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Broken lives: Fights, fractures, and motor vehicle accidents among heroin users entering detoxification

Michael D. Stein^{a,b}, Bradley J. Anderson^a, and Genie L. Bailey^{c,d}

^aGeneral Medicine Research Unit, Butler Hospital, Providence, RI, 02906

^bBoston University School of Public Health, Boston, MA, 02118

^cWarren Alpert Medical School of Brown University, Providence, RI, 02912

^dStanley Street Treatment and Resources, Inc., Fall River, Massachusetts 02720

Abstract

Background—The lives of persons who use illicit substances are filled with physical adversities and negative outcomes.

Objectives—The purpose of this study was to determine: 1) the frequency of substance-related fights, fractures, and driving accidents in the past year among heroin users entering an inpatient detoxification program, and 2) to determine demographic and recent substance use factors associated with the most common of these physical traumas.

Methods—Between May 2015 and December 2015, we surveyed 433 persons entering a short-term inpatient detoxification program that reported heroin use in the last month and recorded their experiences of physical traumas in the last year.

Results—Among participants (72% male; 74% heroin injectors), more than a quarter (28.6%) reported a substance-related fight in the past year. Multivariate modeling revealed cocaine use, hazardous alcohol use, and younger age were significantly associated with fighting, but gender was not. Forty-five (10.4%) persons reported a fracture in the past year, with 64% of fractures related to a substance-related fall or fight. Additionally, 9.0% reported being a driver in a car accident after drinking or using drugs in the past year. Trauma rates were not significantly different from a contemporaneous cohort seeking alcohol detoxification at the same facility.

Correspondence: Michael D. Stein, M.D., Professor of Health Law, Policy and Management, Boston University School of Public Health, Talbot Building 250, 715 Albany Street, Boston, MA 02118, Telephone: (401) 455-6646, Fax: (401) 455-6685, mdstein@bu.edu.

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Contributors

Stein: Wrote first draft of manuscript and PI on grant that collected the data Anderson: Performed data analysis and edited the manuscript

Bailey: Edited the manuscript, and research director at recruitment site

All authors approved of the final manuscript before submission

Conflict of Interest

No conflict declared.

Conclusion—Heroin users, both men and women, lead physically traumatic lives, interrupted by interpersonal violence, falls, fractures, and motor vehicle accidents.

Keywords

heroin; violence; trauma; fractures

1.0 Introduction

The lives of persons who use illicit substances are filled with adversity. Persons who use heroin are beset with the emotional traumas of unstable housing, relationship, and financial worries, and health problems, including the risk of overdose, and for injectors, the heightened risk of HIV, hepatitis C infection and painful skin infections (Stein, 1999; Stein et al., 2015). Physical trauma is less well-studied in this high-risk population, in particular, fractures, fights, falls, and accidents while driving. Given the challenges in treating pain in this population, physical trauma that causes pain has particular relevance to clinical providers, as well as those personally affected.

In the only cohort study of heroin users and injuries, Regidor et al. compared the prevalence of injuries that led to medical treatment among out-of-treatment heroin users, recruited by target sampling, and the general population (Regidor et al., 1996). The investigators reported that heroin users had several times the rate of injury (defined as assaults, burns, and accidental poisoning excluding overdose). The study reported higher rates in male heroin users and also persons who concurrently used alcohol and tranquilizers. Regidor et al. did not specify types of injuries and did not evaluate a multivariate model of factors related to injury (Regidor et al., 1996).

Because most heroin users commonly also use other substances that have been associated with aggression, violence, injury (Cherpitel et al., 2003), and accidents (Hingson et al., 2009; Nunn et al., 2016), such as alcohol, we might expect high rates of trauma in opioid users. However, opioid use itself may lead to physical trauma through its central nervous system depression effects, cognitive impairment, or disinhibiting effects. Indeed, trauma and accidents are the fourth leading cause of death among young drug injectors in San Francisco (Evans et al., 2012). Prescription opioid use predisposes drivers to road trauma (Gomes et al., 2013). More broadly, persons with orthopedic trauma had higher rates of prescription opioid use in the 3 months before their injury than the general population (Holman et al., 2013). Whether these high, pre-injury use rates reported from samples using prescription opioids apply to heroin users remains unclear.

The primary purpose of this analysis was to determine the frequency of fractures, including fractures involving falls related to substance use, substance-related fights, and motor vehicle accidents after drinking or using drugs in the past year among heroin users entering an inpatient detoxification program. To provide context, we compare these trauma frequencies with alcohol users entering the same detoxification program during the same period. The secondary purpose was to determine demographic and recent substance use factors associated with the most common of these traumatic outcomes among heroin users.

