Cross-sectional Associations of Opiate Misuse/Opioid Use Disorder among Adults Experiencing Homelessness

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Abstract

The purpose of this manuscript is to determine the prevalence of opioid misuse/opioid use disorder (OUD) among adults experiencing homelessness and describe characteristics that account for significant variance in relation to opioid misuse in those who misuse and do not misuse opioids. From six homeless shelters in Oklahoma City, adults participated in a survey about their demographics, substance use, mental health, and physical health from July to August of 2016 (n = 569). For assessing substance use, participants responded about their opioid misuse and diagnosis of OUD, current smoking status, arrests due to drug possession or driving while intoxicated, and diagnosis with alcohol use disorder or another drug use disorder, excluding opiate use disorder. A cumulative score of mental health comorbidity was created based on affirmative responses for having been diagnosed with depression, post-traumatic stress disorder (PTSD), schizophrenia/schizoaffective disorder, bipolar disorder, or an anxiety disorder besides PTSD. For physical health, one item from the General Health Survey-Short Form assessed pain, one item from the Behavioral Risk Factor Surveillance Survey assessed health, and one item assessed history of concussion. Bivariate analyses and logistic regression models identified the association. Sixteen percent of participants reported having experienced opioid misuse/been diagnosed with OUD. Substance use behaviors and physical health accounted for significant variance among those who misuse compared to those that do not misuse opioids. The most robust positive association of opioid misuse included: being white, being a current smoker, being diagnosed with another drug disorder, and having a concussion history. Additional research among the homeless population with a focus on concussion history as it relates to substance use and mental health comorbidity is needed.

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Introduction

Over 11 million individuals misused opioids in 2017, which includes the misuse of prescription pain relievers (e.g., OxyContin®) and use of heroin and synthetic opioids (e.g., fentanyl and fentanyl analogs) (Substance Abuse and Mental Health Services Administration, 2018). Because there has been a 22-fold increase in synthetic opioid overdoses from 2002 to 2017, identifying the characteristics of misuse is important (American Psychiatric Association, 2018). The associated cost is also staggering. Opioid misuse is estimated to cost $78.5 billion, one third of which is related to health care and substance abuse treatment (Florence, Zhou, Luo, & Xu, 2016). By highlighting the risk factors that are related to opioid misuse from a cross-sectional perspective, researchers may then use this information to assess whether these risk factors persist over time in relation to opioid misuse.

While opioid misuse and opioid use disorder (OUD) is growing (Agarwal, Saxena, Dahuja, & Choudhary, 2018), the majority of the literature on opioid misuse is derived from data collected from primary care settings, substance use clinics, or services that cater specifically to veterans (Ives et al., 2006). The diverse scope in settings could be why demographic characteristics have been identified; yet, they vary by study population. Among a community sample of U.S. adults, prescription opioid misuse was more prevalent among younger adults, Hispanics, and individuals with less than a high school diploma and those who were unemployed (Becker, Sullivan, Tetrault, Desai, & Fiellin, 2008). Patients with chronic pain that misuse opioids were younger and male compared with non-misusers (Ives et al., 2006), while males and white veterans with posttraumatic stress disorders were more likely to be diagnosed with opioid dependency (Shiner et al., 2017).

Highly correlated with opioid misuse is substance use (Becker et al., 2008). Specifically, tobacco smoking is significantly correlated with opioid misuse (Kahan, Srivastava, Wilson, Gourlay, & Midmer, 2006; Mauro, Canham, Martins, & Spira, 2015; Savage, Kirsh, & Passik, 2008). Convictions associated with a drug, multiple drugs, or driving under the influence have been associated with opioid misuse among chronic pain patients (Ives et al., 2006). In addition, past alcohol abuse, misuse of another prescription medication, and cocaine use have been associated with misuse of opioids (Becker et al., 2008; Ives et al., 2006).

