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PTSD Symptoms, Substance Use, and Vipassana Meditation among Incarcerated Individuals

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The present study evaluated whether Posttraumatic Stress Disorder (PTSD) symptom severity was associated with participation and treatment outcomes comparing a Vipassana meditation course to treatment as usual in an incarcerated sample. This study utilizes secondary data. The original study demonstrated that Vipassana meditation is associated with reductions in substance use. The present study found that PTSD symptom severity did not differ significantly between those who did and did not volunteer to take the course. Participation in the Vipassana course was associated with significantly greater reductions in substance use than treatment as usual, regardless of PTSD symptom severity levels. These results suggest that Vipassana meditation is worthy of further study for those with comorbid PTSD and substance use problems.

Co-occurring posttraumatic stress disorder (PTSD) and substance use disorders (SUD) are common (Kaysen, Simpson, Dillworth, Gunter, Larimer, & Resick, 2006; Kilpatrick et al., 2000; Stewart, Pihl, Conrod, & Dongier, 1998) and associated with poorer treatment outcomes than found with SUD only (Brown, Stout, & Mueller, 1996; Ouimette, Finney, & Moos, 1999). Recent evidence suggests that those with unremitted PTSD are at greater risk than those with remitted PTSD for continued SUD problems (Read, Brown, & Kahler, 2004), and that

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improvement in PTSD symptoms is more strongly associated with improvement in alcohol-related symptoms than is the inverse relationship (Back, Brady, Sonne, & Verduin, 2006).

Among incarcerated individuals, the rates of lifetime and current PTSD have typically been found to be high relative to the general population (Gibson et al., 1999; Spitzer et al., 2001; Teplin, Abram, & McClelland, 1996; Zlotnick et al., 1997), as are the rates of SUD (Kouri, Pope, Powell, & Oliva, 1997; Peters, Greenbaum, Edens, Carter, & Ortiz, 1998; Teplin et al., 1996). Incarcerated men with SUD and PTSD are more likely to have higher recidivism rates than those with only SUD and incarcerated women with both disorders are more likely to relapse than are those with only SUD (Kubiak, 2004). Thus, incarcerated individuals with comorbid PTSD and SUD are at higher risk for remaining entrenched in the judicial system (Ouimette et al., 1999).

Growing evidence suggests this comorbidity may be understood in the context of self-medication. Many individuals with PTSD and SUD have a subjective sense that substance use helps them manage intrusive PTSD symptoms (Simpson, 2003; Stewart, Mitchell, Wright, & Loba, 2004), and report that increases in PTSD symptoms lead to increased substance use (Brown, Stout, & Gannon-Rowley, 1998). Experimental evidence from a cue reactivity study (Coffey et al., 2002) suggests trauma-related cues are associated with increased substance craving, particularly for alcohol. Thus, it appears that those with significant PTSD symptoms may engage in self-medication and may be at greater risk for relapse due, at least in part, to their inability to tolerate negative internal and external experiences.

A variety of promising cognitive–behavioral interventions for those dually diagnosed with PTSD and SUD are emerging, including Seeking Safety (Najavits, 2004; Zlotnick, Najavits, Rohsenow, & Johnson, 2003), Substance Dependence PTSD Therapy (Triffleman, Carroll, & Kellogg, 1999), and "Transcend" (Donovan, Padin-Rivera, & Kowaliw, 2001). These interventions generally emphasize learning how to identify and cope with relapse triggers. Seeking Safety has been evaluated in an open trial with 17 incarcerated women. Reductions in both PTSD and SUD symptoms were reported by over half the participants (Zlotnick et al., 2003). Prolonged exposure, a treatment originally developed for PTSD (Foa, Rothbaum, Riggs, & Murdock, 1991), has also been evaluated among individuals with PTSD and SUD (Brady, Dansky, Back, Foa, & Carroll, 2001). Although those who completed the protocol showed substantial improvements in both their PTSD and SUD symptoms, only 38% of the participants completed the protocol, making it of questionable value for this population.

