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Substance use and homelessness among emergency department patients*

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Abstract

Background: Homelessness and substance use often coexist, resulting in high morbidity. Emergency department (ED) patients have disproportionate rates of both homelessness and substance use, yet little research has examined the overlap of these issues in the ED setting. We aimed to characterize alcohol and drug use in a sample of homeless vs. non-homeless ED patients.

Methods: A random sample of urban hospital ED patients were invited to complete an interview regarding housing, substance use, and other health and social factors. We compared substance use characteristics among patients who did vs. did not report current literal (streets/shelter)

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Contributors

KMD, RPM, LG, JR, and DS conceived of the study. KMD, NR, JR, and LG determined the analysis plan. KMD and NR conducted the analysis. JM assisted with the literature review. KMD drafted the article with guidance from LG and JR. All authors provided critical feedback. All authors reviewed and approve of the final version.

Conflict of Interest

RPM has conducted research and clinical demonstration projects unrelated to the present paper with funding from the NIH (NIAAA, NIDA) and NYC Department of Health and Mental Hygiene. He has received study medication without funding or restrictions from Alkermes for research unrelated to the present paper. DS reports having funding from Pfizer for research unrelated to this paper. JR discloses that he has been an investigator or principal investigator on studies that have received support (financial or medication or both) from Indivior (formerly Reckitt-Benckiser) and from Alkermes and from NIDA/NIH and from NIAAA/NIH. As a principal investigator in NIDA's Clinical Trials Network he collaborates extensively with organizations that seek to provide help with or promote recovery from addiction. He does not have equity in these entities and is not a paid consultant or advisory board member. He is an employee of New York University and formerly of the Department of Veterans Affairs. He sees none of these activities as presenting a conflict of interest with the present paper.

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homelessness. Additional analyses were performed using a broader definition of homelessness in the past 12-months.

Results: Patients who were currently homeless (n=316, 13.7%) versus non-homeless (n= 1,993, 86.3%) had higher rates of past year unhealthy alcohol use (44.4% vs. 30.5%, p<.0001), any drug use (40.8% vs. 18.8%, p<.0001), heroin use (16.7% vs. 3.8%, p<.0001), prescription opioid use (12.5% vs. 4.4%, p<.0001), and lifetime opioid overdose (15.8% vs. 3.7%, p<.0001). In multivariable analyses, current homelessness remained significantly associated with unhealthy alcohol use, AUDIT scores among unhealthy alcohol users, any drug use, heroin use, and opioid overdose; past 12-month homelessness was additionally associated with DAST-10 scores among drug users and prescription opioid use.

Conclusions: Patients experiencing homelessness have higher rates and greater severity of alcohol and drug use than other ED patients across a range of measures. These findings have implications for planning services for patients with concurrent substance use and housing problems.

Keywords

Alcohol; Drugs; Overdose; Opioids; Homelessness; Vulnerable Populations; Emergency Service

1. Introduction

Homelessness and substance use are intricately related. Estimates of substance use among people experiencing homelessness vary depending on the population studied and definitions used, but are consistently above average (Fazel et al., 2008; Fischer and Breakey, 1991; Koegel et al., 1988; O'Toole et al., 2004). A meta-analysis of international studies found alcohol dependence ranging from 8.1–58.5% and drug dependence ranging from 4.5–54.2% among homeless populations (Fazel et al., 2008), substantially higher than overall global prevalence rates (WHO, 2018). Drug overdose is the leading cause of death among people experiencing homelessness, with many other deaths also attributable in some way to substance use (Baggett et al., 2014; Baggett et al., 2013).

Better understanding the interactions between homelessness and substance use is important to respond to these overlapping serious life issues. Homelessness has been associated with worse alcohol and drug use severity and outcomes (Collins, 2016; Eyrich-Garg et al., 2008; Linton et al., 2013). Prior studies have been limited to including only participants who have experienced homelessness or those seeking substance use treatment. One exception, a study of primary care patients with drug problems, found that patients experiencing homelessness had higher DAST-10 and ASI scores, and used the emergency department (ED) more frequently than other patients (Krupski et al., 2015).

