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Prevalence of lifetime nonmedical opioid use among U.S. Health Center Patients aged 45 years and older with psychiatric disorders

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Abstract

Objective: Despite recent concerns over the increase in opioid misuse among aging adults, little is known about the prevalence of lifetime nonmedical opioid use in underserved, vulnerable middle-aged and older patients with psychiatric disorders. This study aims to determine the lifetime prevalence of nonmedical opioid use among underserved, vulnerable U.S. adults aged ≥45 years with psychiatric disorders.

Method: A nationally representative sample (n = 3,294) was obtained from the 2014 Health Center Patient Survey which collects data on psychiatric disorders, opioid use, and other health information from underserved, vulnerable U.S. primary care populations. Predictor variables included self-reported panic disorder, generalized anxiety disorder, schizophrenia, or bipolar disorder. The outcome variable was self-reported lifetime nonmedical opioid use. Frequencies, counts, and unadjusted and adjusted logistic regression models were conducted with the cross-sectional survey dataset.

Results: Patients with bipolar disorder had the highest lifetime nonmedical opioid use rate (20.8%), followed by schizophrenia (19.3%), panic disorder (16.5%), and generalized anxiety disorder (14.5%). Nonmedical opioid use was significantly associated with bipolar disorder (OR 3.46, 95% CI [1.33, 8.99]) and generalized anxiety disorder (OR 2.03 95% CI [1.08, 3.83]).

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Disclosure statement

No potential conflict of interest was reported by the authors.

Conclusion: Our findings demonstrate a high prevalence of lifetime nonmedical opioid use in underserved, vulnerable middle-aged and older health center patients with psychiatric disorders. Given the prevalence, health center professionals should monitor, prevent, and treat new or reoccurring signs and symptoms of nonmedical opioid use in this high-risk group of aging patients with psychiatric disorders.

Keywords

Opioids; geriatric psychiatry; geriatrics; epidemiology; primary care; health centers

Introduction

The lifetime prevalence of nonmedical opioid use--taking opioids either without a prescription, in higher amounts than prescribed, or using illicit heroin—increased from 5.6% in 2002 to 8.0% in 2013 among adults aged 50 years and older (Schepis & McCabe, 2016). Although the opioid epidemic has been generally associated with young adults, there has been a recent surge in treatment admissions for heroin use and other illicit opioid misuse among U.S. middle-aged and older adults that uncovers a hidden aspect of the opioid crisis (Dart et al., 2015; Frenk, Porter, & Paulozzi, 2015; Hedegaard, Chen, & Warner, 2015; Huhn, Strain, Tompkins, & Dunn, 2018). Further, it has been found that suicidal intent and fatality outcomes related to prescription opioid medication misuse are more common among adults aged 60 years and older, compared to those under 60 (West, Severtson, Green, & Dart, 2015). In response to the opioid crisis, there have been multiple calls for the development of opioid misuse treatments for adults and older adults from the general population (Murthy, 2016; Nosyk et al., 2013; Voon & Kerr, 2013). Recent advances in treatments include experimental drugs for opioid withdrawal (Brown & Alper, 2018), mindfulness training (Garland et al., 2014), taper support groups (Sullivan et al., 2017), and web-based cognitive-behavioral therapy for co-occurring chronic pain and aberrant drug-related behavior (Guarino et al., 2018). However, there has been limited research in underserved, vulnerable middle-aged and older adult groups such as those with psychiatric disorders.

Baby boomers, U.S. adults born between 1946 and 1964, are quickly aging into older adulthood. Given the association between receipt of prescription opioids and drug overdose deaths (West et al., 2015), it is predicted that there will be additional misuse and overdoses due to a higher number of older adults receiving prescription opioids for painful aging-related physical health conditions (e.g. coronary heart disease, congestive heart failure) in coming years (Carew & Comiskey, 2018; Schepis & McCabe, 2016; Sproule, Brands, Li, & Catz-Biro, 2009). These painful aging-related conditions are even more prevalent in underserved, vulnerable groups including middle-aged and older adults with psychiatric disorders such as schizophrenia and bipolar disorder (Correll et al., 2017). Additionally, for older adults compared to younger counterparts, older adults taking opioid medications for medical or non-medical reasons might experience worse health outcomes, including increased risk of drug poisoning (Dowell, Haegerich, & Chou, 2016), falls and fall-related injuries (Rolita, Spegman, Tang, & Cronstein, 2013), and cognitive and psychomotor deficits (Clegg & Young, 2011).

