



Interpersonal Trauma Exposure, Trauma Symptoms, and Severity of Substance Use Disorder among Youth Entering Outpatient Substance Abuse Treatment

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Abstract

A substantial body of literature has found associations between interpersonal victimization, trauma symptoms, and substance use disorders (SUD) among adolescents. Secondary data analysis was conducted on structured interview data collected by treatment providers as 172 adolescents (ages 12–19) entered outpatient substance abuse treatment. Results indicate high prevalence rates of interpersonal trauma exposure: 71.5% self-reported trauma exposure, specifically direct physical abuse or assault, sexual abuse or assault, and/or witnessing intimate partner violence of a parent. Severity of SUD, as measured by number of DSM-5 criteria endorsed, was not only associated with the number of types of criterion A events for Posttraumatic Stress Disorder but also more self-reported internalizing problems. There was no significant relationship between the severity of SUD and the severity of trauma symptoms at treatment intake, gender, or attention problems. Ongoing assessment of possible trauma symptoms is recommended throughout substance abuse treatment with youth who have reported trauma exposure, as well as continued screening of trauma exposure.

Keywords Interpersonal victimization · Posttraumatic stress disorder · Internalizing problems · Adolescents

Trauma exposure is associated with binge drinking (Cisler et al. 2011) and substance use disorders in adolescents (Blumenthal et al. 2008; Clark et al. 1997; Deykin and Buka 1997; Hawke et al. 2008; Lipschitz et al. 2003). The most commonly reported traumatic events among adolescents are interpersonal victimization such as physical abuse, sexual abuse, and witnessing violence against other people (Clark et al. 1997; Deykin and Buka 1997; Giaconia et al., 2000). In fact, there is a substantial body of literature that has found associations between interpersonal victimization and substance use problems among adolescents (Ford et al. 2010;

Kilpatrick et al. 2000; Kilpatrick et al. 2003; Titus et al. 2003; Widom et al. 1999). The prevalence of interpersonal victimization among clinical populations has been reported as high as 60% for an adolescent outpatient sample, and 87% in a residential treatment sample (Shane et al. 2006). With regard to one major type of interpersonal trauma exposure, child maltreatment, a review of 35 studies of community and school samples found significant associations between childhood maltreatment and alcohol and drug misuse (Tonmyr et al. 2010), consistent with findings from large scale studies in community, clinical and child welfare populations (Goldstein et al. 2011; Kobulsky et al. 2016; Yoon et al. 2017; Moran et al. 2004; Pilowsky and Wu 2006).

Substance use may serve as a coping strategy to buffer the emotional and neurobiological dysregulation associated with traumatic stress (Andersen and Teicher 2009; Briere et al. 2010; Cohen et al. 2003; De Bellis 2002), specifically managing feelings of shame (Goldstein et al. 2011). The self-medication model of substance use posits that individuals may use substances to alleviate negative affective states (Khantzian 1990, 2003). Research with adolescents and adults finds that the most common motives individuals with substance use disorders give for using substances is to regulate

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emotion, either by decreasing negative affect, increasing positive affect, or modifying an emotion (Cooper et al. 1995; Hides et al. 2008).

A dose response of exposure to potentially traumatic events, especially traumatic events of an interpersonal nature, has been found for co-occurring posttraumatic stress, major depressive disorder, and substance use disorder (Macdonald et al. 2010). Differences across types of trauma exposure and substances used are less clear. For example, Tonmyr and colleagues noted that a majority of literature finds significant associations between physical abuse, sexual abuse, and emotional maltreatment and alcohol and drug use in adolescence, however variations across age and specific substances were noted (Tonmyr et al. 2010). Child sexual abuse has been found to both increase risk (Moran et al. 2004) and decrease rates of substance misuse (Traube et al. 2012). Physical abuse has been noted to greatly increase risk of polysubstance abuse (Snyder and Smith 2015). Witnessing violence has also been found to be significantly associated with substance misuse (Berenson et al. 2001; Kilpatrick et al. 2000; Scheidell et al. 2018) and to increase risk of early initiation of alcohol use (Hamburger et al. 2008).

