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Psychometric Properties of the IES-R in Traumatized Substance Dependent Individuals with and without PTSD

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Abstract

Posttraumatic stress disorder (PTSD) is common among treatment-seeking substance abusers. Despite the high prevalence of these co-occurring conditions, few PTSD screening tools have been evaluated for their utility in identifying PTSD in substance use disorder (SUD) populations. The present study evaluated the psychometric properties of the Impact of Event Scale- Revised (IES-R) in a sample of 124 substance dependent individuals. All participants had a history of a DSM-IV Criterion A traumatic event, and 71 individuals met diagnostic criteria for PTSD. Participants with comorbid PTSD reported significantly more symptoms of anxiety, depression, and PTSD compared to substance dependent individuals without PTSD. Acceptable internal consistency and convergent validity of the IES-R were established among a substance dependent sample. Examination of diagnostic effectiveness suggested a cutoff value of 22 as optimal for a substance using population, resulting in adequate classification accuracy, sensitivity, and specificity.

Keywords

comorbidity; Impact of Event Scale-Revised; posttraumatic stress disorder; cocaine dependence; alcohol dependence; traumatic events

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1. Introduction

Among samples of treatment-seeking individuals with substance use disorders (SUDs), researchers have documented current posttraumatic stress disorder (PTSD) rates of 40% or higher (e.g., Bonin, Norton, Asmundson, Dicurzio, & Pidlubney, 2000; Dansky, Roitzsch, Brady & Saladin, 1997; Reynolds et al., 2005). Identification of PTSD comorbidity among substance abusers is clinically important, as presence of PTSD may lead to increased complexity in clinical presentation and treatment. Compared to patients with SUDs alone, patients with comorbid PTSD and SUDs exhibit higher addiction severity, are more likely to have comorbid affective, anxiety, and personality disorders, and are less likely to comply with aftercare (e.g., Back et al., 2000; Brady, Killeen, Saladin, Dansky, & Becker, 1994). These elevated symptoms may contribute to a higher number of inpatient admissions for individuals with comorbid PTSD and SUDs (Brown, Recupero, & Stout, 1995).

When PTSD is left untreated, substance abusers may be at high risk of experiencing additional traumatic events. In a study examining traumatized substance abusers receiving SUD treatment but not treatment for PTSD symptoms, individuals with PTSD were more likely to experience new traumatic events compared to traumatized individuals without PTSD despite improved PTSD global symptoms over the course of SUD treatment (Dansky, Brady, & Saladin, 1998). Accumulation of traumatic experiences may negatively impact substance treatment outcomes. Examining the impact of traumatic event history on relapse to substance abuse, Farley, Golding, Young, Mulligan, and Minkoff (2004) found that odds of repeated substance abuse treatments increased as a function of the number of different trauma type events experienced, indicating increased relapse risk for individuals with multiple traumatic events. Collectively, these studies suggest a cyclical and negative pattern of untreated PTSD, potential for experiencing additional traumatic events, and poorer substance abuse outcomes.

The careful assessment and treatment of PTSD represents a course of action by which the risk of future trauma exposure and diminished substance abuse outcomes can be reduced. However, PTSD cannot be treated if it is not detected, and there is evidence that PTSD is not often assessed in substance abuse treatment clinics. For example, Dansky and colleagues (1997) assessed 97 inpatient substance abusers for the presence of PTSD and found that 40% of the sample met criteria of current PTSD, yet diagnosis of PTSD was listed in only 15% of the discharge summaries. Interestingly, intake reports documented a history of physical and/or sexual abuse in approximately 50% of the sample. This study underscores the discrepancies between routine documentation of patients' trauma history at intake (perhaps because of regulatory paperwork requirements) and lack of thorough assessment/diagnosis of PTSD in substance use treatment facilities.

In an effort to increase PTSD screening in substance abuse treatment clinics, Coffey, Dansky, Falsetti, Saladin, and Brady (1998) administered a modified version of the PTSD Symptom Scale – Self-Report (MPSS-SR; Falsetti, Resnick, Resick, & Kilpatrick, 1993) to 118 treatment-seeking substance users. The MPSS-SR is based on the PTSD Symptom Scale – Self-Report (PSS-SR; Foa, Riggs, Dancu, & Rothbaum, 1993), and measures the frequency and severity of PTSD symptoms. The MPSS-SR demonstrated good internal consistency and convergent validity in this SUD population. Using the National Women's Study (NWS) PTSD Module (Kilpatrick, Resnick, Saunders, & Best, 1989; Resnick, 1996) to diagnose current PTSD according to DSM-III-R criteria (American Psychiatric Association [APA], 1987), Coffey et al. (1998) reported that a score of 28 on the MPSS-SR correctly identified 89% of individuals with current PTSD and correctly classified 74% of the sample on PTSD status.