Despite these findings—and the fact that frequent ED use is associated with both homelessness and substance use (Capp et al., 2013; Doran et al., 2013; Stergiopoulos et al., 2016; Vandyk et al., 2013)—we were unable to find prior research comparing substance use among homeless and non-homeless ED patients. This paper fills this gap by examining substance use characteristics among homeless and non-homeless patients from an urban,

public hospital ED. While our study was exploratory, we hypothesized that ED patients experiencing homelessness would have higher rates of substance use and greater substance use severity than other patients.

2. Methods

2.1. Study Design and Setting

We conducted baseline survey interviews with patients at an urban, public hospital ED (November 2016–September 2017) as part of a larger prospective cohort study. Cross-sectional survey results are presented.

2.2. Selection of participants

Research assistants (RAs) followed a random sampling scheme to approach patients during assigned shifts scheduled seven days per week and at all hours of the day in a distribution approximating ED patient arrival volume over time. Patients were eligible if they were 18 years old and spoke English or Spanish. Patients were ineligible if they were medically unstable (e.g., critically ill, in severe pain), in psychological distress, in police/prison custody, could not provide consent (e.g., dementia), or had already participated. Twelve patients enrolled in a concurrent case management study for opioid users were also excluded. For severely intoxicated patients, RAs returned to the patient later when soberer. When the capacity to consent was questionable, RAs consulted the medical provider and/or used the UCSD Brief Assessment of Capacity to Consent (UBACC) (Jeste et al., 2007). Participants provided written informed consent. The study was approved by the [blinded] IRB.

2.3. Methods and Measurements

Bilingual RAs used iPads to conduct 20 to 40-minute survey interviews using REDCap electronic data capture tools (Harris et al., 2009). Questions were read out loud to study participants. RAs used techniques to maximize privacy including offering to move participants to private locations, requesting visitors leave, and allowing participants to point to answers on the iPad. RAs informed participants of measures taken to ensure information security, including the study's NIH Certificate of Confidentiality (NIH). Participants received a \$15 study incentive.

The survey was constructed using questions largely compiled from previously validated or widely used questionnaires, modified as needed based on input from national experts and a stakeholder feedback process. The survey was professionally translated into Spanish.

Participants were asked where they spent the past night using categories from a large VA/HUD study (ASPE, 2007). We defined current homelessness as self-report of spending the past night in a homeless shelter or outdoors, on the street, in an abandoned or public building, an automobile, or another place not meant for human habitation. All participants were also asked whether they had experienced more broadly defined homelessness—including staying in a shelter, on the street, or doubled up with friends/family because they did not have another place to stay—in the past 12-months. As a measure of income

insecurity, participants were asked whether they had difficulty meeting basic expenses in the past year (U.S. Census Bureau). Participants completed a question on self-rated general health from the CDC's Healthy Days Core Module (CDC). Participants were asked whether a healthcare professional had told them they had any of a list of mental health conditions (depression, anxiety, panic attacks, schizophrenia, bipolar disorder, PTSD, borderline personality, other).

We used previously validated single-item screening questions (SISQ) for unhealthy alcohol use and any drug use in the past year (Smith et al., 2009, 2010). Participants were also asked about past year use of 10 types of drugs and which had caused them the most difficulties or problems. Participants screening positive for unhealthy alcohol use via the SISQ completed the AUDIT (Bohn et al., 1995; WHO). Participants screening positive for drug use via the SISQ or individual drug questions completed the DAST-10 (Skinner, 1982; Yudko et al., 2007). All participants were asked about past year substance use service receipt (Gelberg et al., 2012).

2.4. Analysis

Data analysis was conducted with SAS 9.2 (Cary, NC). We followed STROBE guidelines for observational study reporting (von Elm et al., 2007). For bivariate analyses, we used chi-square tests of independence for categorical variables and t-tests for continuous variables.

Multivariable analysis was conducted using logistic regression. Missing data including refusals were rare. Therefore, complete case deletion was used for missing data. We included age, gender, race/ethnicity, education, insurance, difficulty meeting essential expenses, employment, overall physical health, and mental health conditions as potential confounders (Spearman correlation coefficients all <0.4). We performed manual backward elimination (Hosmer and Lemeshow, 2000); results were qualitatively similar for reduced and full models, so we present only fully adjusted models. Model c-statistics were 0.741–0.892.