2.0 Methods

2.1 Recruitment

Between May 2015 and December 2015, consecutive persons seeking opioid detoxification were approached within the first 24 hours of admission to participate in a survey research study. The detoxification program, one of the largest in Southeastern New England, has 38 beds and is a 24-hour medically supervised treatment facility that provides evaluation and withdrawal management with a mean length-of-stay of 4.9 days using a methadone protocol (as well as individual and group counseling and case management referral for aftercare).

Of patients admitted to the program during the recruitment period, 487 were opioid users who were 18 years or older, English-speaking, and able to provide verbal informed consent as approved by the Institutional Review Board of the authors' affiliated hospital. Nine refused study participation or were discharged before staff could interview them. The remaining 478 persons completed a face-to-face interview and were not incentivized. All surveys were administered by non-treating research staff and required approximately 15 minutes. Four hundred thirty seven persons reported heroin use in the past 30 days, and analyses were limited to the 433 who had complete data.

During this recruitment period at the same detoxification program, we also approached, within the first 24 hours of admission, 78 consecutive persons seeking alcohol withdrawal management for alcohol use disorder. Three persons were also opiate dependent and excluded from analyses, leaving sixty-eight who provided complete data in a face-to-face interview using measures identical to those answered by the heroin group, administered by non-treating research staff without incentives.

2.2 Measures

Sample descriptors included age, gender, race/ethnicity, employment (part- or full-time vs. unemployed), and years of education. Regarding previous opioid treatment, we asked if participants had ever been in opioid detoxification in the past, or had ever received methadone or been prescribed buprenorphine. Participants were classified as recent cocaine and/or benzodiazepine users if they reported any use of these substances during the past 30 days. Participants also reported frequency and usual quantity of alcohol use during the past 30 days; hazardous drinking according to NIAAA guidelines was defined as > 7 drinks / week for females or > 14 drinks / week for males (National Institute on Alcohol Abuse and Alcoholism, 2005). To assess a history of serious mental health problems, we asked, "Have you ever been seen in a psychiatric emergency room or been hospitalized for psychiatric reasons?"

Our physical trauma questions included several questions assessing fractures. First, respondents were asked, "In the past year have you fractured or broken a bone?" Response options included *yes* or *no*, and those answering *yes* were then asked to report on the number of times, if any of the fractures or broken bones were the result of an accidental trip, slip or fall (indicating *yes* or *no*), and "For how many of these were you using alcohol or drugs within two hours of the injury?" Responses to this item included alcohol, drugs, alcohol and drugs, neither alcohol nor drugs. Next, respondents were asked if any of the fractures or

broken bones were the result of a physical fight. Those responding *yes* were asked, “For how many of these were you using alcohol or drugs within two hours of the injury?” Respondents were also asked the following two questions: “In the past year, have you gotten into a physical fight when using drugs or drinking?” and “In the past year, have you been the driver in a car accident within two hours of using drugs or drinking?” each of which included *yes* and *no* response options.

2.3 Analytical Methods

We report descriptive statistics to summarize the characteristics of the sample. We use the *t*-test for differences in means and the χ^2 -test of independence to evaluate the statistical significance of bivariate associations, and multivariate logistic regression to estimate the adjusted associations of background characteristics and substance use behaviors of the heroin users with the likelihood of reporting substance-related physical fights, fractures, falls, and driving accidents. We conducted an auxiliary analysis comparing heroin users’ demographic characteristics and rates of substance-related fights, fractures, falls, and driving accidents in the alcohol detoxification sample.

3.0 Results

Participants averaged 31.7 ($\pm$ 8.49) years of age, 72.3% were male, 9.0% were Hispanic, 85.9% were White, 5.8% were Black, 8.3% were of other racial origins. Race/Ethnicity was dichotomized to contrast non-Hispanic Whites (81.8%) to all minorities in subsequent analyses. Mean years of education was 11.8 ($\pm$ 1.98), 16.2% were employed either part- or full-time, and (12.2%) reported spending 1 or more nights on the street or in a shelter during the past 90 days. Nearly 3 in 4 persons (73.9%) reported recent injection drug use. Mean frequency of heroin use was 26.9 ($\pm$ 6.65, Median = 30) days in the last month. About 43.6% reported using cocaine in the past month; mean days of cocaine use were 4.47 ($\pm$ 8.51). Nearly half (48.7%) reported using benzodiazepines in the past month on an average of 6.12 ($\pm$ 9.68) days. About 23.3% of the participants reported using alcohol at levels exceeding NIAAA recommended guidelines, and 75.1% had previously been in either methadone or buprenorphine treatment programs.

