

Genevieve E. Chandler, PhD, RN O Karen A. Kalmakis, PhD, MPH, FNP-BC, FAANP O Teri Murtha, DNP, PMHNP, CNS-BC

Conclusions: The trauma-informed care approach is intended to promote mindfulness regarding the effect of ACEs on substance abuse in this population. Screening for ACEs is necessary if effective interventions are to be provided, with the goal of improving client outcomes.

ACEs are associated with most of our nation's public health problems, including SUD and depression (Kalmakis & Chandler, 2015). The evidence of a significant relationship between ACEs, alcohol abuse, and mental health disorders (Choi, Dinitto, Marti, & Choi, 2017; V. J. Edwards, Holden, Felitti, & Anda, 2003; Strine et al., 2012); ACEs and adult substance abuse (Banducci, Hoffman, Lejuez, & Koenen, 2014; Mandavia, Robinson, Bradley, Ressler, & Powers, 2016; Mersky, Topitzes, & Reynolds, 2013); and, more specifically, ACEs and opioid use (Austin, Shanahan, & Zvara, 2018; Stein et al., 2017) is convincing. The original ACE study ($n = 17,421$) provided evidence for a graded relationship between the numbers of ACEs reported and the health risk behaviors and diseases among participating adults (Felitti et al., 1998). This relationship has been confirmed and broadened through recent research that examined the associations between ACEs and binge or heaving drinking, smoking, diabetes, heart disease, stroke, depression, and disability (Campbell, Walker, & Egede, 2016; Kalmakis & Chandler, 2015) as well as adult mental health problems (Curran, Adamson, Stringer, Rosato, & Leavey, 2016; McCrory, De Brito, & Viding, 2010). As the

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number of ACEs increase, the risk for an SUD in adulthood increases (LeTendre & Reed, 2017). Indeed, the chronicity of childhood abuse compounded by multiple subsequent traumas may result in a cumulative effect on long-term psychological and physical health (Cloitre et al., 2009).

Socioeconomic Considerations

The original ACE study was based on a sample of 49.7% White participants, of whom 51.4% had a college education. A relationship between ACE exposure and 10 risk factors—smoking, severe obesity, physical inactivity, alcoholism, depression, suicide attempts, any drug abuse, parenteral drug abuse, increased number of sexual partners, and sexually transmitted diseases—was found (Felitti et al., 1998). Subsequently, a study among socioeconomically disadvantaged individuals reported higher incidences of ACEs among participants, including growing up in a household with a family member who misused substances or was imprisoned (Merritt et al., 2013).

Neuropsychological Effects of Trauma

The developmental impact of traumatic events occurring during childhood can produce a change in neurological processes in the brain, resulting in long-term consequences over the lifespan (Ford et al., 2014; Van Der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005). The effects of childhood abuse on the developing brain are well documented (D'Andrea, Ford, Stolbach, Spinazzola, & van der Kolk, 2012). A randomized controlled trial was used to examine the effects of ACEs and SUDs on altered limbic neurobiology, relapse severity, and reduced limbic gray matter volume using magnetic resonance imaging, with the goal of identifying structural changes in the brain. Results indicated that childhood maltreatment resulted in decreased gray matter that was predictive of a shorter time to relapse on substances ($p = .04$; Van Dam, Rando, Potenza, Tuit, & Sinha, 2014).

Similarly, SUD treatment clients with histories of trauma had higher rates of relapse and worse treatment outcomes when compared with those without histories of childhood trauma (Choi et al., 2017; K. M. Edwards et al., 2017; Grupp, 2008; Hien, Campbell, Ruglass, Hu, & Killeen, 2010; Hien, Cohen, Miele, Litt, & Capstick, 2004; Valerie, George, Vincent, & Robert, 2003). Complex trauma affects the developing brain, in particular, emotion regulation, resulting in an inability to modulate distressing emotions in a healthy manner (Cloitre et al., 2009). Thus, self-medication with substances may represent an attempt to cope with overwhelming emotions.