A number of the opioid misuse and OUD studies (Agarwal et al., 2018) have focused on individuals experiencing chronic pain that is both high intensity and high disability (e.g., Hwang et al., 2011). The misuse of opioid prescription(s) for pain has been associated with mental health disorders among veterans (Seal et al., 2012) and retired professional football players with undiagnosed concussions (Cottler et al., 2011). Further, within a veteran sample experiencing homelessness, OUD was comorbid with multiple psychiatric diagnoses, when compared to veterans who were not experiencing homelessness (Iheanacho, Stefanovics, & Rosenheck, 2018).

The current study contributes to literature by exploring cross-sectional associations of opioid misuse/OUD among adults experiencing homelessness. On a given night, approximately 553,000 people in the United States experience homelessness, making homelessness an imperative public health concern (Henry et al., 2018). Within the homeless population, there is an increased risk in premature mortality and comorbidity between mental illness and substance use, which is much more pervasive than in a domiciled population (e.g., Okuyemi et al., 2013), placing them at risk for opioid misuse/OUD. Thus, the purpose of this manuscript is to determine the prevalence of opioid misuse/OUD among adults experiencing homelessness and describe the characteristics that account for significant variance among individuals who misuse opioids.

Methods

Data and Sample

The current study recruited participants from July to August of 2016 from six homeless shelters in Oklahoma City, Oklahoma, by using flyers posted at the various recruitment sites. Eligibility criteria included being at least 18 years of age, having a minimum of 7th grade English literacy level as indicated by a score of 4 or higher on the Rapid Estimate of Adult Literacy in Medicine-Short Form (Agarwal et al., 2018), and obtaining services (e.g., shelter, counseling) at the six recruitment sites. An informed consent process occurred prior to participants completing the survey, and participants were compensated with a $20 department store gift card. More detailed data collection methods have been previously described elsewhere

(Hernandez et al., 2019). The study was approved by the Institutional Reviews Boards at the authors' institutions.

Of the 648 screened participants, interested individuals were excluded due to inability to meet literacy criteria ($n = 38$) or the criteria of being homeless ($n = 29$). Twelve participants were further excluded for missing data, resulting in an analytic sample of 569.

Measures

Opioid misuse and diagnosed disorder. Participants were asked if they had "ever had an alcohol or drug problem (other than tobacco)." Participants who responded affirmatively to having an opiate problem (e.g., heroin, oxycontin, pain pills) were coded as 1; those who did not check this option were coded as 0 (Childress et al., 2015). In addition, participants were asked, "Which substance abuse disorder(s) have you been diagnosed with? (check all that apply)." Those who checked "opiate use disorder" were coded as 1, those who did not check this option were coded as 0. Affirmative responses were combined to create an opioid misuse and disorder dichotomous variable.

Demographic characteristics. Age was the only continuous variable included in the model. The dichotomous variables included in the model consisted of sex (1 = *female*; 0 = *male*), race (1 = *white*; 0 = *minority*), marital status (1 = *not married*; 0 = *married*), educational attainment (1 = *less than high school*; 0 = *high diploma or more*), employment status (1 = *unemployed*; 0 = *employed*), health insurance (1 = *no insurance*; 0 = *has insurance*), lifetime homelessness ≥ four years (1 = *yes*; 0 = *no*), veteran status (1 = *yes*; 0 = *no*), and disability (1 = *yes*; 0 = *no*).

Substance use. Participants were categorized as current smokers if they reported smoking at least 100 cigarettes in a lifetime and having smoked in the past 30 days (Businelle et al., 2015). Two items assessed whether the participant had ever been arrested for 1) drug possession, or 2) driving under the influence of alcohol or drugs, with each given a score of 1 = *yes or* 0 = *no*. Participants responded whether they had ever been diagnosed with any two of the following substance use disorders: alcohol use disorder (AUD) or other drug use disorder (ODUD) diagnosis (e.g., cannabis use disorder, cocaine use disorder), excluding opiate use disorder, with each given a score of 1 = *yes or* 0 = *no*.