More than a quarter (28.6%) of heroin detoxification participants reported a substance-related fight, 10.4% reported a fracture in the past year, and 9.0% reported a substance-related driving accident. In our analysis comparing persons in detoxification for heroin to the 68 persons with alcohol use disorder, persons in the alcohol cohort did not differ significantly from those in the heroin group with respect to gender, ethnicity, race, homelessness, frequency of cocaine use, or frequency of benzodiazepine use. Persons in the alcohol group were significantly older (43.1 vs 31.7, $t = 10.05$, $p < .001$, had higher mean years of education (12.4 vs 11.8; $t = 2.10$, $p = .036$), and were more likely to be employed part- or full-time (29.4% vs 16.2%; $\chi^2 = 7.00$, $p = .008$). Persons in alcohol detoxification did not differ significantly from those in heroin detoxification with respect to the likelihood of substance-related fights (23.5% vs 28.6%; $\chi^2 = 0.76$, $p = .383$), fractures (13.2% vs 10.4%; $\chi^2 = 0.49$, $p = .482$), or substance-related driving accidents (7.4% vs. 9.0%; $\chi^2 = 0.20$, $p = .654$). To determine if these comparisons were sensitive to alcohol use among

person in heroin detoxification we removed persons meeting NIAAA criteria for hazardous alcohol use ($n = 111$) and re-evaluated these associations. Between group differences in substance related fights were smaller (23.5% among persons in alcohol detoxification and 23.2% among those persons in heroin detoxification not meeting criteria for hazardous alcohol use [$\chi^2 = 0.00$, $p = .958$]). Between group differences with respect to substance related accidents ($\chi^2 = 0.08$, $p = .782$) and fractures ($\chi^2 = 0.11$, $p = .745$) were also substantively small and not statistically significant.

Among heroin users, persons reporting a substance-related fight ($n=124$) had significantly higher mean frequency of cocaine ($t = -3.34$, $p < .001$) and benzodiazepine ($t = -3.33$, $p = .001$) use (Table 1). They were also significantly ($\chi^2 = 6.29$, $p = .012$) more likely to report recent injection drug use, use alcohol at hazardous levels ($\chi^2 = 20.65$, $p < .001$), and were more likely to have lifetime history of having been treated or hospitalized for psychological problems ($\chi^2 = 15.13$, $p < .001$). Bivariate associations with other background characteristics were not statistically significant at the .05 level.

After adjusting for other variables in the full model, age was inversely and significantly (OR = 0.96, 95%CI 0.93; 0.99, $z = -2.48$, $p = .013$) associated with the likelihood of substance-related physical fighting (Table 1). Other statistically significant correlates with a higher likelihood of fighting in the multivariate model were frequency of cocaine use (OR = 1.03; 95%CI 1.01; 1.06, $z = 2.18$, $p = .029$), hazardous use of alcohol (OR = 2.37, 95%CI 1.40; 4.03, $z = 3.21$, $p = .001$), and treatment for psychiatric problems (OR = 1.70, 95%CI 1.04; 2.79, $z = 2.12$, $p = .034$). Frequency of benzodiazepine use also tended (OR = 1.02, 95%CI 1.00; 1.05, $z = 1.91$, $p = .057$) to be associated with a higher likelihood of fighting.

Forty-five (10.4%) heroin detoxification participants reported a total of 75 fractures in the past year; 19 (4.4%) reported a fracture due to a fall with 8 of these substance-related (alcohol and/or drugs). Ten (2.3%) participants said they had 1 or more fractures due to substance-related physical fight. In total, 64.4% of fractures were related to a substance-related fall or fight.

The number of heroin detoxification participants reporting fractures ($n = 45$) and incidents as the driver of a car accident within two hours or using drugs or drinking ($n = 39$) were small, limiting statistical power to detect associations with background characteristics, but we conducted analyses with these outcomes paralleling those reported in Table 1 for substance-related fights. Persons reporting a fracture reported significantly ($t = -2.36$, $p = .019$) more mean days of cocaine use (7.29 , ± 10.8) than those who did not experience a fracture (4.14 , ± 8.15). They were also significantly ($\chi^2 = 5.86$, $p = .015$) more likely to report using alcohol at levels exceeding NIAAA guidelines for hazardous use (37.8% vs 21.7%). Persons reporting a fracture also tended ($\chi^2 = 3.53$, $p = .060$) to be more likely to report prior psychiatric treatment (62.2% vs 47.4%). None of the associations were significant at the .05 level in a multivariate logistic regression model. Substance-related driving accidents were not associated with any of the evaluated correlates.