We defined current homelessness *a priori* as having spent the last night in the shelter or on the streets/another place not meant for human habitation. Sensitivity analyses using a modified definition of current homelessness to include those also spending the last night in transitional housing or an institution showed similar results. We conducted exploratory subgroup analyses for shelter vs. street dwellers (Supplemental Material)¹. We also present results for participants who reported any experience of homelessness—including staying in a shelter, on the street, or doubled up with friends/family—in the past 12 months, as a more inclusive measure of recent experience with homelessness.

¹Supplementary material can be found by accessing the online version of this paper at <http://dx.doi.org> and by entering doi: [10.1016/j.drugalcdep.2018.04.021](https://doi.org/10.1016/j.drugalcdep.2018.04.021).

3. Results

3.1. Participation and Sociodemographics

Approximately half (52.0%) of patients approached were ineligible (n=2,816) or refused to complete eligibility screening questions (n=357). Primary reasons for ineligibility were expected given the ED population and included being medically unfit (n=858), too intoxicated to participate (n=496), unable to speak English/Spanish (n=480), or in prison/police custody (n=361). Of 2,924 eligible patients, 2,396 participated (81.9%). Duplicate records (n=84) for patients identified by name, birthday, and social security number (if applicable) as having participated more than once and 3 participants without housing status information were excluded, leaving a final analytic sample of n=2,309.

The rate of current homelessness was 13.7% (8.7% shelter, 5.0% street). Most patients spent the last night in their apartment (68.3%), with smaller numbers spending it in someone else's apartment (10.4%) or an institution (5.1%). Approximately 1 in 5 patients overall (21.4%) reported having been homeless at some point in the past year, including being "doubled up." Patients who were currently homeless differed from other patients in multiple basic characteristics (Table 1).

3.2. Substance Use Characteristics by Homelessness Status

In bivariate analyses (Table 1), patients currently experiencing homelessness had higher rates of past year unhealthy alcohol use, more binge drinking days in the past year, and higher AUDIT scores. Patients experiencing homelessness had higher rates of past year drug use across all categories of drugs. Whereas cannabis was the most commonly used drug among all patients, patients experiencing homelessness also frequently reported difficulty with cocaine/crack and heroin. Among patients screening positive for drug use, DAST-10 scores were higher for patients who were experiencing homelessness. Patients experiencing homelessness also had significantly higher rates of lifetime opioid overdose. Among patients with substance use, rates of past year substance use treatment were higher for patients experiencing homelessness. Patients experiencing homelessness more commonly reported that their ED visit was related to substance use.

3.3. Multivariable Analysis (Table 2)

Current homelessness and any homelessness in the past year were both significantly associated with all alcohol use outcomes examined in multivariable analyses, and with positive screening for any drug use. In contrast, current homelessness was not significantly associated with DAST-10 scores in multivariable models, but more broadly defined past year homelessness was. Though past year prescription opioid use appeared strongly associated with both measures of homelessness in unadjusted analyses, in multivariable analyses this relationship remained statistically significant only for any homelessness in the past year. The largest multivariable associations with heroin use and opioid overdose were observed for any homelessness in the past year, though significant relationships were also observed for current homelessness. The observed relationship between homelessness and receipt of substance use services disappeared in multivariable analyses.

4. Discussion

In this study of urban ED patients, we found that alcohol and drug use prevalence, severity, and other characteristics were significantly associated with homelessness. To our knowledge, no prior research has examined comprehensive substance use characteristics by housing status among ED patients. One study found that 22.8% of ED patients with high-risk substance use were homeless, but no comparison was given for patients without high-risk use (Hankin et al., 2013). Our findings are consistent with research conducted in other groups including primary care patients, and Veterans and others entering substance use treatment (Buchholz et al., 2010; Eyrich-Garg et al., 2008; Krupski et al., 2015; Welte and Barnes, 1992).