Mental health comorbidity. Serious mental illness was defined as self-reported history of being diagnosed with: depression, post-traumatic stress disorder (PTSD), schizophrenia/schizoaffective disorder, bipolar disorder, or an anxiety disorder besides PTSD. A count variable was created whereby the total number of diagnoses was summed for each participant. This is similar to prior research (Childress et al., 2015).

Physical health. One item from the General Health Survey-Short Form (Ware & Sherbourne, 1992) was used to asses bodily pain during the past four weeks (0 = *None* to 4 = *Severe)*. "Moderate" and "severe" responses for pain experiences were scored as one and the remaining responses as zero. Self-rated health was rated on a scale of 1 = *Excellent* to 5 = *Poor* from the Behavioral Risk Factor Surveillance Survey (Centers for Disease Control and Prevention, 2009). The physical health responses "poor" and "fair" were scored as one and the remaining responses as zero. A third item asked, "Have you ever had a blow to the head that caused a concussion (symptoms of a concussion can include head ache, memory loss, confusion, blurred vision, dizziness, nausea, vomiting, loss of balance, ringing in the ears)?", requiring a 1 = *yes or* 0 = *no* response.

Analytic Plan

Descriptive statistics were calculated. One-way analysis of variance and chi-square tests were conducted to identify associations of opioid misuse. Relative risks (RR) and 95% confidence intervals were conducted for statistically significant comparisons. Characteristics that were related to opioid misuse (i.e., *p*-value of < 0.10) were included in a logistic regression model to identify significant associations of opioid misuse. Standard errors were adjusted in the logistic regression model to account for lack of independence as participants were clustered by data collection site. All analyses were conducted using STATA version 15.0 statistical software (StataCorp LP, College Station, Texas).

Results

Ninety-two participants (16%) reported having experienced opioid misuse/been diagnosed with OUD (Table 1). Adults who had experienced opioid misuse/been diagnosed with OUD were more likely to: be white, be a current smoker, have been arrested for drug possession, have been arrested for driving under the influence of alcohol/drugs, have a history of AUD, have a history of ODUD, have been diagnosed with multiple mental health problems, have experienced moderate/severe pain in the past four weeks, and have previously experienced a concussion compared with adults without a history of misusing opioids.

The multivariate logistic regression model indicated that white race (OR = 4.21, *p* < .000), current smoking status (OR = 2.51, p = .014), having been diagnosed with other drug use disorder (OR = 3.35, *p* < .000), and concussion history (OR = 1.89, *p* = .001) were positively related to opioid misuse/having been diagnosed with OUD (Table 2).

Discussion

Cross-sectional associations of opioid misuse/having been diagnosed with OUD among adults experiencing homelessness were identified. The identified associations were similar to previous research associations regarding substance use (i.e., smoking and other SUDs) and mental health disorders (Becker et al., 2008). Current smoking and a history of other drug use disorder were identified as significant correlates of opioid misuse. This is consistent with previous literature (Becker et al., 2008; Ives et al., 2006; Kahan et al., 2006). Aside from substance use, white race and a concussion history were positively associated with opioid misuse. While white race is not a consistent correlate of opioid misuse, concussion history is a novel finding among this particular population as it has only been identified as a correlate of OUD (to the authors' knowledge) among retired football players (Cottler et al., 2011).