4.0 Discussion

The current study advances the limited research on physical trauma encountered by heroin dependent individuals by demonstrating high rates of past year physical trauma among heroin users undergoing in-patient detoxification. Among respondents, more than one-quarter reported a physical fight, more than one in ten had fractured a bone, and 9% had been in a car accident in which they were the intoxicated driver. We also included a contemporaneous comparison group of persons with alcohol use disorder, a population whose history of trauma has been studied widely (Cherpitel et al., 2003; Hingson et al., 2009; Nunn et al., 2016). Heroin users in this sample reported a remarkably high frequency of fractures and substance-related physical fights and driving accidents in the past year that were similar to that reported by persons with alcohol use disorder from the same community who were seeking detoxification.

The violence that we report here as being common in the lives of persons with opioid use disorder is in keeping with older literature reporting that cocaine and alcohol are associated with violence severity among men and women in substance abuse treatment (Chermack and Blow, 2002). We found that both cocaine use and hazardous alcohol use were associated with fighting in heroin users. Heroin, cocaine, or alcohol-related violence could be related to the cognitive impairment or disinhibiting effects of these substances (Bennett et al., 1994; Davis, 1996). Conceptual models of violence emphasize a variety of potential mechanisms to account for the relationship between substance use and violence, including individual difference factors (antisocial/aggressive personality traits, psychiatric distress), contextual influences (relationship type, involvement with a drug using subculture, provocation), as well as acute substance-related effects (Chermack and Giancola, 1997). These adverse life events may also be related to personality characteristic known to be prominent among heroin users, namely, impulsivity (Hayaki et al., 2005). While we are unaware of other studies of fighting among adults, these high rates are similar to levels reported among adolescents (Lowry et al., 1998).

Among the heroin users, cocaine use, alcohol use, and younger age were associated with fighting, and notably, men and women reported similar levels of physical fighting. We cannot discern from our data what proportion of such fighting is related to fighting with strangers, or with the more commonly studied intimate partner violence which is well-described in substance users in urban environments (Illangasekare et al., 2013; Meyer et al., 2011) as a cause of injuries and fractures (Gilbert et al., 2012).

Unrelated to fighting, heroin users also commonly reported falls and fractures, often within hours of using, suggesting a causal relationship. Persons using opioids daily may be under the influence of opioids when performing dangerous activities at work, at home, or during sporting activities. Opioids may have an effect on bone strength (Daniell, 2004), making fractures related to falls or other trauma more common.

Our participants were not infrequently involved in motor vehicle accidents. We do not know how many persons in our sample had driven a vehicle in the past year; the 9% intoxicated driving accident rate is likely an underestimate as many persons may not have driven a car at

all. Nonetheless, these rates are substantially higher than national estimates for drivers of similar age as respondents in the current study; annual accident rates (whether involving substances or not) are 4.95% for 25 to 29 year olds and 4.20% for 30 to 39 year olds (Tefft, 2012). Laboratory studies indicate an undeniable association between alcohol and driving impairment (Charlton and Starkey, 2015; Liu and Ho, 2010; Zhang et al., 2014); there is also evidence that cannabis and benzodiazepines increase accident risk. In contrast, Fishbain et al.'s review of the 48 reviewed reports concluded that opioids do not appear to impair driving skills in opioid dependent or tolerant patients (Fishbain et al., 2003). But past work has provided equivocal evidence that opioids increase driving risk. Nonetheless, we speculate that these negative driving outcomes may be due to the CNS depression effects of opioids, as well as to the stimulating effect of cocaine and alcohol.