More recently, Hyman, Garcia, Kemp, Mazure, and Sinha (2005) investigated the Early Trauma Inventory- Short Form (ETI-SF) in a sample of cocaine dependent individuals. While

the ETI-SF provides a thorough investigation of childhood-related traumatic experiences, the utility of this instrument as a broad screener of PTSD is limited due to its explicit focus on childhood trauma. Kimerling, Trafton, and Nguyen (2006) examined a four-item screening instrument for PTSD (the PC-PTSD) in a sample of substance dependent veterans and established evidence of sound psychometric properties of the instrument as a screening tool. While the PC-PTSD was sensitive to detection of PTSD symptoms (Kimerling et al., 2006), the brevity of the instrument does not permit monitoring of symptoms over time.

Thus, despite recent growth in attention to PTSD screening and measurement issues for individuals with SUDs, there is a lack of instruments suitable for symptom measurement throughout treatment. Several areas of research investigating the comorbidity of SUD and PTSD suggest that accurate diagnosis and treatment of PTSD is important in substance abusing populations. First, high prevalence rates of trauma and PTSD among substance abusers are evident. Second, evidence (Coffey, Schumacher, Brady, & Dansky, 2007; Dansky et al., 1998) suggests PTSD symptoms decrease over the course of SUD treatment and abstinence in a manner consistent with identified patterns of reduced severity in mood symptoms during SUD treatment (Brown et al., 1995). Thus, reassessment of PTSD symptoms during and following SUD treatment will be consistent with recommendations for re-evaluation of mood symptoms during the course of SUD treatment (Brown et al., 1995). Lastly, as noted above, untreated PTSD, re-experiencing traumatic events, and poor substance abuse outcomes appear to be cyclically related (Dansky et al., 1998; Farley et al., 2004). An instrument that can be administered repeatedly is needed in order to fully monitor the course of PTSD symptoms. Unfortunately, only one of the above instruments (Coffey et al., 1998) has suitably broad coverage to apply to a range of PTSD-related traumas, and is useful for tracking of PTSD-related symptoms. However, this study used the now dated DSM-III-R criteria for PTSD rather than DSM-IV criteria.

In the present study, we sought to validate a commonly used instrument for assessment of PTSD symptomatology and severity in a sample of substance dependent individuals, filling a notable gap in assessment for this population. The current study had two primary aims. The first aim was to assess the psychometric properties of the Impact of Event Scale-Revised (IES-R) among treatment-seeking substance dependent individuals who had been exposed to a Criterion A traumatic event. The targeted recruitment of individuals with trauma exposure ensures a sample reflective of the population most appropriate for assessment of PTSD symptoms. Individuals with and without a concurrent diagnosis of PTSD were included. Internal consistency and construct validity of the IES-R were assessed. The second aim of the study was to establish a clinically useful cutoff score for the IES-R so that this widely used measure of PTSD symptomatology may be utilized in substance use treatment clinics to more easily screen for likelihood of a positive PTSD diagnosis. We hope that the provision of PTSD screening tools with appropriate cutoff scores may increase treatment access for substance dependent individuals with PTSD by focusing attention on PTSD prevalence and symptoms, and the need for PTSD services, in substance using populations. Ideally, this emphasis on detection and monitoring of PTSD symptoms will contribute to increased referrals and/or provision of PTSD treatments.

2. Method

2.1 Participants

Substance dependent participants ($n = 128$) were selected for the current analyses from a laboratory-based study examining reactivity to trauma and drug cues in 232 individuals with and without PTSD and SUDs (healthy controls and PTSD+ only participants were excluded from the present sample). Participants completed additional measures as part of the larger study, results of which are available elsewhere (Coffey et al., 2002; Saladin et al., 2003). Four

cases were deleted due to missing data on the variables of interest. Participants were recruited from substance use treatment programs at a large university medical center and other local substance use treatment centers, increasing the likelihood of a representative treatment-seeking substance dependent sample. All participants met criteria for alcohol and/or cocaine dependence. Seventy-one participants met DSM-IV (APA, 1994) criteria for both PTSD and substance dependence diagnoses, with the remaining 53 participants meeting criteria for substance dependence only. However, all participants, regardless of PTSD status, satisfied DSM-IV Criterion A for PTSD with a crime-related trauma (e.g., physical or sexual assault either as a child or as an adult). Although all participants reported at least one crime-related trauma, individuals were not excluded from the study if non-crime-related traumas were also reported. Participants were excluded from the study if they met diagnostic criteria for a psychotic disorder, were experiencing a current manic episode, or were receiving treatment currently for PTSD. All procedures were approved by an Institutional Review Board and all participants provided informed consent. Participants received financial compensation for their participation.