A number of trauma-related sequelae have been found to mediate the relationship between childhood trauma and adolescent substance misuse. A review of the literature found that the presence of Post-traumatic Stress Disorder (PTSD) symptoms rather than the past trauma exposure or a particular type of traumatic experience influenced substance abuse in adolescence (Nooner et al. 2012). PTSD and posttraumatic stress symptoms have been associated with increased risk of early initiation of alcohol use (Wu et al. 2010), drug use (Kilpatrick et al. 2000), substance misuse (Allwood et al. 2014) and cannabis use disorder (Cornelius et al. 2010) among adolescents. In clinical samples of adolescents with substance use disorders, rates of PTSD are consistently noted to be elevated compared to community samples (Chan et al. 2008; Clark et al. 1997; Jaycox et al. 2004; Lubman et al. 2007; Stevens et al. 2003). In a study of 297 adolescents (ages 15–19) in substance abuse treatment programs and with a diagnosis of alcohol and/or drug dependence, the lifetime prevalence of PTSD was 29.6%, which was five times higher than the prevalence rate for a community sample of adolescents (Deykin and Buka 1997). Importantly, research with adults suggests that comorbid substance use disorder (SUD) and PTSD are linked to greater impairment and may complicate treatment and treatment outcomes (Brown and Wolfe 1994). In a large, national, longitudinal sample of adolescents, PTSD significantly impeded reduction in alcohol use in adolescents with PTSD compared to those without PTSD (McCart et al. 2011).

Psychiatric comorbidity was associated with a positive diagnosis of PTSD among adolescents in substance abuse treatment (Deykin and Buka 1997). Among trauma-exposed adolescents, comorbidity with substance use and depression were more common than the occurrence of PTSD alone (Kilpatrick

et al. 2003). In a sample of 212 adolescents entering long-term residential treatment, adolescents with PTSD had higher internalizing problems compared to adolescents who were exposed to trauma but did not have PTSD and adolescents who were not exposed to trauma (Jaycox et al. 2004). A transactional-ecological model of developmental traumatology has posited that poor adaptive functioning increases externalizing problems prior to adolescence, which in turn increases risk of adolescent substance use (Oshri et al. 2011). Externalizing symptoms may mediate increased rates and severity of substance misuse for adolescents with prior exposure to maltreatment, while internalizing symptoms do not mediate in this way (Kobulsky et al. 2016). In a meta-analysis Attention Deficit Hyperactivity Disorder (ADHD) was present in 25% of the adolescents with SUD (van Emmerik-van Oortmerssen et al. 2012). Thus, consideration of comorbid mental health problems, in particular internalizing problems, externalizing problems, and attention deficits, is warranted when examining the relationship between PTSD and SUD among adolescents.

Various construct and operational definitions of substance use/misuse have been examined in the literature on the association of trauma exposure, posttraumatic stress, and substance use among adolescents: alcohol and drug use, alcohol and drug misuse, polysubstance abuse, substance misuse, early initiation of alcohol use, marijuana and hard drug use, cannabis use disorder, stimulant abuse and/or dependence, and substance use disorder. Severity of SUD, as represented by the number of DSM-5 criteria for SUD endorsed, was selected as the indicator of substance misuse in the current study to focus on adolescents with greater social problems associated with their substance use. Moreover, with regard to trauma exposure, this study focused on examining greater number of types of trauma exposure to better understand if there is a dose-dependent relationship with greater severity of SUD, even after controlling for other key factors, such as posttraumatic symptoms and comorbid internalizing and attention problems. Thus, the purpose of the current study is to examine the association of number of types of trauma exposure of an interpersonal nature, posttraumatic symptoms, and comorbid mental health problems with substance use severity (alcohol and/or drug) among adolescents entering outpatient substance abuse treatment. Understanding the multivariate relationships between these constructs can inform treatment providers about topics to include in screening, assessments, and treatment plans with adolescent clients.

Method

Participants

The sample consists of 172 adolescents (ages 12–19 years old) who entered outpatient treatment for substance abuse with

behavioral health providers who had received training in one of two evidence-based practices: (1) ENCOMPASS Cognitive Behavioral Therapy Plus (ENCOMPASS CBT+), and (2) Functional Family Therapy (FFT). Clients and their families participated in treatment in eight programs across one south-eastern state. The average age of clients was 15.6 (SD = 1.5). The majority of clients were male (61.6%) and 38.4% were female. Self-reported race of clients was White/Caucasian (85.5%), Black/African American (6.4%), Hispanic (2.3%), and multiracial (5.8%).