Several limitations merit discussion. First, we do not know what bias we introduced by our use of a nonprobability sample, but heroin users are typically under-represented in large national surveys. We recruited a socioeconomically disadvantaged group, from a single site, and thus our findings may not be generalizable to individuals with higher socioeconomic status, heroin users at other sites, or prescription opioid users. Others have reported that substance use treatment samples report higher rates of violence than community based samples (Brown et al., 1998; Chermack et al., 2000). Second, we do not know the types of fractures respondents incurred nor do we know with whom they were fighting. Third, we do not know if injuries reported were due to pharmacologic effects of opioids or other substances, or resulted from the behavioral, environmental, or personality characteristics of participants. The relationship of fighting with a lifetime history of acute psychiatric treatment and trend toward an association with recent benzodiazepine use suggests these physical traumas may be related to comorbid psychiatric disorders. In addition, many heroin users consume other substances and we cannot definitively discern the independent effect of heroin use on these outcomes. Of course many acts of violence do not involve substance use, and the consumption of substances does not necessarily precede incidents of violence. Finally, we defined intoxicated driving as having consumed alcohol or drugs within two hours preceding the reported accident; this conservative definition may have led to underreporting of substance-related accidents. Future research should investigate national data sources where substance use, mental health, and trauma variables are both available at the individual level, or perhaps other surveys can focus on the last traumatic event of heroin users in more detail. Importantly, we are not aware of any studies using individual level data that clearly show that reducing substance use leads to fewer injuries/trauma, and this would be worthy of study.

Physical trauma is relevant to addiction management at both the patient and policy levels. At the individual level, treating the pain related to physical trauma is complicated in opioid users who may have hyperalgesia and require specialized pharmacological management (Alford, 2009). Painful trauma could lead to increased self-medication (using heroin or prescription opioids) and therefore, conceivably, an increased risk of overdose. Our data suggest that "harm reduction," a term used to refer to infectious disease risk mitigation, should be taken literally among heroin users who are at high risk for bodily harm from trauma. Reduction of substance-related trauma and driving accidents likely require policies that reduce substance use per se. Attention to the daily physical toll of substance use can

begin during short detoxification admissions as the treatment environment offers a safe place to begin discussion of ongoing physical risk as well as medical and emotional risk.

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Highlights

- More than quarter of heroin users reported substance-related fight in the past year
- Cocaine, hazardous alcohol use, younger age associated with fighting, but not gender
- One in ten heroin users reported fracture or substance-related driving accident in the past year
- Physical trauma rates were similar to those in persons seeking alcohol detoxification

Table 1

Unadjusted and Adjusted Associations of Substance-Related Physical Fighting with Demographic Characteristics and Indicators of Substance Use Behaviors and Psychological Treatment History (n = 433).

	Substance Related Fight		t or χ^2 (p =)	Logistic Regression Model	
	No (n = 309)	Yes (n = 124)		aOR (95%CI)	z (p =)
Age	32.1 ($\pm$ 8.84)	30.7 ($\pm$ 7.49)	1.56 (.119)	0.96 (0.93; 0.99)	-2.48 (.013)
Gender (Male)	224 (72.5%)	89 (71.8%)	0.02 (.880)	1.09 (0.64; 1.84)	0.32 (.752)
Non-Latino Caucasian (Yes)	248 (80.3%)	106 (85.5%)	1.62 (.203)	1.34 (0.72; 2.51)	0.91 (.361)
Years Education	11.8 ($\pm$ 1.95)	11.8 ($\pm$ 1.78)	-0.17 (.865)	0.98 (0.87; 1.11)	-0.32 (.748)
Employed Part/Full-Time (Yes)	55 (17.8%)	15 (12.2%)	2.04 (.154)	0.75 (0.38; 1.48)	-0.84 (.404)
Homeless (Yes)	33 (10.7%)	20 (16.1%)	2.45 (.118)	1.12 (0.57; 2.21)	0.34 (.737)
Recent Injection Drug Use (Yes)	218 (70.6%)	102 (82.3%)	6.29 (.012)	1.54 (0.85; 2.78)	1.43 (.153)
Heroin Use Days (0-30)	27.3 ($\pm$ 5.86)	26.0 ($\pm$ 8.27)	1.86 (.063)	0.97 (0.94; 1.00)	-1.73 (.083)
Cocaine Use Days (0-30)	3.61 ($\pm$ 7.64)	6.60 ($\pm$ 10.1)	-3.34 (<.001)	1.03 (1.01; 1.06)	2.18 (.029)
Benzodiazepine Use Days (0-30)	5.15 ($\pm$ 9.15)	8.54 ($\pm$ 10.6)	-3.33 (.001)	1.02 (1.00; 1.05)	1.91 (.057)
Hazardous Alcohol Use (Yes)	54 (17.5%)	47 (37.9%)	20.65 (<.001)	2.37 (1.40; 4.03)	3.21 (.001)
Ever in Methadone or Buprenorphine Treatment	232 (75.1%)	93 (75.0%)	0.00 (.986)	1.21 (0.70; 2.09)	0.67 (.501)
Psychiatric Treatment	133 (43.0%)	79 (63.7%)	15.13 (<.001)	1.70 (1.04; 2.79)	2.12 (.034)