2.2 Measures

Diagnostic inclusion and exclusion criteria were assessed via the Structured Clinical Interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon, & Williams, 1996) which provides diagnoses for DSM-IV axis I disorders. The substance use module has shown good validity (Kidorf, Brooner, King, Stoller, & Wertz, 1998; Kranzler, Kadden, Babor, Tennen, & Rounsaville, 1996) and high interrater reliability (Skre, Onstad, Torgersen, & Kringlen, 1991) in earlier versions of the SCID (SCID-III-R; Spitzer & Williams, 1986). DSM-IV PTSD Criterion A and trauma history was assessed with the National Women's Study (NWS) Event history-PTSD Module (Kilpatrick et al., 1989; Resnick, 1996). The NWS Event History-PTSD Module is a structured interview that uses open and closed-ended, behaviorally specific questions to evaluate a wide range of potentially traumatic events (e.g., sexual assault, physical assault; motor vehicle accidents, combat, etc.). The NWS Event History-PTSD Module demonstrates good concurrent validity with the SCID-PTSD module and acceptable reliability (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Participants were required to report at least one crime-related Criterion A event (direct physical or sexual assault during childhood or adulthood) for inclusion in the larger study. Once Criterion A was satisfied using the NWS Event History-PTSD Module, the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995), a psychometrically sound, structured clinical interview, was used to assess Criteria B-F. The combined use of the NWS Event History-PTSD Module and CAPS has been used successfully in a number of studies (e.g., Back, Jackson, Sonne, & Brady, 2005; Brady, Dansky, Back, Foa, & Carroll, 2001; Coffey, Stasiewicz, Hughes, & Brimo, 2006; Coffey, Schumacher, Brady, & Dansky Cotton, 2007; Saladin et al., 2003).

The original Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979) is one of the most widely used PTSD symptom scales in the literature (Joseph, 2000). The items of the IES are based on Horowitz's model of emotional processing of trauma (Horowitz, 1976) and the scale was published just prior to the release of DSM-III (APA, 1980). With the change of symptom cluster conceptualization of PTSD in the DSM-III (i.e., re-experiencing/intrusions, avoidance, and hyperarousal), Horowitz's two symptom model (intrusions and avoidance) no longer matched diagnostic criteria. In 1997, Weiss and Marmar, in an effort to make the IES more compatible with the DSM conceptualization of PTSD, modified the IES to assess the three symptom clusters identified in all versions of the DSM since DSM-III (Impact of Event Scale-Revised; IES-R; Weiss & Marmar, 1997). Weiss and Marmar largely retained the original intrusion and avoidance subscales and added a hyperarousal subscale. The Impact of Events Scale – Revised (IES-R; Weiss & Marmar, 1997) assesses self-reported PTSD

symptomatology experienced in the past seven days. It consists of 22 items measured on a five point Likert scale (0–4, with labels of ‘Not at all’ to ‘Extremely’).

To measure depression and general psychiatric functioning, the Beck Depression Inventory (BDI; A. T. Beck, Rial, & Riskels, 1974) and the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994) were administered. The BDI is a well-validated 13-item self-report questionnaire that assesses symptoms of depression. The SCL-90-R is a 90-item checklist used to indicate general symptomatology related to DSM-IV psychiatric disorders, with well documented validity and reliability (Derogatis, 1994). The Short-Michigan Alcohol Screening Test (SMAST; Selzer, Vinokur, & van Rooijen, 1975) provided an index of alcohol use severity, and was administered to individuals identifying alcohol as their primary substance of choice. Individuals identifying cocaine as their primary substance completed the Drug Abuse Screening Test (DAST; Skinner, 1982).