Procedure

The university Institutional Review Board approved all study procedures. This study is a secondary data analysis of the youth self-reported intake survey data collected by behavioral health providers using a secure, online, structured survey. Guidelines instruct outpatient programs to collect intake data within the first three sessions. Even though U.S. federal legislation generally requires parental permission for minors to participate in human research, there are important exceptions, and one that relates to substance abuse treatment research (Brody and Waldron 2000). The Office for Human Research Protections states that if minors have the legal right to consent to treatment for a specific problem (e.g., substance abuse, mental health, sexually transmitted disease, pregnancy) then minors have the right to consent independently to treatment research (45 CFR 46.402; Code of Federal Regulations, Title 45, Part 46, 1994). In the state where the study was conducted, state law specifically allows minors (with no minimum age) to obtain substance abuse treatment and mental health care without the consent of a parent or guardian. Thus, adolescents gave consent (as opposed to assent) to participate in this study.

A measure of self-reported traumatic stress was collected during the clinical intake process by treating providers and entered into a clinical database used by the clinical team to monitor symptoms during the service delivery process. Following the completion of treatment, this clinical data was merged with the research database described above using unique identifiers recorded in both databases. The use of clinical data for this investigation was approved by the appropriate university Institutional Review Board.

Measures

Sociodemographics Gender and date of birth were self-reported items from the Center for Substance Abuse Treatment (CSAT) Government Performance Reporting Act (GPRA) (Mulvey et al. 2005). A client's age was calculated from their self-reported date of birth and the date the intake was completed. The self-reported item asking clients their race was from the Teen Addiction Severity Index (T-ASI; Kaminer et al. 1991).

Substance Use The intake survey incorporated items from the alcohol and drug use sections of the T-ASI (Kaminer et al. 1991). Items included were number of months of use of alcohol and illegal use of various classes of drugs in the 12 months before entering treatment: marijuana, prescription opiates, heroin, methadone, buprenorphine, sedatives/tranquilizers/benzodiazepines, barbiturates, amphetamines, cocaine, synthetic marijuana, hallucinogens, and inhalants. Generic names, brand names, and slang terms were included with the questions about each class of substances to help prompt participants' recall and to allow for accurate classification of drugs. Prior research has found the T-ASI to have good reliability and validity (Kaminer et al. 1991; Kaminer et al. 1993).

Substance Use Disorder The 11 diagnostic criteria for substance use disorders included in the intake survey are from the DSM-5, which specifies how individuals can be classified on the severity of SUD based on the number of criteria selected: fewer than 2 (*none*), 2–3 (*mild*), 4–5 (*moderate*), and 6 or more (*severe*). The 11 criteria included in the DSM-5 are similar to the criteria in the DSM-IV, for which there is evidence of excellent test-retest reliability (Hasin et al. 1996) and validity. For example, Horton et al. (2000) found excellent test-retest reliability in a sample of African American and Caucasian individuals with alcohol dependence ($k = 0.78$, $k = 0.80$, respectively) and opiate dependence ($k = 0.77$, $k = 0.71$, respectively). However, the DSM-5 does away with the distinction between substance abuse and dependence, substituting severity ranking instead and the DSM-5 also deletes the criterion about legal problems arising from substance use and adds a new criterion about craving and compulsion to use. In an analysis that compared the diagnosis of substance abuse and dependence per the DSM-IV and the diagnosis of severity of substance use disorders per the DSM-5, Malone and Hoffmann (2016) found that diagnoses of the two sets of criteria were largely in agreement at either extreme of the diagnostic continuum (no disorder and severe substance use disorder), with the most variation for individuals who received a diagnosis of substance abuse per the DSM-IV.

Mental Health Problems The brief version of the Youth Pediatric Symptom Checklist (Y-PSC-17) was included in the intake survey to assess functioning in attention problems, internalizing problems, and externalizing problems with three subscales, consisting of 5 to 7 items each with response options: 0 (*Never*), 1 (*Sometimes*), and 2 (*Often*) (Gardner et al. 1999). The youth self-report version (and not the caregiver version) of the PSC-17 was selected to be consistent with the self-report method for the intake survey in the current study. In a large national sample of pediatric patients (ages 4 to 15 years old), internal consistency reliability (Cronbach's $\alpha = 0.89$) and test-retest reliability ($r = 0.85$) of the PSC-17 were high (Murphy et al. 2016). The PSC-17 has had identification

