Short Communication

Adverse childhood experiences predict opioid relapse during treatment among rural adults


a University of Tennessee Health Science Center, 66 North Pauline St., Room 649, Memphis, TN 38163-2181, USA
b University of Memphis, Psychology Building, 400 Innovation Dr., Memphis, TN 38111, USA

HIGHLIGHTS

• Relapses occurred in 54% of rural patients at an opioid use disorder clinic.
• Almost half of all participants reported four or more adverse childhood events.
• ACE score was related to an increase in the odds of relapse.
• Each treatment visit reduced the odds of opioid relapse.
• The highest relapse rate was on the first clinic visit.

ABSTRACT

Adverse childhood experiences (ACE) are a major public health concern (Hughes et al., 2017). ACE include emotional/physical/sexual abuse, neglect, use of drugs in the household, divorce, familial mental illness, and imprisoned family members before the age of 18. Although relations between ACE and substance use disorders are widely documented (Shonkoff et al., 2012; Strine et al., 2012; Substance Abuse and Mental Health Services Administration, 2018), ACE is understudied specifically in the area of opioid use, a current epidemic in the U.S. (Dowell et al., 2017; Seth, Rudd, Noonan, & Haegerich, 2018). One recent study explored ACE and opioid use in patients undergoing opioid detoxification, and found that ACE scores were associated with younger age of opioid use initiation, recent intravenous drug injection, and previous opioid overdose (Stein et al., 2017).

However, this cross-sectional study did not explore whether ACE

1. Introduction

Adverse childhood experiences (ACE) are a public health concern and strong predictor of substance abuse, but no studies to date have explored the association between ACE and opioid relapse during medication-assisted treatment. Using an observational design, we examined this relationship using archived medical records of 87 patients who attended opioid use disorder treatment (buprenorphine-naloxone and group counseling) at a rural medical clinic. All variables were collected from medical files. ACE scores were derived from a 10-item screening questionnaire administered at intake, a regular procedure for this clinic. The primary outcome was opioid relapse observed at each visit, as indicated by self-reported opioid use, positive urine drug screen for opioids, or prescription drug database results for opioid acquisition. The sample was 100% Caucasian and 75% male. A total of 2052 visit observations from the 87 patients were extracted from the medical records. Patients had an average of 23.6 (SD = 22) treatment visits. Opioid relapse occurred in 54% of patients. Results indicated that for every unit increase in ACE score, there was an increase of 17% in the odds of relapse (95% CI: 1.05–1.30, p = .005). Additionally, each treatment visit was associated with a 2% reduction in the odds of opioid relapse (95% CI: 0.97–0.99, p = .008). We conclude that ACE may increase the risk for poor response to buprenorphine-naloxone treatment due to high rates of opioid relapse during the first treatment visits. However, consistent adherence to treatment is likely to reduce the odds of opioid relapse.
scores predicted opioid relapse prospectively (Stein et al., 2017), a key issue given high relapse rates among those in treatment (Fiellin et al., 2006). In fact, no study has explored relations between ACE and relapse to any drug, although the later life effects of ACE, such as adult life distress and post traumatic stress disorder symptoms (Manyema, Norris, & Richter, 2018; Schalinski et al., 2016) have both been associated with increased odds of substance use relapse (Norman, Tate, Anderson, & Brown, 2007; Pilowsky, Keyes, Geier, Grant, & Hasin, 2013). This suggests that ACE are a likely risk factor for opioid relapse for those in treatment.

1.1. Rural populations

Rural populations are at high risk for opioid use and face a number of health disparities. Studies indicate that rural residents have a younger age of onset of opioid use, are prescribed opioids at higher rates, and have significantly higher prevalence of prescription opioid misuse and opioid use disorder (OUD) than their urban counterparts (Garcia et al., 2017; Hirchak & Murphy, 2017; Monnat & Rigg, 2016; Young, Havens, & Leukfeld, 2012). Further, compared with urban individuals, rural Americans experience reduced access to substance use treatment, are less likely to be insured, and travel longer distances for substance use treatment (Beardsley, Wish, Fitzelle, O’Grady, & Arria, 2003; Bolin et al., 2013; Sigmon, 2014), all factors that are likely to hinder recovery.