2.3 Procedure

Diagnostic and self-report data were collected as part of a larger study assessing PTSD symptomatology and cue-reactivity. Initially, individuals were briefly screened either over the phone or in person for a substance dependence disorder and history of experiencing a traumatic event satisfying PTSD Criterion A. If an individual was likely to satisfy the substance dependence and trauma eligibility criteria, he or she was scheduled for an assessment session. An experienced research assistant obtained informed consent and conducted structured diagnostic interviews during the assessment session. Participants then completed various self-report measures including the BDI, DAST, SMAST, SCL-90-R, and IES-R reported here.

3. Data Analytic Procedure

Descriptive data and symptomatology measures were assessed for differences according to PTSD status using independent sample *t*-tests for continuous variables and chi-square tests for categorical data. Further analyses examined the performance of the IES-R in a substance dependent sample. Internal consistency was assessed within the total and subscale scores. Pearson’s Product-Moment correlations with relevant constructs (i.e., other measures of PTSD symptoms, anxiety, depression) provided evidence of convergent validity. The ability of the IES-R total score to discriminate between those with and without a PTSD diagnosis was examined using discriminant function analysis. Lastly, diagnostic effectiveness was evaluated for a range of possible cutoff scores. Consistent with the objective of this instrument as a screening tool, we prioritized identification of PTSD positive cases. Thus, our *a priori* objective for sensitivity was set at 0.90 (see also Coffey et al., 1998; Coffey, Gudmundsdottir, Beck, Palyo, & Miller, 2006). Sensitivity, specificity, positive predictive accuracy, and negative predictive accuracy were examined for each value within the selected range (selection of range values was guided by published cut-off values for the IES-R [i.e., Asukai et al., 2002; Creamer et al., 2003]).

4. Results

4.1 Participant Characteristics

Demographic data for the 124 treatment-seeking substance dependent participants are presented in Table 1 by PTSD status. The PTSD+ group had significantly more females, $\chi^2(1) = 17.66, p < .001$, and White participants, $\chi^2(1) = 7.45, p = .006$. PTSD+ and PTSD– groups were statistically equivalent in age, $t(122) = 1.37, p = .17$, marital status, $\chi^2(1) = 0.07, p = .80$, educational achievement, $\chi^2(1) = 1.65, p = .20$, and unemployment rates, $\chi^2(1) = 2.65, p = .10$.

Similar levels of alcohol/drug-related problems were present regardless of PTSD status, as indicated by statistically equivalent number of alcohol/drug inpatient, $t(122) = -0.53, p = .60$, and outpatient, $t(122) = -0.06, p = .95$, treatment attempts. SMAST scores, $t(68) = -0.16, p = .87$, and DAST scores, $t(52) = -0.93, p = .36$, were also statistically equivalent across PTSD status groups. For the total sample, 72.6% met criteria for alcohol dependence, and 50.8% were cocaine dependent. Cannabis use disorders were present in 16.1% of the sample. Abuse and dependence diagnoses for alcohol, cocaine, and cannabis were represented equivalently across the PTSD+ and PTSD- groups (all Fisher's exact test p 's $>.40$). Opioid (2.4%) and sedative/hypnotics/anxiolytic (1.6%) use disorders, as well as alcohol or cocaine abuse (0.8% for each) were rare.

As stated above, all participants experienced at least one crime-related Criterion A trauma event in order to be included in the study. Table 2 presents the percentage of participants endorsing specific trauma types, as well as the percentage of individuals reporting additional traumas satisfying Criterion A within the same category. Three quarters (78.2%) of the sample reported a physical assault involving a weapon, with 63.9% of these individuals going on to experience additional physical assault involving weapons. Similarly, 75.9% of females endorsed forced or coerced sexual trauma involving vaginal penetration (with penis) by a male, and 50% of these women reported re-victimization of the same type. Physical assaults without weapon involvement and witnessing events involving serious injury or violent death were also highly prevalent. Overall, a significant portion of those who experienced one traumatic event went on to experience an additional trauma of the same type. These re-experiencing rates were particularly high for attacks with and without weapons, vaginal rape, and accidents.

Additional Axis I comorbid disorders were common. Of mood disorders, 23.4% met criteria for a Major Depressive Disorder, 9.7% for Dysthymic Disorder, 4% for Bipolar Disorders (I, II, and non-specific), and 11.3% for a Substance-induced Mood Disorder. Among anxiety disorders, 12.1% met criteria for Generalized Anxiety, 8.8% for Panic Disorders, 9.7% for Specific Phobias, 6.5% for Social Phobia, 4% for Obsessive-Compulsive Disorder, and 8.1% for Substance-induced Anxiety Disorder.