A potential alternative to these interventions are mindfulness-based interventions targeting experiential avoidance, which may be a central motivation for self-medication of PTSD symptoms with substance use (Batten & Hayes, 2005). Batten and Hayes suggest that rather than pairing successful elements of PTSD and SUD treatments, interventions that address common functional aspects of the two disorders, namely experiential avoidance, may be particularly useful. Mindfulness interventions seek to limit efforts to avoid internal and external experience by fostering nonjudgmental acceptance of moment-to-moment experiences. This may help to prevent relapse by decreasing the perceived need to avoid painful aspects of reality. Support for mindfulness interventions has been found in studies addressing stress and generalized anxiety (Kabat-Zinn et al., 1992), depressive relapse (Teasdale et al., 2000), and addictive behaviors (Marlatt et al., 2004).

In addition, mindfulness skills have been incorporated into interventions for patients with PTSD. Preliminary support for using mindfulness as one of several affect management strategies was found in a study of women with PTSD and histories of childhood sexual abuse (Zlotnick et al., 1997). However, it is difficult to draw strong conclusions from this study because the contributions of the various affect management strategies cannot be isolated. A study of Kosovo high school students with PTSD also found support for including meditation strategies in a mind–body skills intervention for PTSD (Gordon, Staples, Blyta, & Bytyqi, 2004). In addition, older research on transcendental meditation (TM) found that Viet Nam veterans who were randomized to a TM group showed improvement on PTSD, depression, alcohol consumption,

and family problems; the treatment-as-usual (TAU) control group showed no such improvements over the course of the 3-month study (Brooks & Scarano, 1985).

To our knowledge, there has been no previous research on the application of specific mindfulness meditation-based interventions for individuals who have both significant PTSD symptoms and substance use disorders. The present study represents secondary data analysis of a mindfulness meditation intervention that was conducted in a minimum security prison in Washington State (Bowen et al., 2006).

The parent study used a quasi-experimental design to assess the effects of a 10-day Vipassana meditation course on postrelease substance use and abuse and 6-month recidivism relative to treatment as usual. Results from that study indicate the Vipassana course was successful in decreasing postrelease substance use and psychiatric sequelae, relative to the treatment as usual condition (Bowen et al., 2006). The parent study did not address whether PTSD symptom severity was associated with differential outcomes. Although an intervention for people with significant PTSD and SUD symptoms that addresses experiential avoidance is conceptually appealing, such an intensive meditation course may essentially function as an exposure treatment that may not be well tolerated by highly avoidant individuals (Brady et al., 2001). To assess this possibility, we used existing data to evaluate whether Vipassana meditation had deleterious (or beneficial) effects for those with pronounced PTSD symptoms. We evaluated the following questions: (a) Are elevated PTSD symptoms associated with lower likelihood of volunteering for the meditation course? (b) Does PTSD symptom severity significantly moderate treatment outcomes such that greater PTSD severity is associated with poorer treatment response?

Method

Participants and Recruitment

North Rehabilitation Facility (NRF) residents incarcerated during the 10-day period of a Vipassana meditation course were eligible for recruitment. Individuals interested in participating in the study completed baseline consent and assessment ($N = 302$) and 88 returned for a 3-month, posttreatment follow-up assessment. Participants ranged in age from 19 to 60 ($M = 37.6$, $SD = 8.7$) and were predominantly men. The low proportion of women study participants is reflective of the proportion of women residents at the NRF. Sample characteristics for participants completing baseline consents and assessments ($N = 303$) and for those completing baseline and 3-month assessments ($n = 88$) are presented in Table 1.

Residents were incarcerated for a variety of offenses, the most common of which included driving under the influence, theft, drug possession, and prostitution. The NRF did not accept inmates with violent felony charges or sex offenses. The majority of residents at the NRF had some history of problematic substance use. Nearly three quarters (73%) reported using illicit drugs (marijuana, crack or powder cocaine, amphetamines, heroin, other opiates or analgesics, hallucinogens or methadone, not as prescribed) in the 90 days prior to incarceration.

Measures

The current analyses are based on a subset of measures administered in the original study. All measures were self-report. Demographic information was obtained and the PTSD Checklist was administered only at baseline. All other measures were administered at both baseline and follow-up assessments.

Demographic information was obtained on age, gender, ethnic background, education level, and employment status.

The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) assesses alcohol use quantity and frequency for both a typical week and the peak week in the past 90 days. The DDQ has previously demonstrated high reliability (Baer et al., 1992).