The hypothalamic–pituitary–adrenal axis is responsible for increased cortisol levels, which influence chronic neurobiological changes within the hippocampus, neural synapses and receptors, and dendritic spines of the developing brain after persistent adversity (Horner, 2015). In effect, the brain is in a constant state of activation, as the inherent evolutionary purpose of the limbic system for survival is overutilized, resulting in detrimental effects on the developing brain, including the immune and inflammatory processes (Horner, 2015). Thus, the individual may develop faulty coping mechanisms

resulting in physical disease, behavioral issues, and social limitations (Cloitre et al., 2009; D'Andrea et al., 2012; Van Der Kolk et al., 2005). These neurobiological changes that result from the brain's response to ACEs form the basis for using TIC with individuals who have experienced childhood trauma (Agerwala & McCance-Katz, 2013; Leitch, 2017).

Despite the evidence of a relationship between ACEs and SUDs, the clinical practice of separating SUD and mental health treatment persists within both the recovery and mental health communities (Blakey & Bowers, 2014). An understanding of the underlying pathology contributing to mental illness after ACEs is needed if care for SUDs is to improve (Blakey & Bowers, 2014; Cohen et al., 2013; Grupp, 2008; Mandavia et al., 2016; Strine et al., 2012). The current approach to mental health and SUD treatment negatively affects recovery from both, primarily because of the different treatment philosophies and funding resources (Blakey & Bowers, 2014; Hien et al., 2010).

THEORETICAL FRAMEWORK

The TIC model provides a framework for recognition and consideration of the effect of past trauma on the behavior and health of individuals receiving care in behavioral and substance abuse centers (SAMHSA, 2014). Trauma influences individuals, their environment, their social network, and their experiences of treatment (SAMHSA, 2014). Both clients and health providers may have been affected by previous trauma; therefore, incorporation of TIC into clinical practice provides an informed and sensitive way to avoid retraumatization of patients and providers (SAMHSA, 2014). The long-term effects of childhood adversity may threaten the ability to learn self-regulation skills needed to develop self-control and self-efficacy, thereby disrupting the establishment of interpersonal relationships that may be beneficial (Hooper, Bassuk, & Oliver, 2009). Indeed, the use of a TIC model for women in sober housing successfully showed how use of the model in the recovery process improved daily living (K. M. Edwards et al., 2017).

Under the TIC model, people who have experienced trauma are believed to be doing the best they can to cope given their life history, limited internal resources, and few external cultural and social supports. By being trauma informed, providers are able to tailor treatment interventions and facilitate recovery (Kezelman & Stavropoulos, 2012; SAMHSA, 2014). Therefore, the TIC model was used to guide this study.

METHODS

Design

Individual interviews, questionnaires, and postinterview survey and reflections were used in this cross-sectional clinical translation study to assess the incidence of ACEs and the efficacy and feasibility of trauma-informed screening for ACEs among individuals in an SUD recovery program.

Sample, Setting, and Population

Clients of an SUD treatment program in Baltimore, Maryland, were recruited for the study. The treatment program provides

abstinence-based alcohol and drug treatment services in an outpatient setting. Services provided include assessment and evaluation of SUDs, psychoeducation sessions on SUDs, family education, drug testing, and introduction to 12-step programs, including Alcoholics Anonymous and Narcotics Anonymous. The program allows clients to continue to work and stay at home during SUD treatment, or if they choose, the program provides safe, clean, and supportive housing for men and women recovering from drug and alcohol addiction. The recovery houses provide a healing environment with the primary purpose to transition the individual recovering from active addiction to a sober way of living. Clients reside in a single room in a home shared by other clients. Stringent rules and regulations are initiated upon admission for the safety of the client and others in the home.

Procedure

After human subject approval from the University of Massachusetts Amherst Institutional Review Board, recruitment flyers were placed in the treatment center and treatment housing. The SUD counselors and program directors were briefed on the project and were provided flyers. In addition, time was provided at the beginning of center classes for a brief overview of the study as well as times and location for interviews. Individuals over the age of 21 years with a diagnosis of SUD who were enrolled in the recovery program were eligible to participate. Patients with untreated severe mental health disorders were excluded. Of the 30 individuals recruited for the project, none was excluded from participation.