rates comparable to those of the PSC-35 (Gardner et al. 1999) and semi-structured interviews such as the Schedule for Affective Disorders and Schizophrenia for School-Age Children—Present and Lifetime Version (Gardner et al. 2007). The Attention Problems subscale and the Internalizing Problems subscale of the PSC-17 each have 5 items, with scores ranging from 0 to 10, and the Externalizing Problems subscale includes 7 items with scores ranging from 0 to 14. Internal consistency reliability for the subscales in the current study were: Attention Problems (Cronbach's alpha = .857), Internalizing Problems (Cronbach's alpha = .891), and Externalizing Problems (Cronbach's alpha = .776).

Traumatic Stress The Child PTSD Symptom Scale (CPSS) (Foa et al. 2001) has 24 items, 17 of which map directly onto the DSM-IV domains of re-experiencing, avoidance and hyperarousal. At the time of data collection, the CPSS for DSM-5 was not available. The CPSS produces an aggregate PTSD score, and separate subscale scores. Youth are asked to provide answers on a Likert-type scale where 0 is not at all, 1 is once a week or less/once in a while, 2 is 2 to 4 times a week/half the time, and 3 is 5 or more times a week/almost always. The CPSS also provides seven queries about functional impairment that are scored dichotomously as absent (0) or present (1). Scores range from 0–7, with higher scores indicating greater functional impairment. The CPSS has demonstrated good to excellent internal consistency ($r = .86$ for total score, $r = .77 - r = .83$ for subscales), and one week test-retest reliability was excellent ($r = .86$) (Gillihan et al. 2013). In this study, the internal consistency reliability was good ($r = .89$) (Meyer et al. 2015).

Trauma Exposure The number of types of criterion A stressors consistent with the DSM-5 was computed from multiple items from the Juvenile Victimization Questionnaire (JVQ; Finkelhor et al. 2005). Criterion A stressors are defined as experiences where the person was exposed to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence, or witnessing the trauma in person (American Psychiatric Association 2013). An item asking about witnessing intimate partner violence of a parent from the JVQ was included in the intake survey and classified as a criterion A stressor. Eight items assessing the client's experience of physical assault perpetrated by adults, peers, and intimate partners, and sexual abuse perpetrated by adults, peers, and intimate partners were modified from the JVQ and classified as criterion A stressors. Thus, the number of items endorsed was computed: the number of types of PTSD criterion A stressors.

Data Analysis Plan Bivariate tests of association of the variables of interest were conducted (i.e., Pearson correlation, student t test, and chi square test of independence) and

informed the inclusion of variables in the logistic regression model. To examine the association of greater types of trauma exposure, trauma symptomatology, and substance use disorder, a linear regression was conducted with number of DSM-5 SUD criteria regressed on number of types of PTSD criterion A events, the CPSS score, gender (1 = Male, 2 = Female), score on the PSC Attention Problems, and score on the PSC Internalizing Problems subscale (0 = No, 1 = Yes). The alpha was set at $p < .05$ for all statistical tests.

Results

High rates of interpersonal trauma exposure were found in this youth sample: 71.5% ($n = 123$) of youth reported at least one type of event that fit criterion A of the PTSD diagnosis and 55.2% ($n = 95$) of youth reported more than one type of criterion A event, with no significant difference by gender. Of the 123 youth who reported at least one type of event that fit criterion A of the PTSD diagnosis, the average number of types of trauma exposures was 2.6. Of the 172 youth in the sample, the following percentages of youth reported lifetime experience of the different type of interpersonal trauma exposures: 43.0%, physical assault (by peers other than siblings), 35.5%, physical maltreatment by an adult, 27.9%, physical attack by a group of kids, 27.9%, witness intimate partner violence of a parent, 20.9%, sexual abuse by a known person, stranger, peer or partner, and 18.0%, had physical assault by a partner.

Bivariate Pearson correlations between interpersonal trauma exposure, trauma symptomatology, other mental health problems, and substance use severity are presented in Table 1. The number of PTSD criterion A types of events was significantly, positively correlated with youth's scores on the CPSS, the number of DSM-5 symptom criteria for substance use disorder, the average number of classes of illegal drugs used, and average scores on the PSC Attention Problems, Internalizing Problems, and Externalizing Problems subscales. Average scores on the CPSS were significantly positively correlated with the PSC Attention Problems, Internalizing Problems, and Externalizing Problems subscales. The average number of DSM-5 SUD criteria was significantly associated with the average scores on the PSC subscales.