The Daily Drug-Taking Questionnaire (unpublished measure) (Parks, 2001) assesses 14 different drug categories for both a typical and peak week in the past 90 days.

The Short Inventory of Problems (SIP-2R) is a 15-item measure adapted from the Drinker Inventory of

Table 1. Sample Characteristics

	Full sample		3-Month completers	
Demographics	*n*	%	*n*	%
Men	203	67.2	58	65.9
Ethnicity				
European American	179	59.3	51	60.0
African American	39	12.9	11	12.5
Latino	20	6.6	8	9.1
Native American	22	7.3	7	8.0
Alaskan Native	8	1.3	2	2.3
Asian/Pacific Islander	3	1.0	0	0
Multiethnic/other	15	7.2	5	5.7
Education				
Middle school or less	66	21.9	17	19.3
High school or GED	177	58.6	55	62.5
College education	28	9.3	11	12.5
Postgraduate education	23	7.6	4	4.5
Employment				
Full time	117	38.7	31	35.2
Part time	51	16.9	20	22.7
Public assistance/SSI	35	11.6	10	11.4
Unemployed	93	30.8	26	29.5

Note. GED = General Equivalency Diploma; SSI = Social Security Insurance.

Consequences (DrInC; Miller, Tonigan, & Longabaugh, 1995) assessing impulse control, social responsibility, and physical, interpersonal, and intrapersonal consequences during the past 90 days. Validity and reliability has been demonstrated in individuals who abuse alcohol (Miller et al., 1995).

The Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982).The BSI is a 53-item measure used to measure psychological distress. This measure has been used with both nonclinical and clinical populations and it is reported to have good psychometric properties (Derogatis & Melisaratos, 1983).

The PTSD Checklist–Civilian version (PCL-C; Blake et al., 1995) is a 17-item diagnostic screening instrument paralleling the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*; American Psychiatric Association, 1994) criteria for Posttraumatic Stress Disorder. The PCL has good test–retest reliability and internal consistency (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). The PCL-C can be used as a continuous measure of PTSD symptom severity and cut scores of 42 for men (Spiro, Hankin, Leonard, & Stylianou, 2000) and 38 (Dobie et al., 2002) for women have been found to be indicative of PTSD diagnostic status.

Procedure

The study used a quasi-experimental design that compared the outcomes of those who volunteered for the Vipassana meditation course with the TAU comparison group. The NRF residents could voluntarily attend informational meetings to ask questions about the meditation course. They were informed that they could participate in the 10-day meditation course whether or not they agreed to be in the study, or participate in the study in a TAU control condition. Additionally, residents were told they were free to withdraw from either the course or the study at any time and confidentiality was assured.

The TAU participants received services as usual provided by the NRF staff, which included chemical dependency treatment and substance use education; mental health services; adult education, General Equivalency

Diploma (GED) testing, and vocational programs, as well as acupuncture. The Vipassana meditation courses were standardized 10-day residential retreats that involved a code of silence and meditation practice for about 11 hours a day. Nine separate meditation courses (five men's courses, four women's courses) were assessed. Course instructors were experienced meditators appointed by the Buddhist teacher S.N. Goenka. The practice consisted of developing nonjudgmental awareness of one's breath over the first 3 days and of one's bodily sensations over the final 7 days. Additionally, participants attended daily hour-long videotaped talks by S. N. Goenka on Buddhist principles with discussion of the role of attachment (craving or clinging to desired experience) and aversion (avoidance of undesired experience) in suffering. Participants were taught to observe, rather than avoid, sensations and experiences. The course is somewhat different from other mindfulness interventions, which are typically less spiritually grounded and taught in a more secular way. For further details on the Vipassana course, see Bowen et al. (2006). Throughout the course, there was no specific mention of alcohol or drug use, or any direct instruction regarding alcohol or drug-relapse prevention postrelease.

Due to the transient nature of the incarcerated population, it was not possible to determine at study enrollment that participants would be transferred or released prior to the end of the course. Thus, all interested inmates upon giving consent were given a baseline assessment. Of the original 303 study participants, 174 (57 Vipassana, 117 TAU) remained in the facility long enough to complete the postcourse assessment, and 88 completed the 3-month follow-up assessment (29 Vipassana, 59 TAU) after release from the NRF. Due to high attrition at the 6-month assessment and the large time range over which the data were collected (i.e., some as far out as 10 months postrelease), the present longitudinal analyses include only 3-month assessment data.