Previous studies have used concussions as an exclusion study criterion. This could be because a history of lifetime concussions could be a crude marker of other major lifestyle or environmental differences (e.g., family/community violence or engagement in contact sports). However, the use of the crude indicator of concussions in the current study provides insight into the complex comorbidity of opioid misuse. Of the adults who had experienced a concussion, 68% had also experienced moderate or severe pain in the past 4 weeks and 61% had been diagnosed with other drug use disorder (results not shown). Thus, the comorbidity of factors contributes to a complexity in identifying the behavioral risk factors associated with opioid misuse/OUD. At the same time, not every adult who experiences homelessness and experiences

Table 1

Descriptive Statistics for the Full Sample and by Opioid Misuse, M (SD) or %

	Full Sample (*N* = 569)	No history of opioid misuse (*n* = 477)	History of opioid misuse (*n* = 92)	RR (95% CI)
History of opioid misuse	16%	0%	100%	
Demographic characteristics				
Age	43.61 (12.00)	44.18 (11.98)	40.66 (11.77)**	
Sex				
Male	64%	63%	65%	
Race				
White[a]	57%	52%	83%***	1.60 (1.41 – 1.82)
Black or African American	20%	23%	5%	
Asian	< 1%	< 1%	--	
Native Hawaiian or Other Pacific Islander	< 1%	< 1%	--	
American Indian/Alaskan Native	12%	13%	4%	
More than one race/multi-racial	9%	9%	7%	
Other	< 2%	< 2%	1%	
Marital status				
Not married	88%	87%	90%	
Education				
Less than high school education[a]	26%	26%	25%	
High school diploma or GED	41%	41%	42%	
Some college/Associates degree	27%	28%	25%	
Bachelor degree or higher	6%	5%	8%	
Employment				
Unemployed	88%	88%	89%	
Health insurance				
No health insurance	70%	69%	76%	
Experiencing homelessness				
Four or more years	30%	31%	24%	

Table 1 (continued)

Descriptive Statistics for the Full Sample and by Opioid Misuse, M (SD) or %

	Full Sample ($N = 569$)	No history of opioid misuse ($n = 477$)	History of opioid misuse ($n = 92$)	RR (95% CI)
Veteran status				
Veteran	10%	10%	10%	
Disabled status				
Disabled	24%	25%	21%	
Substance use				
Current smoker	78%	76%	92%***	1.22 (1.13 – 1.32)
Arrested for drug possession	35%	32%	49%**	1.53 (1.20 – 1.96)
Arrested for driving under the influence of alcohol or drugs	31%	29%	40%*	1.37 (1.03 – 1.82)
Diagnosed with alcohol use disorder	23%	20%	38%***	1.89 (1.38 – 2.59)
Diagnosed with other drug use disorder	21%	16%	47%***	2.86 (2.12 – 3.85)
Mental health comorbidity	1.70 (1.61)	1.60 (1.59)	2.25 (1.61)***	
Physical health				
Moderate/Severe pain (past 4 weeks)	40%	38%	49%+	1.28 (1.01 – 1.63)
Poor/fair health	37%	35%	42%	
Concussion history	55%	52%	71%**	1.37 (1.17 – 1.60)

Note. RR (95% CI) = Relative risks with 95% confidence intervals. Relative risks and 95% CI were conducted for statistically significant comparisons.
*** $p < .001$, ** $p < .01$, * $p < .05$, +$p < .10$ are for the comparisons between the no opiate use diagnosis group and the opiate use diagnosis group.
[a]Variable was dichotomized for the purposes of the regression model; this particular category was coded as 1 and all other categories were collapsed and coded as 0.

Table 2

Multivariate Logistic Regression Correlates of Opioid Misuse among Adults Experiencing Homelessness (N = 569)

Characteristics	Odds Ratio (95% CI)
Demographic characteristics	
White	4.21 (1.98 – 8.98)***
Substance use	
Current smoker	2.51 (1.21 – 5.23)*
Arrested for drug possession	1.17 (0.60 – 2.28)
Arrested for driving under the influence of alcohol or drugs	1.03 (0.70 – 1.52)
Diagnosed with alcohol use disorder	1.50 (0.90 – 2.50)
Diagnosed with other drug use disorder	3.35 (1.83 – 6.11)***
Mental health comorbidity	1.10 (0.97 – 1.26)
Physical health	
Moderate/Severe pain (past 4 weeks)	1.05 (0.85 – 1.29)
Concussion history	1.89 (1.31 – 2.73)**
Adjusted R^2	17%

