among those who do not have full PTSD.

Our hypothesis that the SUD-PTSD and SUD-trauma groups would have worse post-treatment substance use outcomes than the SUD-only group did not hold true, which is inconsistent with some of the literature. However, a growing literature supports similar results to ours, documenting no significant differences in addiction treatment outcomes for patients with and without PTSD (Ouimette et al., 1997; Read et al., 2004; Trafton et al., 2006). Interestingly, Read et al. also compared outcomes for individuals with remitted versus unremitted PTSD at follow-up and found patients with unremitted PTSD at 6 months had poorer substance outcomes over the prior 6 months. As they noted, the directionality of this association could not be determined. Thus, relapse to substance use may impede remission of PTSD rather than PTSD leading to poorer substance outcomes. Brown et al. (1996) found that women with substance disorders and comorbid PTSD relapsed earlier than substance disordered women without PTSD, however the groups did not differ on other substance outcomes (relapse rates, percentage days abstinent). It has been proposed that PTSD leads to poorer addiction treatment outcomes because individuals may use substances to provide relief from PTSD symptoms and PTSD symptoms over time may come to trigger cravings for alcohol and drugs (Chilcoat and Breslau, 1998; Jacobsen et al., 2001). Some research supports this conceptualization (e.g., Bremner et al., 1996; Steindl et al., 2003). However, a recent VA study found no relationship between current PTSD symptoms and alcohol craving (Freeman and Kimbrell, 2004). Instead, alcohol craving was related to use characteristics (e.g., years of alcohol use to intoxication, years of cocaine use to intoxication, Addiction Severity Index alcohol composite scores, and Michigan Alcoholism Screening Test scores), factors that were not examined in the Bremner et al. or Saladin et al. studies. Another possible explanation for our findings is that veterans with comorbid disorders receiving addiction treatment in VA settings are likely to receive other healthcare services, including treatment for comorbid PTSD and mood disorders, and these services may add support to addiction efforts. Finally, our comparison group also included participants with other mental health disorders (depression, anxiety) that may influence addiction treatment outcomes. In conclusion, our findings add to a growing literature suggesting that substance dependent individuals with PTSD do

not consistently have poorer addiction outcomes. Further study of the complex relationship between PTSD and addiction is clearly warranted. Similar to other findings (e.g., Ouimette et al., 1998), those with trauma histories reported significantly higher psychiatric symptom scores than the SUD-only group prior to relapse, even though all groups included patients with other Axis I disorders. Those with trauma histories had significantly higher symptom scores across all domains except psychotic symptoms (depression, anxiety, PTSD, and total symptoms) than SUD-only. The SUD-PTSD group had a significantly higher PTSD symptom count and more total symptoms than SUD-trauma, suggesting that the SUD-trauma group falls between SUD-only and SUD-PTSD in these symptom domains.

We also found differences between SUD-trauma and SUD-PTSD pre- and post-relapse. While both groups had more PTSD domain and total symptoms than SUD-only, PTSD patients also had significantly more anxiety and total symptoms than SUD-trauma. A continuous view of PTSD may offer a partial explanation for these differences. At baseline, we found that PTSD patients had more symptoms and higher BSI scores than SUD-trauma patients who had higher scores than SUD-only patients. It is possible that PTSD, as the most severe expression of a trauma response, is associated with more symptoms pre- and post-relapse than a less severe response, although both groups may relapse in similar contexts. It is of interest that most symptoms appeared similar before and after substance use episodes within all three groups. At least in the short term, these findings do not support a “rebound effect”, whereby substance use is proposed to increase psychiatric symptoms (Blume et al., 2000). Increases in psychiatric symptoms likely result from more protracted alcohol and drug use as opposed to single use episodes. Alternatively, the self-medication hypothesis (Khantzian, 1985) proposes that alcohol and drugs are used to relieve emotional distress, suggesting that symptoms should lessen after use. Our findings suggest that perceived relief, if any, is short-lived, with symptoms returning to pre-use levels shortly after use. In a retrospective study, veterans with combat-related PTSD reported improvements in some PTSD symptoms associated with alcohol, marijuana, benzodiazepine, and heroin use, whereas cocaine use was associated with a worsening of hyperarousal symptoms (Bremner et al., 1996). Bremner’s study examined substance use and PTSD symptoms by retrospective assessment of a 30 year period, and not surprisingly, retrospective reports over this extended period differ from our findings of little symptom change following a single episode of use.