Because there are ethical concerns about randomization in incarcerated samples, we allowed inmates to choose which treatment and opted to allow all interested and eligible inmates to participate in the study. Of those participants who opted to participate in the study, fewer chose to take the Vipassana course than to participate in the TAU group, resulting in unequal cell sizes.

Participants received $5 for baseline and postcourse assessments and $30 for follow-up assessments.

Data Analysis

We first evaluated whether there were significant demographic or substance involvement differences between those who chose to participate in the Vipassana course as compared with those in TAU among the 88 who completed the 3-month follow-up using *t* and chi-square tests. An ANCOVA was used to evaluate whether there were significant differences in PTSD symptom severity between the two groups. The impact of PTSD symptom severity on substance use and general emotional distress outcomes was evaluated via hierarchical regression analyses. For each analysis, Step 1 consisted of the significant covariate, gender, baseline symptoms, Vipassana course, and PTSD symptom severity. Finally, to examine whether PTSD symptom severity moderates treatment outcomes, two-way product terms were entered at Step 2. For regression analyses, continuous variables were centered by subtracting the mean value from the individual score. This protects against reaching spurious conclusions regarding the impact of specific predictors, especially when examining interaction effects (West, Aiken, & Krull, 1996). A regression approach to analyses was selected both to avoid the problems associated with the use of arbitrary cut-off scores for PTSD and to maximize power in determining the impact of PTSD symptom severity on treatment outcomes.

Results

Independent sample *t* tests compared the 29 Vipassana and 59 TAU participants who completed postcourse and 3-month assessments on baseline measures of demographic, substance use, and psychosocial measures to assess for differences between groups at baseline. A significantly higher percentage of course participants were women (48% women Vipassana vs. 27% women TAU), χ^2 (1, $N = 88$) = 3.87, $p < .05$. No

Table 2. Types of Trauma Exposure Reported by Participants

	Full sample			3-Month completers		
Type of exposure	*n*	%	% Exposed PTSD +	*n*	%	% Exposed PTSD +
Natural disaster	145	48.0	23.4	48	54.5	18.8
Fire or explosion	74	24.5	28.4	21	23.9	19.0
Transportation accident	181	59.9	24.3	60	68.2	16.7
Physical assault	187	61.9	26.3	56	63.6	21.4
Assault with a weapon	135	44.7	28.9	42	47.7	26.2
Sexual assault	50	16.9	46.0	16	18.2	43.8
Other unwanted sexual experience	67	22.2	37.9	23	26.1	30.4
Combat or exposure to a war zone	25	8.3	28.0	4	4.5	0.0
Sudden unexpected death of someone close	131	43.4	40.0	40	45.5	70.0
Serious harm or death you caused someone	35	11.6	37.1	9	10.2	33.3

Note. PTSD = Posttraumatic stress disorder.

statistically significant differences were found ($p < .05$) between the Vipassana and TAU groups on ethnicity, education, employment, or baseline measures of PTSD cut-off scores, illicit drug use, peak alcohol use, or alcohol-related negative consequences. Types of trauma exposure and the rates of PTSD associated with each type of trauma are reported in Table 2. Within the full baseline sample, 24% of those who did not take the course and 26% of those who did take the course were above the PTSD cut-off score. Within the 3-month assessment sample 23% of those who did not take the course and 21% of those who did take the course were above the PTSD cut-off score.

To assess for differential attrition, both the full baseline sample ($N = 303$) and those who completed the post-course assessment ($n = 174$) were compared with those who completed the 3-month assessment ($n = 88$). Independent sample t tests showed no statistically significant differences ($p < .05$) on measures of age, gender, ethnicity, education, employment, PTSD severity, illicit drug use, alcohol use or associated consequences.

To examine whether PTSD symptoms were associated with likelihood of volunteering for Vipassana, we conducted a one-way ANCOVA, with course participation as the independent variable and PTSD symptom severity as the dependent variable and gender as the covariate. There was no significant difference in PTSD symptom severity between those who did and did not volunteer for Vipassana, $F(1, 86) < 1$. This analysis was also conducted with the full baseline sample to ensure that the result was not the product of differential attrition. Again, there was no significant difference in PTSD symptom severity between those who did and did not volunteer for Vipassana, $F(1, 294) < 1$.