Adding to the issues faced by rural populations, research suggests that persons from rural communities have higher ACE scores than those living in urban settings, potentially due to higher rates of poverty and poverty-associated conditions (e.g., increased parental distress, incarceration, and violence) known to differentially affect rural areas (U.S. Department of Health and Human Services, 2015). The combination of high rates of opioid use, few resources, and adult life distress from ACE has led the federal government to recommend the investigation of ACE in relation to OUD and allocated $25.5 million to increase OUD prevention and treatment efforts in rural communities (National Advisory Committee on Rural Health and Human Services, 2018).

1.2. Buprenorphine-naloxone and psychological counseling as a treatment for opioid misuse

Buprenorphine-naloxone is an outpatient-prescribed medication for OUD (Main & Kelly, 2016) that has allowed broad access to efficacious treatment for a varied of individuals, including those from rural settings (Berends, Larner, & Lubman, 2015). The addition of psychological counseling may increase the benefits of buprenorphine-naloxone treatment by improving retention, preventing relapse, and increasing treatment compliance (Fiellin et al., 2006; Mauger, Fraser, & Gill, 2014; Weiss et al., 2011).

1.3. Aims and hypotheses

At this point, little is known about how ACE affects relapse to opioids during buprenorphine-naloxone treatment. It is critical to understand the lasting impact of ACE on the chronic cycle of substance abuse, as ACE may potentially affect recovery. This question is particularly relevant for individuals in a rural treatment setting, given higher rates of opioid use disorder and ACE scores in this population.

This study examined the association between ACE scores and opioid relapse among patients at an outpatient, rural opioid use disorder treatment program. Given the many cognitive and emotional deficits (Shonkoff et al., 2012), and susceptibility to substance use (Hughes et al., 2017; Substance Abuse and Mental Health Services Administration, 2018) associated with ACE, we predicted that higher ACE scores would predict opioid use relapse during buprenorphine-naloxone treatment. In addition, we examined whether treatment attendance reduced relapse risk. We hypothesized that greater number of visits would significantly reduce the risk of relapse.

2. Materials and methods

2.1. Medical charts

Data were abstracted from medical charts of patients (N = 87) enrolled in buprenorphine-naloxone treatment from 2011 to 2017 at a rural clinic in the southeastern US. Given that patients had multiple office visits, all available visit records (N = 2052) were reviewed and data were extracted. Treatment duration ranged from 1 month to 7 years and 10 months.

2.2. Treatment

The clinic was open two mornings per week, with group counseling provided first, followed by individual appointments with physicians. All patients were prescribed 30 days of buprenorphine-naloxone and were required to present for treatment once a month. Group counseling consisted of a trauma-informed session using combined cognitive behavioral therapy, motivational enhancement, and 12-step facilitation. One physician completed all counseling sessions. Two physicians prescribed medication after the counseling session.

2.3. Procedures

The study was reviewed and approved by the University of Tennessee Health Science Center Institutional Review Board (IRB). This was a retrospective chart review with exempt status; participant informed consent was not required, and personal identifiers were not recorded. Charts included Adverse Childhood Experiences (ACE) questionnaire data, number of visits attended, buprenorphine-naloxone prescription data, self-reported opioid use, urine screen results, and prescription drug monitoring database results for each visit. Data were abstracted from the paper medical chart to an excel file with no personal identifiers included. All existing visit data were utilized in analyses.

2.4. Data abstracted from medical charts

2.4.1. ACE questionnaire

ACE data from the medical chart were abstracted. The ACE was administered once at treatment intake. ACE is a 10-item, self-report measure used to assess the occurrence of adverse experiences (e.g., verbal/physical/sexual abuse; neglect, family dysfunction) during childhood (Anda et al., 1999). Response options include yes or no and are summed to create an overall score (range: 0 to 10), with higher scores indicating more adverse events. Internal consistency for ACE scores was α = 0.83.

2.4.2. Opioid relapse criteria

Opioid relapse was coded from 3 possible sources at each treatment visit: Patient self-report, urine drug screen, or prescription drug database result. A positive score in any of these domains was coded as an opioid relapse (vs. no relapse) for that visit.