*Note. *** p < .001, ** p < .01, * p < .05.*

similar comorbidities becomes addicted to opioids. Subgroups of adults who experience homelessness may have distinctly different levels of risk for opioid misuse/OUD, and these groups may vary by clusters of behavior risk comorbidities. The use of latent class analysis to detect classes of adults who experience homelessness by behavior risk factors may assist in detecting opioid misuse/OUD risk profiles. The risk profiles can then be used to develop screeners or instruments used to triage individuals into different treatment programs.

The current study identifies behavioral characteristics related to history of past opioid problems. The current analysis is limited to self-reported, cross-sectional data that lacks specificity in the mental health, physical health, and substance use measures, including current or multiple occurrences (i.e., longitudinal measures) of opioid problems. More nuanced measures of opioid misuse that include the type of opioid misuse (synthetic opioid vs. prescription), the duration of misuse, and the temporal order between the characteristics identified in the current study as risk factors and opioid misuse are needed to provide insight as to what contributes to misuse/being diagnosed with OUD. Research that takes into consideration these factors could help explain why discrepancies exist in identifying the associations of opioid misuse. Overall, this study contributes to the discussion on opioid addiction by identifying cross-sectional associations of opioid misuse among a hard to reach population.

Acknowledgements

References

Agarwal, S., Saxena, K., Dahuja, M., & Choudhary, S. (2018). Chronic pain, substance abuse and depression: Unfolding the common linkage. *Indian Journal of Pain, 32*(1), 51-53. https://doi.org/10.4103/ijpn.ijpn_78_17

American Psychiatric Association. (2018). Opioid Use Disorder. Retrieved from https://www.psychiatry.org/patients-families/addiction/opioid-use-disorder/opioid-use-disorder

Becker, W. C., Sullivan, L. E., Tetrault, J. M., Desai, R. A., & Fiellin, D. A. (2008). Non-medical use, abuse and dependence on prescription opioids among U.S. adults: Psychiatric, medical and substance use correlates. *Drug and Alcohol Dependence, 94*(1-3), 38-47. https://doi.org/10.1016/j.drugalcdep.2007.09.018

Businelle, M. S., Poonawalla, I. B., Kendzor, D. E., Rios, D. M., Cuate, E. L., Savoy, E. J., . . . Reitzel, L. R. (2015). Smoking policy change at a homeless shelter: Attitudes and effects. *Addictive Behaviors, 40*, 51-56. https://doi.org/10.1016/j.addbeh.2014.08.013

Centers for Disease Control and Prevention. (2009). *Overview: BRFSS 2009*. Retrieved from https://www.cdc.gov/brfss/annual_data/2009/pdf/overview_09.pdf

Childress, S., Reitzel, L. R., Maria, D. S., Kendzor, D. E., Moisiuc, A., & Businelle, M. S. (2015). Mental illness and substance use problems in relation to homelessness onset. *American Journal of Health Behavior, 39*(4), 549-555. https://doi.org/10.5993/ajhb.39.4.11

Cottler, L. B., Ben Abdallah, A., Cummings, S. M., Barr, J., Banks, R., & Forchheimer, R. (2011). Injury, pain, and prescription opioid use among former National Football League (NFL) players. *Drug and Alcohol Dependence, 116*(1-3), 188-194. https://doi.org/10.1016/j.drugalcdep.2010.12.003

Florence, C. S., Zhou, C., Luo, F., & Xu, L. (2016). The economic burden of prescription opioid overdose, abuse, and dependence in the United States, 2013. *Medical Care, 54*(10), 901-906. https://doi.org/10.1097/mlr.0000000000000625