Of importance to the national opioid crisis, a strikingly high proportion of ED patients who were currently homeless and opioid users reported a lifetime history of opioid overdose (44.6%). Rates of self-reported prescription opioid misuse for patients who were not homeless in our study were similar to national estimates (4.4% vs. 4.7%) (Han et al., 2017), but rates among patients experiencing homelessness were nearly three times higher. Opioid overdose history was particularly strongly associated with having experienced any homelessness (including living doubled up) over the past year. This finding suggests that unstable housing, in addition to frank homelessness, may be associated with opioid use and overdose and that efforts to reduce opioid overdose should include people with “hidden” forms of homelessness such as living doubled up. Given that overdose is the leading cause of death among people experiencing homelessness (Baggett et al., 2013), more attention on stemming the opioid epidemic should be focused on this vulnerable population including naloxone distribution training (NY Daily News, 2018), connecting people who are homeless and unstably housed with medication-assisted treatment, and addressing core problems of housing instability.

The relationship between homelessness and substance use is especially relevant for emergency medicine, as ED patients have significantly higher than average rates of both substance use (Bernstein and D'Onofrio, 2013) and homelessness (Malecha et al., 2017). Our study found that patients experiencing homelessness were more likely than other patients to report that their ED visit was related to substance use, which has also been suggested in national research (Ayangbayi et al., 2016; Ku et al., 2010). Given the frequent overlap of homelessness and substance use among ED patients, surprisingly little attention has been paid to housing status in prior ED-based SBIRT (screening, brief intervention, and referral to treatment) and other substance use interventions. Overall, ED-based SBIRT programs have shown modest success for alcohol and mixed results for drug use (McCormack, 2017). No prior research has examined how housing status may affect the success of SBIRT or other ED-based substance use interventions. The subset of ED patients who are chronically homeless and have severe substance use disorders likely needs intensive interventions that include case management, connections to housing, and robust substance use treatment (McCormack et al., 2013). The significant proportion of patients with dual diagnoses (drugs plus alcohol or substance use plus mental illness) must also be recognized. Other patients may have less intense needs, which could be addressed via referrals to trusted local social services in conjunction with interventions to address substance use.

4.1. Limitations

We conducted a cross-sectional study and cannot conclude causality or temporality of the observed relationships. Our outcomes were self-reported. We did, however, take steps to maximize the comfort of participants in disclosing sensitive information and used validated self-report measures of substance use severity (i.e., AUDIT, DAST-10). Finally, our study was conducted at one public hospital which serves a large number of patients experiencing homelessness, and patients experiencing homelessness were less likely to refuse study participation. While these issues may increase the rates of homelessness found in our study, they should not affect our primary findings regarding the relationship between homelessness and substance use outcomes.

5. Conclusions

In this study of ED patients, we found that homelessness was significantly associated with more frequent and severe substance use across a variety of domains, including opioid overdose history. Our findings suggest that ED-based substance use interventions should assess and address patient homelessness as a key factor related to substance use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Substance use differs by homelessness status among emergency department (ED) patients.
- Homelessness is associated with high rates and severity of alcohol and drug use.
- Homelessness is associated with high rates of opioid overdose.

Table 1.

Participant Characteristics from an Urban Emergent Department, by Current Homelessness Status.