4.2 Symptom Levels and PTSD status

PTSD+ participants exhibited significantly greater symptoms than PTSD- participants on all mood and PTSD measures (see Table 1). Although PTSD+ participants were consistently higher in symptoms levels (as would be expected), PTSD- participants are not asymptomatic and exhibit some elevations in symptoms.

4.3 Reliability and Validity of the IES-R

Internal consistency was high among the total (Chronbach's $\alpha = 0.95$) and subscale scores (Intrusion $\alpha = 0.92$; Avoidance $\alpha = 0.85$; Hyperarousal $\alpha = 0.91$). Convergent validity was demonstrated with consistent and high correlations between the IES-R total and subscale scores, and related measures of PTSD symptomatology and negative affect (see Table 3).

The IES-R was examined for diagnostic value in determining the presence of PTSD in a sample of SUD participants. A discriminant function analysis suggested that the overall model, and each of the IES-R subscales, discriminated between PTSD status groups. The model correctly identified PTSD status in 75.0% of the sample, and accounted for 31.0% of the variance explained, Wilk's Lambda = 0.69, $\chi^2(3, N = 124) = 44.77, p < .001$. Standardized coefficients indicated that the Avoidance subscale made the largest unique contribution to group discrimination (0.69 compared to 0.24 for Hyperarousal and 0.18 for Intrusion). Similarly, examination of the structure matrix indicated that the Avoidance subscale (0.96) was most

important contributor to the discrimination function, although hyperarousal (0.84) and intrusion (0.80) made strong contributions.

4.4 Determining Diagnostic Values

While the IES-R was not intended as a diagnostic instrument, it is commonly employed as a screening measure to assess the presence and severity of PTSD symptoms. To this end, a range of cutoff scores for the IES-R was examined for suitability with a substance dependent sample. Diagnostic effectiveness indices, including sensitivity, specificity, positive predictive accuracy, negative predictive accuracy, overall classification accuracy, and kappa values for the selected range of cutoff values are displayed in Table 4. As can be seen in Table 4, cutoff values of 22–24 meet the minimum *a priori* goal for sensitivity while maximizing specificity. With this range, 77% of the sample was correctly classified, with sensitivity at 92%, and specificity at 57%. The chance-corrected classification agreement was 50% (Kappa = 0.50), falling within the moderate range. Use of these cutoff values resulted in correct identification of 65 out of 71 PTSD+ cases and 30 out of 53 PTSD– cases.

5. Discussion

On their own, SUDs and PTSD are highly prevalent disorders with pronounced impacts on functioning. The clinical picture among substance abusers is further complicated by the high rates of comorbid disorders, of which PTSD is overrepresented compared to the general population. Identification of substance abusers with comorbid PTSD is important given data suggesting these individuals suffer from greater severity in psychological symptoms, greater functional impairment, poorer prognosis, and are more likely to experience new traumatic events (Back et al., 2000; Brady et al., 1994; Ouimette, Ahrens, Moos, & Finney, 1997; Reynolds et al., 2005). Further, it appears that the PTSD comorbid diagnosis relative to other Axis I/SUD combinations causes a greater negative impact for the individual (Ouimette et al., 1997).

In the present sample of traumatized substance dependent participants, 57% met criteria for PTSD and other Axis I disorders were common. Consistent with the above literature, the substance dependent individuals with comorbid PTSD in this sample reported significantly greater severity in symptoms of anxiety, depression, and PTSD compared to the PTSD– group. Although we did not measure alcohol/drug consumption directly, the greater severity in affective symptomatology does not appear to be a function of greater drug/alcohol use, as the groups reported equivalent levels of alcohol- and drug-related problems. Although many studies report higher levels of addiction severity among individuals with comorbid PTSD and SUD's (e.g., Back et al., 2000; Brady et al., 1994), some have found a pattern similar to that of the current study with comparable substance use severity, but greater PTSD-related and psychiatric symptoms (Reynolds et al., 2005).

Interestingly, the PTSD– group exhibited elevated PTSD-related symptoms, despite the fact that they had no diagnosis of PTSD. This may be reflective of symptom overlap captured by PTSD-related measures [e.g., arousal symptoms in PTSD and arousal during acute substance withdrawal (e.g., Coffey, Dansky, Carrigan, & Brady, 2000)], high rates of psychiatric comorbidity, increased trauma-related events among individuals with SUDs, and/or higher levels of generalized distress. The degree of overlap suggests that PTSD symptom inventories may have difficulty distinguishing presence or absence of PTSD in SUD groups because of this increase in reported symptoms. While it is possible that the presence of SUDs adds to general high levels of distress (as suggested by the elevated scores in the SUD/PTSD– group), the findings from the current study support the ability of the IES-R's three symptom subscales to identify substance dependent individuals with and without PTSD.