Henry, M., Mahathey, A., Morrill, T., Robinson, A., Shivji, A., & Watt, R., (Abt Associates). (2018). *The 2018 annual homeless assessment report (AHAR) to Congress: Part 1: Point-in-time estimates of homelessness.* Washington, DC: The U.S. Deparment of Housing and Urband Development. Retrieved from https://www.hudexchange.info/resources/documents/2018-AHAR-Part-1.pdf

Hernandez, D. C., Daundasekara, S. S., Arlinghaus, K. R., Sharma, A. P., Reitzel, L. R., Kendzor, D. E., & Businelle, M. S. (2019). Fruit and vegetable consumption and emotional distress tolerance as potential links between food insecurity and poor physical and mental health among homeless adults. *Preventive Medicine Reports, 14*, 100824. https://doi.org/10.1016/j.pmedr.2019.100824

Hwang, S. W., Wilkins, E., Chambers, C., Estrabillo, E., Berends, J., & MacDonald, A. (2011). Chronic pain among homeless persons: Characteristics, treatment, and barriers to management. *BMC Family Practice, 12*, 73. https://doi.org/10.1186/1471-2296-12-73

Iheanacho, T., Stefanovics, E., & Rosenheck, R. (2018). Opioid use disorder and homelessness in the Veterans Health Administration: The challenge of multimorbidity. *Journal of Opioid Management, 27*(4), 273-284. https://doi.org/10.5055/jom.2018.0447

Ives, T. J., Chelminski, P. R., Hammett-Stabler, C. A., Malone, R. M., Perhac, J. S., Potisek, N. M., . . . Pignone, M. P. (2006). Predictors of opioid misuse in patients with chronic pain: A prospective cohort study. *BMC Health Services Research, 6*, 46. https://doi.org/10.1186/1472-6963-6-46

Kahan, M., Srivastava, A., Wilson, L., Gourlay, D., & Midmer, D. (2006). Misuse of and dependence on opioids: Study of chronic pain patients. *Canadian Family Physician, 52*(9), 1081-1087.

Mauro, P. M., Canham, S. L., Martins, S. S., & Spira, A. P. (2015). Substance-use coping and self-rated health among US middle-aged and older adults. *Addictive Behavior, 42*, 96-100. https://doi.org/10.1016/j.addbeh.2014.10.031

Okuyemi, K. S., Goldade, K., Whembolua, G.-L., Thomas, J. L., Eischen, S., Guo, H., . . . Jarlais, D. D. (2013). Smoking characteristics and comorbidities in the Power To Quit randomized clinical trial for homeless smokers. *Nicotine & Tobacco Research, 15*(1), 22-28. https://doi.org/10.1093/ntr/nts030

Savage, S. R., Kirsh, K. L., & Passik, S. D. (2008). Challenges in using opioids to treat pain in persons with substance use disorders. *Addiction Science & Clinical Practice, 4*(2), 4-25.

Seal, K. H., Shi, Y., Cohen, G., Cohen, B. E., Maguen, S., Krebs, E. E., & Neylan, T. C. (2012). Association of mental health disorders with prescription opioids and high-risk opioid use in US veterans of Iraq and Afghanistan. *JAMA, 307*(9), 940-947. https://doi.org/10.1001/jama.2012.234

Shiner, B., Leonard Westgate, C., Bernardy, N. C., Schnurr, P. P., & Watts, B. V. (2017). Trends in opioid use disorder diagnoses and medication treatment among veterans with posttraumatic stress disorder. *Journal of Dual Diagnosis, 13*(3), 201-212. https://doi.org/10.1080/15504263.2017.1325033

Substance Abuse and Mental Health Services Administration. (2018). *Key substance use and mental health indicators in the United States: Results from the 2017 National Survey on Drug Use and Health* (HHS Publication No. SMA 18-5068, NSDUH Series H-53). Retrieved from https://www.samhsa.gov/data/

Ware, J. E., Jr., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical Care, 30*(6), 473-483.