	Homeless, % n=316	Not Homeless, % n=1,993	p-value
Sociodemographics			
Age, years, mean (sd)	49.3 (13.1)	45.7 (16.5)	<.0001
Female	59 (18.7)	947 (47.8)	<.0001
Race/ethnicity			<.0001
Hispanic/Latino	114 (36.2)	1156 (58.3)	
Non-Hispanic Black	129 (41.0)	402 (20.3)	
Non-Hispanic White	47 (14.9)	233 (11.7)	
Other	25 (7.9)	192 (9.7)	
Insurance			<.0001
Uninsured	50 (15.8)	571 (28.7)	
Medicaid and/or Medicare	229 (72.5)	970 (48.8)	
Private / Other	37 (11.7)	448 (22.5)	
Education			0.0002
Less than high school diploma	122 (38.6)	717 (36.0)	
High school graduate/GED	105 (33.2)	493 (24.8)	
Some college or higher	89 (28.2)	780 (39.2)	
Employment			<.0001
Working (full or part-time)	56 (17.7)	995 (49.9)	
Unemployed	124 (39.2)	419 (21.0)	
Unable to work	114 (36.1)	340 (17.1)	
Retired	22 (7.0)	238 (11.9)	
Unable to meet essential expenses, past 12 mo	208 (66.2)	725 (36.7)	<.0001
Physical and Mental Health			
Overall health fair or poor	169 (53.7)	871 (43.9)	0.0013
Mental illness diagnosis (lifetime)	184 (58.6)	694 (35.0)	<.0001
Alcohol Use			
Unhealthy alcohol use, past 12 mo	139 (44.4)	608 (30.5)	<.0001
# days ^a , past 12 mo, mean (sd)	155.2 (152.4)	64.7 (111.0)	<.0001
AUDIT score ^a , mean (std dev)	18.8(12.0)	9.8 (9.7)	<.0001
AUDIT score category ^a			<.0001
0–7	30 (21.3)	345 (56.8)	
8–15	29 (20.6)	137 (22.6)	
16–19	16 (11.3)	26 (4.3)	
20–40	66 (46.8)	99 (16.3)	
Drug Use			
Any drug use, past 12 mo	129 (40.8)	374 (18.8)	<.0001
# days ^b , past 12 mo, mean (sd)	193.1 (167.6)	133.3 (152.6)	<.0001

	Homeless, % n=316	Not Homeless, % n=1,993	p-value
DAST-10 score ^c , mean (sd)	4.0 (3.2)	2.6 (2.6)	<.0001
DAST-10 score category ^c			<.0001
0	17 (10.7)	79 (16.4)	
1–2	50 (31.4)	229 (47.6)	
3–5	41 (25.8)	96 (20.0)	
6–8	31 (19.5)	51 (10.6)	
9–10	20 (12.6)	26 (5.4)	
Drugs used, past 12 mo			
Cannabinoids	111 (35.1)	384 (19.3)	<.0001
Cannabis	108 (34.6)	382 (19.4)	<.0001
Synthetic Cannabinoids	17 (5.4)	14 (0.7)	<.0001
Opioids	65 (20.6)	120 (6.0)	<.0001
Heroin	52 (16.7)	75 (3.8)	<.0001
Prescription Opioids	39 (12.5)	86 (4.4)	<.0001
Sedatives	35 (11.2)	89 (4.5)	<.0001
Hallucinogens	14 (4.5)	46 (2.3)	0.027
Stimulants	82 (25.9)	157 (7.9)	<.0001
Prescription stimulants	12 (3.8)	44 (2.2)	0.087
Methamphetamine	15 (4.8)	14 (0.7)	<.0001
Cocaine or Crack	77 (24.7)	134 (6.8)	<.0001
Inhalants	5 (1.6)	8 (0.4)	0.009
Drug causing most difficulty ^d			<.0001
Cannabis	57 (35.6)	280 (58.2)	
Cocaine or Crack	38 (23.5)	63 (13.1)	
Heroin	35 (21.9)	48 (10.0)	
Opioid overdose history, lifetime	49 (15.8)	72 (3.7)	<.0001
Among current opioid users	29 (44.6)	27 (22.7)	0.002
Substance Use Treatment, Past Year^e	110 (51.4)	181 (21.6)	<.0001
Detox	73 (34.1)	120 (14.4)	<.0001
Inpatient or Residential Program	53 (24.8)	69 (8.3)	<.0001
Outpatient Care or Support Group	67 (31.5)	113 (13.5)	<.0001
Other			
ED visit today substance use related	79 (25.0)	130 (6.5)	<.0001

Percentages are among those who answered each question; missing data <1.2% unless otherwise noted for all variables except AUDIT (2.5%), DAST-10 (2.8%).

^aAmong those screening positive for unhealthy alcohol use via single-item screener (response of 1 time unhealthy drinking in past year). AUDIT score analyses also include additional small number of participants who screened positive for unhealthy alcohol use via a modified categorical response version of the single-item screener and n=1 who refused single item screening but had positive AUDIT scores. Per WHO, scores 8 represent hazardous drinking and 20 represent the highest risk category (Babor et al., 2001).