All ACE screening interviews were conducted by a Doctor of Nursing Practice (DNP) student who is a psychiatric mental health nurse practitioner with over 15 years of clinical experience. The student received education in TIC. The screening interviews took place during normal center hours, 15 minutes before the start of classes. Screening interviews were conducted in a private room provided by the center. At the start of each interview session, participants were reminded of the study purpose, the provision of confidentiality, and the right to decline or stop participation at any time. Once consent was obtained, the demographic questionnaire was administered. Next, the ACE screening interview was conducted followed immediately by the childhood experiences questionnaire. Questionnaires were identified by project numbers only. The questionnaires were stored in a locked file at the DNP student's office. Beverages, snacks, and a \$15 gift card were provided to clients at the end of each interview. Community resources, a brochure about ACEs and health, a pamphlet on available grounding and mindfulness skills services, and referrals for therapy were provided to participants after the interviews. The community resources, and the brochure specifically designed for this project, were made available in the center and recovery houses as well.

Interview Protocol

A nonjudgmental, trauma-informed, patient-centered ACE screening interview, previously found to be effective in screening for ACEs in a primary care setting, was used (Kalmakis,

Shafer, Chandler, Aponte, & Roberts, 2018). The interview protocol included (a) a brief explanation of the relationship between ACEs and adult health, including SUD; (b) a request that the participant "tell me about your childhood?"; and (c) a compassionate response and discussion about appropriate supportive follow-up care.

Measures

The Positive and Adverse Childhood Events Survey (PACES) was used in this project as a self-report measure of childhood adversity and protective childhood experiences before the age of 18 years (Leitch, 2015). This questionnaire was chosen because it intersperses protective questions that highlight client resilience in between the ACE questions. The protective items included questions about family support, activity, and community involvement. This format is believed to decrease the potential for triggering clients and retraumatization (Leitch, 2015). The questionnaire included 10 "yes or no" items of individual strengths as well as the established ACE score items (Felitti et al., 1998). The ACE score has been used numerous times and has been found to be a reliable, retrospective assessment of ACEs, with a test-retest reliability of .64 (Dube et al., 2004). ACE questionnaire items included physical (1), sexual (1), and psychological (1) abuse, neglect (2), and household dysfunction (5).

Demographic information, including age, marital status, race, and ethnicity, were also obtained via a self-report questionnaire. The interviewer asked each participant what their drug of choice was and how long they had been in SUD treatment. After each interview, the DNP student recorded the screening time as well as reflections on the client responses.

Data Analysis

Data gathered from the 30 participants were entered into SPSS statistical software and double-checked for accuracy. One participant did not respond to the PACES questionnaire. The PACES score was separated into the two major components, childhood adversity and positive childhood experiences, which were then considered as separate continuous measures for analysis purposes. Time to interview was considered a continuous variable. Descriptive statistics were used to analyze demographics, ACE and protective factors, self-reported diagnoses, and postintervention survey data. The DNP notes, included in the postinterview reflections, were reviewed and grouped into common ideas as shared by participants, as well as interesting impressions, insights, and responses to the interviews.

RESULTS

Thirty clients consented and participated in the study. All participants had an SUD diagnosis and ranged in age from 21 to 70 years. The drug of choice for 29 participants was opioids; one participant reported use of alcohol only. More than half were African American, and most were unmarried, with varying educational levels. Eighty percent of the participants were not currently working (see Table 1). Time enrolled at the center ranged from 1 to 51 days, and 20% of the participants had been enrolled within the last 2 days.