2.5. Statistical analysis

Analyses were performed with SAS/STATv14.2 (SAS Institute Inc., Cary, NC). Descriptive statistics were generated for the outcome variable (opioid relapse), available demographic characteristics (gender, age), ACE score, and number of treatment visits. As a descriptive analysis, trend in relapse over visits was tested with Cochran-Armitage test for trend.

The effect of initial ACE score on subsequent relapse (coded as 0 or
Table 1
Descriptive statistics for full sample and by relapse status.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (N = 87)</th>
<th>Relapsers (N = 47)</th>
<th>Non-relapsers (N = 40)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age M (SD)</td>
<td>39.9 (9.5)</td>
<td>38.9 (11.4)</td>
<td>40.9 (6.8)</td>
<td>0.333</td>
</tr>
<tr>
<td>21–40 N (%)</td>
<td>46 (52.9)</td>
<td>28 (39.6)</td>
<td>18 (45.0)</td>
<td>0.102</td>
</tr>
<tr>
<td>41–60 N (%)</td>
<td>29 (44.8)</td>
<td>17 (36.2)</td>
<td>22 (55.0)</td>
<td></td>
</tr>
<tr>
<td>61–81 N (%)</td>
<td>2 (2.3)</td>
<td>2 (4.3)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Gender: Male N (%)</td>
<td>65 (74.7)</td>
<td>36 (76.6)</td>
<td>29 (72.5)</td>
<td>0.661</td>
</tr>
<tr>
<td>Race: White N (%)</td>
<td>87 (100)</td>
<td>47 (100)</td>
<td>40 (100)</td>
<td></td>
</tr>
<tr>
<td>Visits M (SD)</td>
<td>23.6 (22.0)</td>
<td>31.4 (24.2)</td>
<td>14.3 (14.6)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>ACE score M (SD)</td>
<td>3.5 (2.9)</td>
<td>3.8 (3.2)</td>
<td>3.3 (2.6)</td>
<td>0.439</td>
</tr>
<tr>
<td>0 N (%)</td>
<td>16 (18.4)</td>
<td>10 (21.3)</td>
<td>6 (15.0)</td>
<td>0.441</td>
</tr>
<tr>
<td>1–3 N (%)</td>
<td>31 (35.6)</td>
<td>14 (29.8)</td>
<td>17 (42.5)</td>
<td></td>
</tr>
<tr>
<td>4 or more N (%)</td>
<td>40 (46.0)</td>
<td>23 (48.9)</td>
<td>17 (42.5)</td>
<td></td>
</tr>
</tbody>
</table>

1) over visits was tested using a generalized estimating equation (GEE) marginal model (with exchangeable covariance structure) for repeated measures in SAS PROC GEE, while adjusting for gender and age. This approach allowed us to use all visit observations clustered by patient. GEE fit criteria were examined using the Quasilikelihood under the Independence model Criterion (QIC), a statistic similar to Akaike’s Information Criterion (Pan, 2001). We also tested for influential observations using DFBETA statistics for each predictor (difference between the regression coefficient for all data and observation deleted scaled by the standard error). All associations were considered significant at alpha < 0.05.

3. Results

3.1. Descriptive statistics

The sample was 100% Caucasian and 75% male. Age ranged from 21 to 81 years old (M = 39.9, SD = 9.5). The number of office treatment visits ranged from 1 to 80 (M = 23.6, SD = 22). The mean ACE score was 3.5 (SD = 2.9). Approximately 18% of participants reported no ACE, whereas 46% reported four or more ACE (see Table 1). The most commonly reported ACE included parent separation or divorce (59%), alcohol abuse by an adult in the household (53%), verbal abuse (48%), and emotional neglect (40%). The majority (91%) of patients were prescribed Suboxone (8 mg), 7% were prescribed Bunavail (4.2/0.7 mg), and 2% were prescribed Zubsolv (5.7/0.7 mg).