^bAmong those screening positive for any drug use via single-item screener (response of 1 time in past year).

^c Among those screening positive for any drug use via the single-item screener or who reported having used any of ten individual categories of drugs over the past year. NIDA-recommends DAST-10 cut-offs for moderate (3–5), substantial (6–8), and severe (9–10) problems related to drug use (NIDA).

^d Among those who answered affirmatively to use of at least one of the individual drugs queried. Top three responses included in table.

^e Among those screening positive for unhealthy alcohol or drug use, individual drugs used, or substance use treatment.

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Table 2.

Association of homelessness status and substance use characteristics

<i>Alcohol Use^a</i>						
	Unhealthy Alcohol Use		AUDIT 8		AUDIT 20	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Current homelessness	1.82 (1.43–2.32)	1.38 (1.04–1.84)	4.87 (3.16–7.52)	2.83 (1.74–4.60)	4.52 (3.04–6.70)	1.92 (1.22–3.03)
Homeless, past 12 mo	2.09 (1.71–2.57)	1.75 (1.35–2.27)	5.42 (3.79–7.76)	3.57 (2.33–5.46)	5.74 (3.96–8.31)	2.77 (1.76–4.34)
<i>Drug Use^b</i>						
	Any Drug Use		DAST-10 3		DAST-10 6	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Current homelessness	2.98 (2.32–3.84)	1.66 (1.23–2.25)	2.45 (1.70–3.52)	1.33 (0.87–2.03)	2.48 (1.64–3.74)	1.24 (0.77–2.00)
Homeless, past 12 mo	3.85 (3.10–4.79)	2.41 (1.83–3.17)	2.90 (2.09–4.03)	1.63 (1.09–2.43)	3.52 (2.36–5.27)	1.77 (1.10–2.84)
<i>Opioid Use and Overdose^c</i>						
	Prescription opioid use	Heroin use	Opioid Overdose history			
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Current homelessness	3.14 (2.10–4.67)	1.42 (0.89–2.25)	5.06 (3.47–7.38)	1.82 (1.18–2.82)	2.75 (1.43–5.26)	2.66 (1.06–6.69)
Homeless, past 12 mo	4.25 (2.95–6.13)	2.08 (1.33–3.26)	9.73 (6.59–14.36)	4.29 (2.70–6.83)	3.16 (1.55–6.42)	3.98 (1.43–11.03)
<i>Substance Use Treatment Service Receipt (past year)^d</i>						
	Detox		Other Inpatient		Outpatient Program / Support	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Current homelessness	3.09 (2.19–4.35)	1.08 (0.67–1.72)	3.66 (2.46–5.44)	1.43 (0.87–2.33)	2.93 (2.06–4.16)	1.18 (0.75–1.85)
Homeless, past 12 mo	3.88 (2.81–5.36)	1.08 (0.68–1.71)	4.24 (2.86–6.28)	1.46 (0.89–2.41)	3.26 (2.35–4.53)	1.16 (0.74–1.79)

All models adjust for age, gender, race/ethnicity, education, insurance status, difficulty meeting essential expenses, employment, physical health, and mental health.

^aUnhealthy alcohol use via single-item screener (SISQ), response = 1 time in past year. Analyses for AUDIT outcomes restricted to participants who screened positive for unhealthy alcohol use (including via SISQ or modified version of SISQ with categorical response options) and n=1 who refused alcohol screening questions but had positive AUDIT score. AUDIT = 8 signifies hazardous use and = 20 possible dependence.

^bAny drug use via single-item screener (SISQ), response = 1 time in past year. Analyses for DAST-10 outcomes restricted to participants who screened positive for any drug use or use of any of the individual drugs queried. DAST-10 = 3 signifies “moderate” or greater and = 6 signifies “substantial” or greater problems with drug use.

^cAnalysis for opioid overdose history restricted to those who reported prescription opioid or heroin use in the past year.

^d Analyses restricted to those with unhealthy alcohol use, drug use, or substance use treatment in the past year. Models additionally adjust for mean AUDIT and DAST-10 scores.

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