Consistent with the other studies (e.g., J. G. Beck et al., 2008; Creamer et al., 2003), the IES-R scale scores were highly correlated with one another and with other measures of psychopathology (e.g., PTSD, depression, anxiety). Evidence of reliability and convergent validity of the IES-R for a substance dependent sample was established.

In terms of clinical utility, the IES-R subscales correctly classified three quarters of the sample, which represents an improvement upon chance-based prediction. In contrast to the J. G. Beck et al. (2008) study, the current analyses found the avoidance scale to be most important for discrimination. This may be due to functional differences in the use of avoidance among substance abusers (indeed, substance use itself can be a form of avoidance). Further, these differences may suggest that the importance of avoidance behaviors and/or the ability of the avoidance subscale to discriminate between PTSD+ and PTSD− individuals may be population specific (trauma type and/or substance abusers). Sensitivity and specificity were comparable to estimates reported in other studies, slightly improved in comparison to the J. G. Beck et al. (2008) study, and below that reported in the Creamer et al. (2003) study.

We recommend a cutoff value of 22 for the IES-R total score as optimal for use in an SUD sample. The low end of the 22–24 total score range was chosen because the screening objective is to identify as many PTSD+ individuals as possible with the knowledge that subsequent diagnostic testing will eliminate any false positive cases. However, with roughly equivalent properties for values 22–24, we encourage researchers and clinicians to adjust the cutoff value based on sample-specific presentations. The present recommended cutoff value is lower than the value of 33 suggested by the Creamer et al. (2003) study but in the range of cutoff values of 24/25 suggested by Asukai et al. (2002). The higher cutoff value proposed by the Creamer et al. (2003) study may reflect the population targeted, Vietnam veterans who likely have experienced a longer duration and greater severity of symptoms in comparison to our sample of individuals with substance dependence. The difference between cutoff scores may also be related to the fact that a diagnostic interview was not used to determine PTSD status for the community veterans in Creamer et al., rather an individual was classified as satisfying PTSD if his/her PCL score exceeded 50. Lastly, the differing cutoff scores may reflect base rate differences between the two samples. Although Creamer et al. did not report the prevalence of PTSD in the community sample, we can estimate the prevalence rate for the nontreatment-seeking community veteran sample via reports from the National Vietnam Veterans Readjustment Study (NVVRS), which estimate PTSD rates at 18.7% lifetime and 9.1% current for Vietnam veterans (Dohrenwend et al., 2006). Thus, base rates for the Creamer et al. study were likely lower than the 57% PTSD positive cases in this sample. As others (Brenner & Gefeller, 1997; Streiner, 2003) have noted, base rates and diagnostic misclassifications are related. The proportion of false positives increases in low prevalence conditions, and, in populations with high prevalence rates, the proportion of false negatives increases (Streiner, 2001). Selection of a higher cutoff value (to limit the number of false positives) in the Creamer et al. report may have been driven by the potential for higher rates of false positives given the comparatively lower community veteran sample base rate.

5.1 Limitations

All participants in the sample experienced at least one PTSD Criterion A event, which may reduce somewhat the generalizability of the findings presented here. Although this is a methodological concern, given the high percentages of treatment-seeking substance abusers with positive trauma histories (as high as 89–94%; Farley et al., 2004; Reynolds et al., 2005), this does not seem out of proportion with other clinical samples of individuals with SUDs. Further, the targeted sample (trauma experienced) is consistent with the use of the IES-R as a screening tool for PTSD. As the trauma events in the current study were restricted to crime-related events (e.g., physical assault, sexual abuse), it remains to be seen whether these results

will generalize to other trauma types (e.g., combat, motor vehicle accidents). Motor vehicle accident trauma survivors, in particular, may represent a distinct subsample within PTSD. Blanchard, Hickling, Taylor, and Loos (1995) noted that the percentages of substance abuse/dependence were much lower in treatment seeking MVA samples compared to other reported estimates for PTSD samples.

Although use of the measure represented an improvement in diagnostic agreement over agreement by chance alone, the Kappa value was in the moderate range, leaving room for improvement. The majority of errors in classification fell toward over identification of PTSD cases (false positives), as we attempted to minimize the chance of failures to identify positive cases of PTSD (false negatives). As with any instrument used as a diagnostic screening tool, clinicians should be aware of the possibility of misidentifying true cases of PTSD, and reduce the potential for errors through the use of multiple sources of information (e.g., clinical interview).