TABLE 1 Participant Demographics

Demographic Variables	Participants (N = 30)
Gender	
Male	11
Female	19
Race/ethnicity	
White	14
African American	14
Hispanic	2
Marital status	
Single	20
Separated/divorced	8
Married/living with partner	2
Age (years)	
21–30	14
31–40	7
41–50	5
50+	4
Education completed	
Grade school	8
GED	4
High school	15
College	3

Of the 29 participants who responded to the PACES questionnaire, all reported at least one ACE (see Figure 1). Of these, 82.8% ($n = 24$) reported more than four ACEs. The mean ACE score for the sample was 5.8 ($SD = 2.35$), with a range of 1–10 (see Table 2). The mean resiliency score (protective PACES items) was 7.27 ($SD = 2.08$), with a range of 3–10. Among the participants for this study, 96.6% reported experiencing more than four protective factors in their childhood, and more than half (55.2%) reported experiencing eight or more protective factors (see Figure 2).

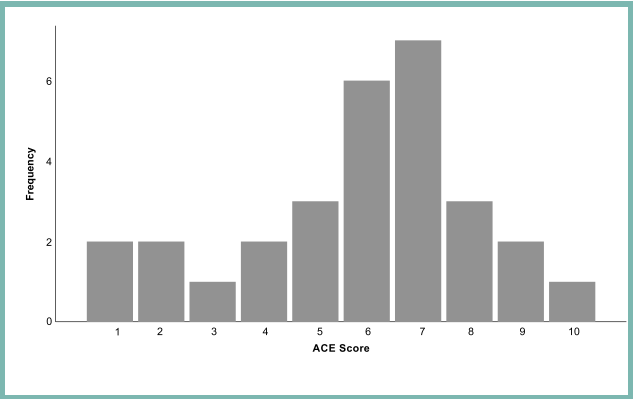


Figure 1. Total ACE score ($N = 29$).

TABLE 2 Specific ACEs Answered as Yes ($N = 29$)

Specific ACE	Frequency	%
Not including spanking, did any adult in your home ever physically hurt you by hitting, kicking, etc.?	17	58.6
Did anyone in your home often swear at you, insult you, put you down, or humiliate you?	22	75.9
Did anyone at least 5 years older than you sexually abuse you (including unwanted touching)?	11	37.9
Did you often or very often feel that no one in your family loved you or thought you were special?	18	62.1
Did you often or very often feel you didn't have enough to eat, had to wear dirty clothes, or were left alone or with other young children without an adult in the house?	4	13.8
Did any adults who lived with you use drugs or get drunk in front of you so much that they couldn't care for themselves?	18	62.1
Did you experience death of a parent, abandonment, or divorce?	24	82.8
Was there violence in your home such as hitting, throwing things, kicking, or threatening with a weapon such as a gun or knife?	22	75.9
Did anyone in your home get arrested or go to jail/prison?	18	62.1
Was anyone in your home depressed, mentally ill, or suicidal?	19	65.5
ACE(s) = adverse childhood experience(s)		

Of the 30 study participants, 12 (40%) received referrals for further mental health counseling after the ACE screening interviews. Twelve (40%) requested no mental health referral at the time, and six (20%) were considered not to need mental counseling, because they were currently receiving counseling.

Interview Notes

One of the most notable findings among the postinterview reflections was the general lack of awareness, to this point, of the relationship between ACEs and current SUD. Once the participants understood the correlation between ACEs and drug use, they appeared visibly relieved to learn that their symptoms and challenges in staying clean were not because they were “damaged goods” but rather experienced long-lasting effects of childhood adversity. They were reassured to learn that they were not “crazy.” Gaining knowledge about the impact of ACEs on their recovery seemed to provide a sense of

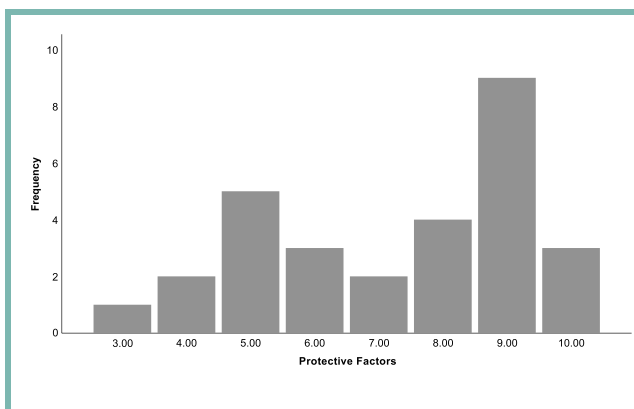


Figure 2. Total protective factors score ($N = 29$).

relief and a feeling that they were “normal.” Once they recognized the effect of ACEs, participants talked openly about traumatic events in childhood and felt encouraged to divulge sensitive information.