Table 2 presents the results of the linear regression with number of DSM-5 SUD criteria as the criterion variable. The results of the regression indicated the only statistically significant predictors, when regressed on number of DSM-5 SUD criteria, were the number of PTSD criterion A events and the score on the Internalizing Problems subscale. Gender, CPSS score, and the PSC Attention Problems subscale were not significantly associated with the number of DSM-5 SUD criteria endorsed.

Table 1 Correlations for Trauma Exposure, Trauma Symptomatology, Other Mental Health Problems, and Substance Use at Treatment Intake (*n* = 172)

	Number of types of PTSD criterion A events	Score on CPSS	Number of DSM-5 SUD criteria endorsed events
Number of types of PTSD criterion A events reported	1		
Score on CPSS at intake	.307***	1	
Number of DSM 5 SUD criteria endorsed	.308***	.130	1
Average number of classes of illegal drugs used in the 12 months before entering treatment	.327***	.133	.627***
Average maximum number of months used illegal drugs in the 12 months before treatment	.135	-.012	.332***
Average number of months used alcohol in the 12 months before entering treatment	.042	.045	.403***
Score on PSC Attention Problems subscale	.342***	.390***	.206**
Score on PSC Internalizing Problems subscale	.410***	.433***	.363***
Score on PSC Externalizing Problems subscale	.328***	.171*	.228**

p* < .05, *p* < .01, ****p* < .001

Discussion

This study investigates associations between number of types of trauma exposure, mental health symptoms, and substance use severity in a sample of treatment-seeking youth. The results of this study suggest that in this population, the extent and severity of substance use is, in part, a function of greater types of trauma exposure, and that clinical remedies for adolescent addiction may be enhanced by understanding the symptom development, progression and maintenance process from a trauma perspective. This is particularly salient given literature that suggests trauma exposed youth have impaired recovery when they receive treatment focusing only on addiction (Funk et al. 2003; Grella and Joshi 2003).

Youth in this study were referred to outpatient treatment for substance use disorders, yet almost three-fourths of individuals self-reported trauma exposure, specifically direct physical abuse or assault, sexual abuse or assault, and/or witnessing intimate partner violence of a parent. This level of exposure is higher than that reported in representative studies of

adolescents with rates of 68.2% (Copeland et al. 2007), 43% (Giaconia et al. 1995), and 12% to 54.2% for youth in foster care (Greeson et al. 2011). These experiences represent profound interpersonal violations that have been empirically established to lead to impairment in several areas of functioning and development (Cook et al. 2005). Additionally, these complexly traumatized youth can develop maladaptive behaviors that can alter their life course and mental health trajectory (Ford et al. 2010). Indeed, findings of this study document significant psychiatric comorbidity and positive correlations between youth trauma symptom scores, attention problems, internalizing problems, external problems, and the number of DSM-5 symptom criteria for substance use disorder. This substance use profile includes the utilization of more and different classes of illegal drugs, and higher addiction severity in those with more extensive trauma histories. Given the fact that the majority of the youth included in this study had multiple types of trauma exposures, findings from the Adverse Childhood Experiences Study provide some support for this pattern of disturbance, that is, that more types of childhood

Table 2 Predictors of Severity of Substance Use Disorder at Intake (*n* = 172)

Variable	Number of DSM-5 SUD criteria endorsed			
	B	SE B	β	t
Constant	2.540	.933		2.722
Gender (1 = Male, 2 = Female)	-.137	.592	-.018	-.231
Number of types of Criterion A events in lifetime	.480	.186	.204	2.574*
CPSS score	-.018	.026	-.055	-.668
PSC Attention Problems score	-.051	.113	-.042	-.454
PSC Internalizing Problems score	.376	.111	.333	3.394**
<i>F</i> (5, 166) = 6.627, <i>p</i> < .000				
<i>R</i> ² = .166				

p* < .05, *p* < .01

adversity were related to increased risks of drug initiation, drug use, and drug addiction in a strong and graded fashion (Dube et al. 2003).