As noted above, gender differed significantly between the two groups and therefore was included in analyses of course participation and PTSD symptom severity. The results of all regression analyses are presented in Table 3.

The first regression predicted 3-month peak drinking. The final model was significant, $F(5, 80) = 5.00$, $p < .001$, adjusted $R^2 = .20$. In that model, baseline drinking and course participation were the only significant predictors of 3-month peak drinking. Participation in the Vipassana course predicted lower 3-month consumption.

We next examined course participation and PTSD symptoms as predictors of drinking consequences (SIP). The final model was significant, $F\ (5, 81) = 10.76$, $p < .001$, adjusted $R^2 = .38$. Baseline drinking consequences and PTSD symptoms predicted 3-month drinking consequences. Posttraumatic stress disorder symptoms were associated with higher drinking consequences.

Course participation and PTSD symptoms were examined as predictors of 3-month days of illicit drug

use over a peak week. The final model was significant, $F(5, 65) = 4.79$, $p < .001$, adjusted $\chi^2 = .23$. Baseline illicit drug use and course participation predicted 3-month drug use. Course participation was associated with lower 3-month use.

Finally, course participation and PTSD symptoms were examined as predictors of 3-month psychological distress. The final model was significant, $F(5, 85) = 10.92$, $p < .001$, adjusted $R^2 = .37$. Baseline PTSD symptom severity was the only significant predictor of

Table 3. Hierarchical Regression Predicting Treatment Outcome From Course Participation and Posttraumatic Stress Disorder (PTSD) Symptoms

Analysis, step, and variable	*B*	*SE B*	β	R^2	ΔR^2
3-Month peak drinking					
Step 1				.25***	.25***
Gender	−1.82	1.96	−.10		
Baseline drinking	0.37	0.09	.42***		
Course participation	−1.90	0.93	−.21*		
PTSD symptoms	0.06	0.07	.08		
Step 2				.25***	.002
Gender	−1.82	1.97	−.10		
Baseline drinking	0.36	0.09	.41***		
Course participation	−1.91	0.94	−.21*		
PTSD symptoms	0.07	0.08	.10		
Course by PTSD interaction	0.03	0.08	.05		
3-Month drinking consequences					
Step 1				.41***	.41***
Gender	−1.67	2.62	−.06		
Baseline consequences	0.46	0.09	.48***		
Course participation	−2.58	1.29	−.18*		
PTSD symptoms	0.26	0.11	.25*		
Step 2				.42***	.003
Gender	−1.66	2.63	−.06		
Baseline drinking	0.45	0.09	.47***		
Course participation	−2.57	1.30	−.18		
PTSD symptoms	0.29	0.11	.27*		
Course by PTSD interaction	0.06	0.10	.06		
3-Month drug use (peak week)					
Step 1				.29***	.29***
Gender	−0.19	0.70	−.03		
Baseline drug use	0.32	0.11	.33***		
Course participation	−1.09	0.34	−.36***		
PTSD symptoms	0.02	0.03	.11		
Step 2				.29***	.000
Gender	−0.19	0.71	−.03		
Baseline drinking	0.32	0.11	.33***		
Course participation	−1.09	0.34	−.36***		
PTSD symptoms	0.02	0.03	.10		
Course by PTSD interaction	0.004	0.03	−.02		
Three-month psychological distress					

Continued

Table 3. *Continued*

Analysis, step, and variable	*B*	*SE B*	β	R^2	ΔR^2
Step 1				.41***	.41***
Gender	4.29	6.78	.06		
Baseline distress	0.29	0.16	.28		
Course participation	−6.02	3.33	−.16		
PTSD symptoms	0.96	0.43	.35*		
Step 2				.41***	.001
Gender	4.18	6.83	.06		
Baseline drinking	0.28	0.16	.27		
Course participation	−6.05	3.35	−.16		
PTSD symptoms	1.01	0.47	.37*		
Course by PTSD interaction	0.08	0.27	.03		

Note. All continuous variables were centered prior to calculation of interactions.
* $p < .05$. ** $p < .01$. *** $p < .001$.

3-month psychological distress, with those with higher PTSD symptoms reporting more psychological distress 3 months later.