5.2 Summary and Future Directions

Others have noted the importance of developing screening methods for PTSD in settings other than mental health clinics (Kimerling et al., 2004). Particularly among substance treatment clinics, where the percentages of individuals experiencing trauma and PTSD are higher than the general population (Bonin et al., 2000; Dansky et al., 1997; Reynolds et al., 2005), it is important to address PTSD symptomatology. Unfortunately, it appears that many of these diagnoses are overlooked within substance use treatment settings (Dansky et al., 1997). The slow growth in development and examination of commonly used PTSD symptom inventories within substance use samples is reflective of this general lack of attention to PTSD diagnosis. Few studies have been published with specific attention to the examination of the psychometric properties of PTSD inventories in this population, and unfortunately, at least one of these is outdated (Coffey et al., 1998).

Given the high comorbid rates of PTSD, establishing psychometric soundness for PTSD measures within a substance using sample seems particularly important. Despite the popularity of the IES-R, very little work has been conducted on establishing its psychometric properties in specific populations. The current study provides initial support for the use of the IES-R in individuals with substance dependence disorders, and establishes evidence of reliability and validity within this population. Future studies may wish to examine the factor structure of this instrument among substance abusers, as well as the hypothesized links between chronicity and severity of symptoms in relation to the IES-R factor structure. A longitudinal examination of the IES-R factor structure at different time points during treatment or following a traumatic event may provide clarification of PTSD cluster-specific symptom change over time.

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Table 1

Demographics and self-reported measures by PTSD status in a substance dependent sample

	PTSD+ sample (<i>n</i> = 71)	PTSD- sample (<i>n</i> = 53)	Statistic (d.f.)	<i>p</i> -value
Age	34.6 (8.3)	36.7 (8.4)	<i>t</i> (122) = 1.37	.17
% Female	63.4%	24.5%	$\chi^2(1) = 17.66$	<.001
% White	66.2	45.3	$\chi^2(1) = 7.45$	.006
% Never married	43.7	52.8	$\chi^2(1) = 0.07$	.80
HS Diploma/GED (%)	40.8	37.7	$\chi^2(1) = 1.65$	.20
Unemployed (%)	67.6	60.4	$\chi^2(1) = 2.65$	.10
SMAST ⁺	9.0 (3.7)	8.9 (3.7)	<i>t</i> (68) = -0.16	.87
DAST ⁺	18.9 (3.5)	17.9 (4.7)	<i>t</i> (52) = -0.93	.36
IES-R Total	45.4 (17.8)	21.5 (19.2)	<i>t</i> (122) = -7.15	<.001
Intrusion	15.2 (7.6)	7.5 (7.7)	<i>t</i> (122) = -5.95	<.001
Avoidance	17.7 (6.1)	9.0 (7.7)	<i>t</i> (122) = -7.07	<.001
Hyperarousal	11.9 (6.4)	5.1 (5.6)	<i>t</i> (122) = -6.19	<.001
CAPS Total Score	94.9 (47.4)	38.3 (34.0)	<i>t</i> (116) = -7.59	<.001
Re-experiencing	21.7 (15.1)	3.2 (6.9)	<i>t</i> (100) = -8.24	<.001
Avoidance	40.8 (20.9)	18.3 (18.8)	<i>t</i> (117) = -6.08	<.001
Hyperarousal	32.2 (26.2)	17.6 (16.2)	<i>t</i> (120) = -3.58	<.001
BDI	13.9 (6.2)	8.8 (6.9)	<i>t</i> (121) = -4.22	<.001
SCL-90-R Positive Total	63.5 (17.1)	43.64 (21.8)	<i>t</i> (122) = -5.69	<.001

Notes. PTSD status determined by diagnostic interviews using the National Women's Study PTSD Module and the Clinician Administered PTSD Scale. Means and standard deviations are presented unless otherwise noted. PTSD = Posttraumatic Stress Disorder, SMAST = Short-Michigan Alcohol Screening Test, DAST = Drug Abuse Screening Test, IES-R = Impact of Event Scale-Revised, CAPS = Clinician Administered PTSD Scale, BDI = Beck Depression Inventory, SCL-90-R = Symptom Checklist-90-Revised.