A significant finding in this study was that the severity of the substance use disorder, as represented by the number of DSM-5 criteria for SUD endorsed, was not only associated with the number of types of criterion A events for PTSD but also higher self-reported internalizing problems. Koob and Le Moal's (2008) model of addiction poses that the allostatic load derived from trauma exposure and accelerated by the pharmacological effects of illegal substances "promotes neuroadaptation to drug effects, modulates sensitization to rewards and punishment, and intensifies negative mood states" (p. 182). This pattern is cyclical, such that further substance use is needed to counteract the dysphoric mood produced by the addiction, which may have been initiated by the trauma exposure, depending on the temporal onset of events (Koob and Le Moal 2008). Youth with comorbid substance use and trauma exposure require treatment approaches that can simultaneously attack both mechanisms of action to interrupt this habituating cycle. The Integrated Dual Disorder Treatment (IDDT) model is an evidence-based framework that could be used to combine adolescent substance abuse treatment with empirically established trauma treatments to reduce trauma symptoms, improve functioning, and promote recovery or remission from addiction (Drake et al. 2006).

Interestingly, there was no significant relationship between the severity of substance use disorder and the severity of trauma symptoms (as measured by the CPSS) at treatment intake, despite literature reviews of other studies that document the link between PTSD symptoms and severe substance use (Brady et al. 2004; Jacobsen et al. 2001). In the current study, it is possible that recent substance use may have moderated trauma symptom presentation at intake, though additional investigation is needed for confirmation. Existing research suggests that youth may use anxiolytic, depressant and analgesic medications to aid sleep, reduce irritability, improve attention, reduce hypervigilance, and control excessive startle responses and/or averse nightmares (Stewart et al. 1999; Tull et al. 2015). Substance using youth may be unaware of or unable to detect symptoms, compromising the accuracy of self-reports during the intake process, a time when they are just beginning the process toward recovery. Therefore, whenever possible the inclusion of collateral respondents (caregivers, child welfare workers, service providers) can provide a more comprehensive picture of the trauma symptoms of these youth. It is also possible that substance use increases vulnerabilities to victimization and can impair recovery from previous trauma exposures (Messman-Moore et al. 2008; Gilreath et al. 2014). Ongoing assessment of possible trauma symptoms is recommended throughout substance abuse treatment with youth who have reported trauma exposure, particularly

greater trauma exposure, as new experiences may arise, and/or reactions may emerge once the suppressive effects of substances abate. Moreover, it is recommended that therapists use trauma history screening measures to re-assess a youth's trauma experiences intermittently during treatment episodes to reveal any new exposures that may confound treatment recovery. Safety skill training and trauma psychoeducation programs may assist adolescents in increasing their capacity for self-protection and can be an important prevention practice that can easily be integrated into a dual disorder treatment framework, if these components are not already part of the trauma services provided.

This study has some limitations that must be considered. As a cross-sectional study, causality cannot be inferred. Additionally, youth data are based on self-report, and may have been influenced by their reluctance to be truthful about their experiences. Even so, rates of endorsement of trauma experiences and substance use patterns are not consistent with a pattern of social desirability bias and reflect reporting about sensitive topics that is convergent with data reported in other studies (Johnston et al. 2006). The study was limited in its inventory of types of trauma exposures, making it likely that there are other events (e.g. sex trafficking, bullying, etc.) that were not captured or recorded. This may have led to an underreporting of trauma experiences. Although the sample size was sufficient to retain power for the multivariate analysis, the experiences captured represent a fraction of those with substance use disorders, many of whom are not treatment seeking. Thus, generalizability is limited.

Future research should further examine the relationship between greater trauma exposure and addiction development, maintenance and recovery using longitudinal samples so that the direction of causality can be determined, and the moderating effects of clusters of trauma symptoms can be explored. Even though some prospective investigations have found that PTSD typically precedes substance use (Lipschitz et al. 2003; Reed et al. 2007; Wu et al. 2010), another way in which substance use and trauma exposure are associated is that substance use can increase the risk for interpersonal trauma exposure, specifically victimization (Haller and Chassin 2014; McCart et al. 2012) and the development of trauma symptoms because substance use interferes with emotion regulation (Giaconia et al. 1995). Understanding the nature of the associations (unidirectional, bidirectional or related to exogenous variables) has important implications for prevention and intervention and can advance theory development regarding the essential elements of integrated, trauma-informed substance use treatment.

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Compliance with Ethical Standards

Disclosure of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical Standards and Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation [institutional and national] and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.”

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