



Full length article

Adverse childhood experience effects on opioid use initiation, injection drug use, and overdose among persons with opioid use disorder



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ABSTRACT

Introduction: Adverse childhood experiences are associated with the development of substance use disorders. With opioid use disorder, a growing concern in the United States, we were interested in examining the relationship between adverse experiences and three landmarks of opioid use: age of opioid initiation, injection drug use, and lifetime overdose.

Methods: Between May and December 2015, we interviewed consecutive persons seeking inpatient opioid detoxification. Participants were asked about age of opioid initiation, last month injection drug use, and lifetime history of overdose, and completed the ten-item Adverse Childhood Experience (ACE) questionnaire.

Results: Participants ($n = 457$) averaged 32.2 (± 8.64) years of age, 71.3% were male, and 82.5% were non-Hispanic White. The mean score on the ACE scale was 3.64 (± 2.75). Mean age at time of initiating opioid use was 21.7 (± 7.1) years, 68.7% had injected drugs within the past month, and 39.0% had overdosed. After adjusting for age, gender, and ethnicity, the ACE score was inversely associated with age of initiating opioid use ($b = -0.50$, 95% CI -0.70 ; -0.29 , $p < .001$), and positively associated with recent injection drug use (OR = 1.11, 95% CI 1.02; 1.20, $p = 0.014$) and the likelihood of experiencing an overdose (OR = 1.10, 95% CI 1.02; 1.20, $p = 0.015$) in a graded dose response manner.

Conclusion: Greater adverse childhood experiences are associated with three landmarks of opioid use risk. ACE screening may be useful in identifying high-risk subsets of opioid-using populations.

1. Introduction

Opioid use disorder is a growing public health concern. In addition to its high prevalence, the morbidity and mortality associated with opioid use has increased dramatically, with incidents of overdose nearly quadrupling over the past decade (NSDUH, 2014).

Previous studies investigating the precursors of substance misuse have focused on childhood adversity, often childhood sexual abuse (CSA) (Darke et al., 2005; Heffernan et al., 2000; Kendler et al., 2000), which is strongly associated with experiencing other adverse events in childhood (Dong et al., 2004a,b; Anda et al., 2004). The Adverse Childhood Experiences (ACE; Felitti et al., 1998) questionnaire was developed to examine the long-term effects of childhood experiences on medical problems and examines a wide array of childhood adversity. Greater number of ACEs experienced (e.g., abuse, neglect, household

dysfunction) have been correlated with several adult physical illnesses such as obesity, diabetes, ischemic heart disease, and frequent headaches (Anda et al., 2010; Dong et al., 2004a,b; Felitti et al., 1998; Monnat and Chandler, 2015). Additionally, ACE scores are associated with several psychiatric problems including depressive disorders, psychosis, and suicidality (Brodsky and Stanley, 2008; Chapman et al., 2004; Trotta et al., 2016). ACE scores are also associated with smoking, alcohol abuse, and illicit drug use (Allem et al., 2015; Anda et al., 2002; Douglas et al., 2010; Dube et al., 2002; Dube et al., 2003).

With respect to opioid use, adverse experiences during childhood (e.g., parental substance use, emotional neglect, physical and sexual abuse) have been linked to opioid dependence (Afifi et al., 2012; Moselhy et al., 2010) and earlier age of injection drug use (IDU) initiation (Taplin et al., 2014).

In the present study, we explored three landmarks of opioid use: age

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of opioid initiation, current IDU, and lifetime overdose and their relationship to ACE score. Age of opioid use initiation is a critical developmental concern, as those who initiate drug use at an earlier age are more likely to develop drug dependence problems (Anthony and Petronis, 1995; Baldwin et al., 2013; Chen et al., 2009; King and Chassin, 2007). Another milestone in the history of an opioid user is the transition from prescription opioids to injection heroin use. IDU is associated with serious medical complications, including HIV and HCV infection (Bruneau et al., 2012; Torres et al., 2011) as well as a greater risk for overdose (Lake et al., 2015). Many injection heroin users have a history of problematic prescription opioid use prior to heroin initiation (Muhuri et al., 2013; Pollini et al., 2011) and IDU suggests an escalation in addiction severity. In this cross-sectional study of opioid users entering a detoxification program, we hypothesized that higher ACE scores (i.e., reported adverse experiences during childhood) would correlate with an increased probability of each of these risk outcomes.

2. Methods

Between May and December 2015, consecutive persons seeking inpatient opioid detoxification were approached by research staff upon admission to Stanley Street Treatment and Resources, Inc. (SSTAR) in Fall River, Massachusetts to participate in a survey. SSTAR's program has 38 beds and is a 24-h medically supervised detoxification facility that provides evaluation and withdrawal management followed by referral to outpatient substance use treatment.