⁺ SMAST calculated using drinkers only (*n* = 70), DAST calculated using drug abusers only (*n* = 54).

Table 2
Percentages of Participants Experiencing DSM-IV PTSD Criterion A Trauma Types and Percentage of these Individuals Reporting Multiple Trauma Events of Same Type

Trauma Type	% (out of $n = 124$) with ≥ 1 Event(s) Satisfying Criterion A ¹	% (n variable) with Multiple Criterion A Events of Same Type
Sexual Trauma (Forced or Coerced)		
Vaginal Penetration ($n = 58$) ²	75.9 ($n = 44$)	50.0 ($n = 22$)
Digit/Object Penetration	16.1 ($n = 20$)	15.0 ($n = 3$)
Oral Sex	28.2 ($n = 35$)	37.1 ($n = 13$)
Anal Sex	13.7 ($n = 17$)	11.8 ($n = 2$)
Touched	18.5 ($n = 23$)	13.0 ($n = 3$)
Attempted	19.4 ($n = 24$)	8.3 ($n = 2$)
Physical Assault with Weapon	78.2 ($n = 97$)	63.9 ($n = 62$)
Physical Assault without Weapon	66.9 ($n = 83$)	51.8 ($n = 43$)
Parental Abuse	37.9 ($n = 47$)	31.9 ($n = 15$)
Abuse in Adulthood	29.0 ($n = 36$)	25.0 ($n = 9$)
Other Event with Serious Injury or Physical Damage	19.4 ($n = 24$)	29.2 ($n = 7$)
Feared Injury or Death	30.6 ($n = 38$)	13.2 ($n = 5$)
Witnessed Serious Injury or Violent Death	54.0 ($n = 67$)	38.8 ($n = 26$)
Family/Friend Experienced Violent Death (murder, car accident)	39.5 ($n = 49$)	34.7 ($n = 17$)
Accident	55.6 ($n = 69$)	42.0 ($n = 29$)
Disaster	51.6 ($n = 64$)	15.6 ($n = 10$)
Other Stressful Incident	31.5 ($n = 39$)	25.6 ($n = 10$)

Note. Trauma history was collected using the National Women's Study PTSD Module.

¹ Column percentages do not sum to 100% as many participants reported multiple traumas that satisfied PTSD Criterion A.

² Percent calculated among females only ($n = 58$).

Table 3
Correlations between IES-R Total and Subscale Scores and Selected Measures in a Substance Using Sample

	IES-R Total	Intrusion	Avoidance	Hyperarousal
IES-R				
Total	--			
Intrusion	0.94	--		
Avoidance	0.89	0.72	--	
Hyperarousal	0.94	0.87	0.74	--
SCL-R-90				
Global Severity	0.70	0.62	0.61	0.72
Positive Symptom Total	0.68	0.62	0.58	0.71
Positive Symptom Distress	0.52	0.43	0.47	0.54
Anxiety	0.59	0.53	0.51	0.59
Depression	0.58	0.53	0.50	0.59
CAPS				
Total	0.58	0.53	0.53	0.54
Re-experiencing	0.60	0.58	0.53	0.55
Avoidance & Numbing	0.49	0.46	0.45	0.43
Hyperarousal	0.36	0.31	0.34	0.36
BDI	0.41	0.39	0.34	0.41

Notes: All correlations are significant at the 0.001 level. IES-R = Impact of Event Scale-Revised, CAPS = Clinician Administered PTSD Scale, SCL-90-R = Symptom Checklist-90-Revised, BDI = Beck Depression Inventory.

Table 4

Diagnostic Effectiveness Indices for Select Cutoff Scores of the Impact of Events Scale- Revised (IES-R) in a Substance Using Sample

Cut off value	Sensitivity	Specificity	Positive Predictive Accuracy	Negative Predictive Accuracy	Overall Classification Accuracy	Kappa
19	.93	.55	.73	.85	.77	.50
20/21	.93	.57	.74	.86	.77	.52
22/23/24	.92	.57	.74	.83	.77	.50
25	.89	.58	.74	.79	.76	.49
26	.86	.60	.74	.76	.75	.48
27	.83	.60	.74	.73	.73	.44
28	.82	.60	.73	.71	.73	.43
29	.82	.64	.75	.72	.74	.47
30	.79	.68	.77	.71	.74	.47
31	.75	.68	.76	.67	.72	.43
32	.74	.70	.76	.67	.72	.43
33	.73	.72	.78	.67	.73	.45
34	.70	.77	.81	.66	.73	.47