Higher levels of anxiety and PTSD domain symptom counts predicted an increased likelihood of relapse in negative intrapersonal contexts. Negative intrapersonal contexts include anger, fear, and depression, feelings that are common in individuals experiencing anxiety and posttraumatic psychiatric symptoms. Additionally, many anxiety disorders are associated with avoidance of social interactions (e.g., social phobia, agoraphobia, panic disorder) and thus, increases in anxiety symptoms are likely to decrease exposure to interpersonal contexts. PTSD domain symptoms were also associated with an increased likelihood of relapse in negative physiological contexts. Physiological reactivity (especially in the face of trauma cues) is also a

common posttraumatic response and a symptom of PTSD. Other studies have also shown a relationship between arousal symptoms in PTSD patients, which would fall under negative physiological contexts, and SUD. PTSD arousal symptoms differentiated hazardous drinkers from low-risk drinkers in a study of alcohol treatment outcomes among combat veterans (Steindl et al., 2003). Greater arousal symptoms were associated with a higher likelihood of hazardous drinking. In addition, PTSD and trauma exposure have been associated with increases in physical health problems (Tate et al., *in press*; Goodwin and Davidson, 2005; Schnurr et al., 2000; Boscarino and Chang, 1999; Boscarino, 1997), thus increasing the likelihood of negative physical experiences (e.g., pain, side effects of medications, and other treatment).

PTSD domain symptoms were also associated with reduced likelihood of drinking in the context of social pressure. In a prior study, we found that substance dependent veterans with either PTSD or mood disorders were more likely to relapse when alone compared to substance dependent veterans without these disorders, who were more likely to initiate substance use following treatment in social contexts (Tate et al., 2004). This is not unexpected given that some PTSD symptoms are likely associated with reduced social contact: efforts to avoid activities, places, or people that arouse recollections of the trauma, markedly diminished interest or participation in significant activities, feelings of detachment or estrangement from others. Thus, PTSD symptoms may lead to resuming substance use in non-social contexts, eliminating any potential for social pressure. Alternatively, close social ties of individuals with PTSD may avoid exerting social pressure to resume substance use due to concerns about the disinhibiting influence of alcohol and drugs on PTSD symptoms such as irritability or anger that may subsequently be directed at the social tie.

This study has several limitations. The SSAGA, our diagnostic assessment for PTSD, utilized a single general probe to assess trauma exposure, which may result in under-reporting of trauma experiences. A significant portion of our sample had non-combat related traumas, however, a study with male combat veterans may not generalize to other populations. Although we did not find significant difference in the type of traumas experienced (i.e., combat, crime, child abuse) in the SUD-trauma and SUD-PTSD groups, other meaningful differences may exist. For example, we included trauma experiences even though a minority of SUD-trauma participants denied a response involving fear, helplessness, or horror, suggesting that these traumas may have differed in severity, duration, or other characteristics from traumas experienced by individuals who developed full PTSD. Future studies with civilians and women are needed. We did not standardize the interventions delivered in this naturalistic sample, including both inpatients and outpatients from dual diagnosis mental health and alcohol and drug treatment settings. The inclusion of such diversity reflects populations commonly seen in treatment settings. However, it may also influence findings and complicate the interpretation of results, increasing the importance of replication. Ideally, a comparison group would have similar rates of psychopathology, but lower rates of mood and non-PTSD anxiety disorders in our SUD-only group high-

lights the need for replication of our results. However, it is worth noting that in a review of the research on the link between substance use disorders and PTSD, Najavits et al. (1997) found that individuals with both disorders tend to have more comorbid Axis I diagnoses than individuals with either disorder alone. The fact that the SUD-only group had lower rates of comorbid Axis I disorders than the SUD-trauma and SUD-PTSD groups is thus consistent with findings from other research studies. Psychiatric symptoms and relapse contexts were measured in retrospective reports. Thus, we have no way of knowing whether what the participants reported are the actual reasons that they relapsed. Finally, our assessment of PTSD severity during relapse was derived from the PTSD symptom domain on the Contextual Cue Assessment of Substance Use Episodes, which is not a standardized measure of PTSD.

This study demonstrates that PTSD symptoms increase the likelihood of relapse in intrapersonal and negative physiological contexts, suggesting that those contexts should be a target for intervention in trauma-exposed individuals. In addition, individuals with trauma histories tend to experience more psychiatric symptoms across several domains prior to relapse than those without trauma histories. In relation to relapse contexts, these findings suggest dimensional rather than categorical consideration of trauma exposure, indicating that trauma history should be considered in all SUD patients, regardless of PTSD diagnosis. Understanding relapse contexts specifically for those with trauma histories and PTSD can help us to understand one mechanism whereby those with both PTSD and SUD have a poorer clinical course.

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