Five hundred thirty consecutive patients admitted to SSTAR for detoxification during the recruitment period met eligibility criteria (i.e., 18 years or older and English-speaking) to provide verbal informed consent as approved by the Butler Hospital Institutional Review Board and were invited to participate in the current study. Forty-two refused participation or were missed by research staff due to early discharge. The remaining 488 consented to a face-to-face, 15-min, structured, standardized interview within the first 24 h of admission after withdrawal symptoms had relented; no compensation was provided. A total of 457 participants completed the interview and were available for analysis.

2.1. Measures

Sample descriptors included age, gender, race and ethnicity. Participants were asked about age of opioid initiation, last month IDU (yes/no), and, "Since your first drug use, have you ever overdosed?" We asked participants about the presence of adverse childhood experiences they experienced using the ten-item ACE questionnaire (Felitti et al., 1998). Internal consistency reliability of the 10-item index was 0.79 in this sample.

2.2. Analytical methods

ACE scores were calculated as the sum of ten yes/no questions about abuse, neglect, and household dysfunction. We report descriptive statistics to summarize the characteristics of the sample. Between sex differences in ACE item responses were measured using *t*-tests for differences in means and χ^2 tests for differences in counts. Adjusting for age, gender, and race/ethnicity, multivariate linear regression was used to estimate the adjusted association of ACE scores with age of opioid initiation; tests of significance and 95% confidence interval estimates were based on heteroskedastic Huber-White standard errors. We used multivariate logistic regression to estimate the adjusted association of ACEs with the likelihood of recent IDU and lifetime drug overdose. Because age of opioid use may have been initiated prior to age 18, we conducted an auxiliary analysis to estimate the adjusted association of ACE scores with age of opioid initiation among persons ($n = 321$) who initiated opioid use at age 18 or older.

Table 1
Descriptive Statistics ($n = 457$).

	n (%)	Mean (SD)	Median	Range
Age		32.2 (± 8.64)	30	18–64
Sex (Male)	326 (71.3%)			
Hispanic Ethnicity	40 (8.8%)			
Race				
White	397 (86.9%)			
Black	25 (5.5%)			
Other	35 (7.7%)			
Age Initiated Opioid Use		21.7 (± 7.12)	20	Dec-54
ACE Score		3.63 (± 2.75)	3	0–10
IDU Past 30-days	314 (68.7%)			
Ever Overdose	178 (39.0%)			

3. Results

3.1. Demographics

As shown in Table 1, participants ($n = 457$) averaged 32.2 (± 8.64) years of age, 71.3% were male, 8.8% were Hispanic, 86.9% were White, 5.5% were Black, and 7.7% identified other racial origins. Race/Ethnicity was dichotomized to contrast non-Hispanic Whites to all minorities in subsequent analyses. Age at time of initiating opioid use ranged from 12 to 54 years with a mean of 21.7 (± 7.12, Median = 20) years. Past 30-day IDU was reported by 68.7% of the sample and 39.0% reported a drug overdose at least once in their life.

3.2. ACE distribution

Individual ACE items and prevalence are shown in Table 2. The most frequently endorsed items were having parents who were separated or divorced (59.5%), living with a problem drinker or someone who used drugs (51.4%), and having an adult in the household who often swore at or humiliated them (47.5%). The mean score on the 10-item scale was 3.64 (± 2.75, Median = 3.0). Sixty-seven (14.7%) participants did not endorse any item, 168 (36.8%) had scores between 1 and 3, and 222 (48.6%) had scores of 4 or higher. Compared to males, females were significantly ($\chi^2 = 55.87$, $p < 0.001$) more likely to endorse being touched or fondled in a sexual way, feeling that no one in their family loved or thought they were important ($\chi^2 = 6.66$, $p = 0.010$), having a mother or stepmother who pushed, shoved, or grabbed them ($\chi^2 = 5.53$, $p = 0.019$), living with a problem drinker or alcoholic ($\chi^2 = 4.10$, $p = 0.043$), and saying that a household member was depressed, mentally ill, or attempted suicide ($\chi^2 = 9.31$, $p = 0.002$). Overall, mean ACE scores for females (4.39 ± 2.92) were significantly ($t = 3.80$, $p < 0.001$) higher than for males (3.33 ± 2.63).

3.3. Adjusted association of ACEs with landmarks of opioid use

After adjusting for age, gender, and race/ethnicity, the ACE score was inversely associated with age of opioid use initiation ($b = -0.50$, 95%CI -0.70 ; -0.29 , $p < .001$) (Table 3). A 1-point increase in the ACE was associated with a 1.11 (95%CI 1.02; 1.20) factor increase in the expected likelihood of a recent IDU and a 1.10 (95%CI 1.02; 1.20) factor increase in the expected odds of reporting a lifetime overdose. Associations with age, gender, and race/ethnicity are also reported in Table 3.

Among persons who initiated use at 18 years of age or older, the estimated adjusted association of ACE scores with age of opioid initiation was statistically significant ($b = -0.31$, 95%CI -0.51 ; -0.11 , $p = 0.003$) but somewhat attenuated when compared to the full sample.

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