Discussion

The present study evaluated whether a 10-day Vipassana meditation course offered in a minimum security prison was acceptable to inmates reporting relatively more severe PTSD symptoms, and whether PTSD symptom severity interacted with course status to influence 3-month substance use and psychological distress outcomes. The results indicate that there was not a significant difference in PTSD severity between those who did and did not volunteer for the course, suggesting that those with marked PTSD symptoms were not deterred.

The main findings of the present study indicate that a 10-day Vipassana meditation course was associated with comparable improvements in illicit drug use and drinking outcomes for those with and without marked PTSD symptoms. Just as Ouimette et al. (1999) found in their study of veterans dually diagnosed with SUD and PTSD, we found a main effect of PTSD such that those in our sample with marked PTSD symptoms were more severe at both the baseline and the follow-up assessments with regard to substance use consequences and psychological distress (cf., Read et al., 2004). Consistent with Ouimette et al's (1999) finding of no significant interactions on SUD outcomes with PTSD status, we also found no significant interactions between PTSD symptom severity and treatment outcome. It is possible that our encouraging results regarding a Vipassana meditation course derive from having provided inmates with a new way of dealing with painful affect and thoughts, including those that are trauma-related. We also find it noteworthy that although women were significantly more likely to choose to participate in the Vipassana intervention than men, the intervention appears to have been equally beneficial for both genders. Given our small sample size and relatively short-term follow-up, these findings should be interpreted judiciously, but do suggest that this may be a promising intervention for future study.

The study is not, however, without its limitations. First, the quasi-experimental study design allowed self-selection into the Vipassana course and therefore may have introduced bias and did yield unequal cell sizes. Although this design was appropriate given the exploratory nature of this study and the incarcerated sample, this is not as rigorous a test as a randomized clinical trial. The small final sample size also represents a noteworthy limitation, as it is possible that the insignificant interaction between PTSD severity and treatment outcome was due to low power. Future research in this area should incorporate random assignment and a sufficiently large sample stratified by PTSD diagnostic status. The use of self-report measures is another

potential limitation, particularly the validity of self-reported alcohol and drug use. Considerable research suggests self-report is a viable means of collecting accurate data if the measures are reliable and valid and confidentiality is assured (Babor, Stephens, & Marlatt, 1987; Darke, 1998), as was the case with the present study. However, given that this was an incarcerated sample, it is possible that substance use was underreported. There is no reason, however, to think that this would have differentially affected either treatment condition. In addition, the high attrition rate at the two follow-up points is unfortunate, although not unusual in this type of sample (Farrington, Petrosino, & Welsh, 2001). Our attrition analyses indicated that there were not significant differences on key indices between those we were able to follow and those who were lost to follow-up, which suggests our results are representative of the entire sample.

The results may also not be generalizable to a nonincarcerated population. Although this remains to be seen and is worthy of future study, in light of the enormous magnitude of the problems with recidivism and substance abuse following incarceration (Hiller, Knight, & Simpson, 1999), further work on this intervention in the criminal justice system appears warranted. It also would have been useful to have included both a measure of mindfulness and a diagnostic measure of PTSD, and future studies should do so. Finally, the PCL-C was not readministered at the follow-up assessments; thus, we do not know whether the intervention had any specific beneficial, or detrimental, effect on the participants' PTSD severity. However, the results from the measure of general psychological distress suggest that those with marked PTSD symptoms did not experience any exacerbation of their level of distress, which provides some reassurance that their PTSD was also not markedly exacerbated.

In closing, avoidance is not only central to the diagnosis of PTSD, but is also related to the exacerbation of symptoms (Marx & Sloan, 2005; Steil & Ehlers, 2000; Tull & Roemer, 2003), and has repeatedly been implicated in the relationship between PTSD and SUD (Simpson, 2003; Stewart et al., 2004). Mindfulness meditation may be conceptualized as an approach that directly opposes escape and avoidance. Exposure to trauma-related internal cues is thus facilitated as is being grounded in the present, while the impact of self-judgment and criticism are minimized. The results of the present study suggest that this intensive, mindfulness-based meditation course is tolerated well by those with PTSD symptoms, and may provide a viable treatment alternative for those dually diagnosed with PTSD and SUD. Moreover, these results suggest that mindfulness interventions and the mechanisms of change are important areas for future research.

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