3.2. Descriptive relapse data

Of the 87 patients, 47 (54%) relapsed at least once. Of the 2052 visit observations, 145 (7%) indicated a positive result for opioid relapse. The median number of visits to relapse was 1. Cochran-Armitage test showed a significant linear decline in relapse across treatment visits (p < .001), with the highest relapse rate being 34% on the first visit (see Fig. 1).

3.3. ACE scores and opioid relapse across visits

GEE repeated measures model allowed us to include patients with an unbalanced number of follow-up visits and make use of all available data while adjusting for number of visits for each patient. Results demonstrated that for every unit increase in ACE score, the odds of opioid relapse were 17% higher (OR = 1.17, 95% CI: 1.05–1.30, p = .005). Additionally, odds of opioid relapse were 2% lower for every additional treatment visit (OR = 0.98, 95% CI: 0.97–0.99, p = .008). Neither gender (OR = 1.49, 95% CI: 0.68–3.28, p = .313) nor age (OR = 0.99, 95% CI: 0.96–1.02, p = .97) were associated with opioid relapse. DFBETA statistics indicated that no observations (individuals with > 1 relapse) influenced findings or were out of bounds of normal expectancy.

4. Discussion

This is the first study to evaluate the association between ACE scores and opioid relapse during combined buprenorphine-naloxone treatment and group counseling in a rural clinic setting. ACE scores were associated with opioid relapse, suggesting that these childhood events may ultimately impair the individual’s ability to adhere to effective treatment later in life. This finding is of particular concern for rural populations that are at risk for both ACE and opioid use. Additionally, this association may also suggest that trauma-informed care may be quite relevant for rural individuals with OUD given the relevance of ACES.

Our finding that remaining in treatment was related to reduced relapse risk was encouraging and suggests that promoting treatment adherence among those who are newly engaged in buprenorphine-naloxone treatment could be beneficial, as the first visits were clearly the highest risk period for relapse. Over time, the risk of relapse appeared to decline steadily, suggesting that stability is achievable among those who remain in treatment.

4.1. Limitations

In this study, generalizability was very limited due to the sample selected and the restricted information collected. In addition, retrospective data collection, such as ACE screening, is prone to bias. Nevertheless, the evidence for childhood traumatic events negatively impacting mental health has been documented extensively (Substance Abuse and Mental Health Services Administration, 2018).

Further, because the patient’s relapse status was discernible to the physician via self-report, urine screen, or prescription drug database monitoring, this may have contributed to reduced relapse rates above and beyond that evoked by the treatment. However, because treatment was not contingent upon opioid negative tests, this accountability was unlikely to be a contributor to relapse. Moreover, only one physician provided group counseling to patients, and fidelity of these group sessions was not recorded, indicating that there could be some variability in the delivery of aspect of treatment.

Finally, a few patients with multiple relapses and high ACE scores could arguably affect the association in the model. We checked fit statistics such as DFBETAs, leverage, and influence for ACE scores in the model and found no evidence of any fall out of bounds of normal expectancy, suggesting that this was unlikely.

4.2. Future directions and conclusions

Results from this clinically important population provide us future avenues for clinical investigation. Systematic assessment of the path from ACE to opioid relapse is necessary to identify clear points of intervention, be they financial, social, or personal. A clear future direction is to determine the type of ACES that are most associated with relapse. This study examined the association between ACES and relapse during treatment at a rural clinic. Although future work will be necessary to extend these findings to other populations and settings, this work represents an important first step to understanding the relation between ACE and opioid use during buprenorphine-naloxone treatment.

Role of funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Contributors

All authors assisted in the design of the study. Author Derefiniko
Fig. 1. Proportion of patients who relapsed by visit number (N = 87).

Described and directed the study and wrote drafts of this manuscript. Author Salgado García conducted the literature review and wrote drafts of this manuscript. Author Talley reviewed patient files, collected data, and conducted sample statistics of the data. Author Bursac conducted the statistical analysis. Authors Johnson, Murphy, McDevitt-Murphy, and Andrasik wrote and edited sections of this manuscript. Author Sumrok provided access to patient files and edited this manuscript. All authors contributed to the creation of this manuscript and have approved the final version.

Declaration of interest

None.

Conflict of interest

All authors declare that they have no conflicts of interest.

References