DISCUSSION

Consistent with previous studies, there was an increased number of ACEs in the population with SUD compared with the general population. All participants who responded to the PACES questionnaire reported at least one ACE; and 82.8%, four ACEs. This is compared with the finding from the Behavioral Risk Factor Surveillance System ACE data of a random national sample, in which 14.3% of respondents reported more than four ACEs (Centers for Disease Control and Prevention, 2010). ACE scores of 4 or more have been associated with binge drinking, heavy drinking, smoking, risky HIV behaviors, and depression (Campbell et al., 2016).

The number of participants who reported experiencing protective factors in their childhood was unexpected; 96.6% reported experiencing at least four protective factors. ACEs can interrupt healthy development; yet, if protective factors are accessible, it is hypothesized that stress may provide an opportunity to build resilience. Rutter (2012) referred to the “steeling effect” as a way that resilience can support health and well-being. However, the findings from this study did not support the idea that protective factors lead to resiliency and improved health outcomes in this population.

Through this translational research project, we showed the efficacy of the three-part screening interview with individuals diagnosed with SUDs. On the basis of the results of this project, nurse practitioners, and SUD counselors, could effectively administer the screening interview within a reasonable time frame, consistent with reports of its use in primary care (Kalmakis et al., 2017).

The interviewer was aware that individuals in the early phases of treatment for SUDs are vulnerable to relapse, so asking the questions pertaining to child trauma may elicit negative, uncomfortable emotions. As the purpose of the project was to gather data concerning the three-phase protocol, and not therapy, caution was required to prevent overwhelming emotions. The DNP student, skilled in trauma therapy, recognized signs

of being overwhelmed and contained emotions as necessary. The three-part screening interview, however, supported a nonjudgmental approach that led to a relaxed and trusting session. The interview procedure provided a validating, compassionate atmosphere. Participants were initially guarded but, as the interview progressed, became noticeably calm, validating the effectiveness of the protocol and responding positively to the third phase that emphasizes that the interviewer responded with compassion.

The use of ACE screening has been recommended to identify individuals with a greater risk for opioid misuse and to increase the potential of prevention and intervention efforts by understanding the upstream social determinants of opioid use (Austin et al., 2018; Stein et al., 2017). The screening interviews provided an opportunity for the participants to consider the role of ACEs in their current substance use. The question posed in the original ACE study needs to be considered: Is substance abuse an attempt by the individual to self-heal after ACEs (Felitti, 2002)? If so, introducing the idea that ACEs may play a significant role in the development of SUDs raises self-awareness and perhaps paves the way for self-acceptance and recovery.

LIMITATIONS

Although this project showed the feasibility of conducting an ACE screening intervention in an SUD treatment center and the prevalence of ACEs among clients with SUDs, the sample size was small, limiting generalizability. In addition, the participants were all from one treatment center in an urban environment, also limiting generalizability to persons with SUDs in the United States.

CONCLUSION

Early childhood trauma may result in profound, developmental injuries that manifest over the lifespan in certain individuals. The three-phase screening interview resulted in valuable information concerning the impact of ACEs on the population with SUD and provides evidence that ACEs are common among persons with SUDs. Implementation of ACE screening may optimize chances for long-term maintenance of SUD recovery. A longitudinal study to investigate the effectiveness of TIC in SUD treatment programs for individuals with ACE history and SUDs is a logical next step to increase knowledge in this area. Implementation of a TIC model should be considered in all SUD treatment facilities to promote awareness of past trauma in this population. Screening for ACEs is necessary if effective interventions are to be provided, with the goal of improving client outcomes.

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