The biopsychosocial model conceptualizes health and well-being by first examining an individual's background related to biomedical experiences (e.g. opioid medication misuse) and psychosocial illness impairment (e.g. bipolar disorder), which often interact and negatively influence one another to worsen aging-related health outcomes (World Health Organization, 2001). Despite the greater chances of experiencing painful aging-related physical health conditions and the adverse consequences to opioid use in older adults, there is limited research on the lifetime prevalence of nonmedical opioid use among underserved, vulnerable middle-aged and older adults with panic disorder, generalized anxiety disorder, schizophrenia, and/or bipolar disorder. Influenced by the biopsychosocial model, the primary aim of this study was to ascertain the prevalence of lifetime nonmedical opioid use rates among U.S. underserved, vulnerable patients aged 45 years and older with panic disorder, generalized anxiety disorder, schizophrenia, and/or bipolar disorder. The data used in this study were obtained from the nationally representative 2014 Health Center Patient Survey (HCPS), which collects data on these four types of psychiatric disorders, opioid use, and other health information. Our secondary aim was to investigate the associations between lifetime nonmedical opioid use and psychiatric disorders after controlling for sociodemographic and clinical characteristics.

Materials and methods

Survey description

The data were extracted from the publicly-available 2014 HCPS data file, which is sponsored by the Health Resources and Services Administration (HRSA). The purpose of the HCPS is to provide results to guide and support the mission of HRSA's Bureau of Primary Health Care to improve the health of the nation's underserved communities and vulnerable populations by assuring access to comprehensive, culturally competent, quality primary health care services. The HCPS used a three-stage sampling method to identify a nationally representative sample of 2014–2015 patients from HRSA-funded health centers. Any person with or without health insurance is able to seek care from a HRSA-funded health center, but service costs differ based on a sliding scale at each local facility. First-stage sampling units were HRSA health center program grantees, stratified by funding stream and other characteristics and sampled with probability proportional to size. Second-stage sampling units were specific sites within each grantee. Third-stage sampling units included a random sample of clinic patients with at least 1 prior visit in the last year. Minority populations and those aged 65 years and older were oversampled in the survey to improve the representation of these groups. The survey data include health-related outcomes such as self-reported physical and mental health conditions and health behaviors. Data were collected between September 2014 and April 2015 through computer-assisted, in-person interviews. The sample consisted of 7,002 patients, with a 91.4% interview response rate. Each respondent received a $25 gift card upon completing the interview. A detailed data file user's manual can be found at the HRSA website: (https://bphc.hrsa.gov/datareporting/research/hcpsurvey/2014usermanual.pdf). Based on past work documenting the accelerated chronological age and high premature mortality rate in adults with psychiatric disorders (Higgins-Chen, Boks, Vinkers, Kahn, & Levine, 2020), we selected the age range of 45 years and older for this population. For the current study, we excluded respondents who

were younger than age 45 and those missing responses on the lifetime nonmedical opioid use and psychiatric disorder questions, resulting in a final sample size of 3,294.

Measures

Sociodemographic variables.—The sociodemographic variables included age, gender, race, marital status, education, military history, and geographical location. Each sociodemographic variable was dummy-coded: age as ≥65 age (0 = 45–64); gender as female (0 = male); race as Hispanic (0 = non-Hispanic White, Black, or Other); marital status as married (0 = not married); education as less than high school degree (0 = more than high school degree); military history as served active duty (0 = no active military history); and geographical location of the health center as urban (0 rural).

Clinical characteristics.—Physical health conditions were considered self-reported, as respondents were asked if they were ever told by a doctor or other health professional if they had hypertension, diabetes, coronary heart disease, traumatic brain injury, or chronic obstructive pulmonary disorder. Overall health status was measured with a single item asking how participants rate their health in general, using a 5-point scale ranging from 1 (excellent) to 5 (poor). The scores were reverse-scored so that higher scores reflect better health status. Activities of daily living (ADL) impairment was measured with five items (e.g. “Do you have difficulty dressing or bathing?”). The level of ADL impairment was based on the sum of these items. Instrumental activities of daily living (IADL) impairment was measured with a “Yes” or “No” reply to a single item (i.e. “Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor or shopping?”). History of alcohol use was also measured by a “Yes” or “No” to a single item (i.e. “Lifetime: Ever used alcoholic beverages?”).

Primary variables of interest.—Any psychiatric disorder was determined by using four items. These questions asked participants whether they were ever told by a doctor or other health professional that they have a panic disorder, generalized anxiety disorder, schizophrenia, or bipolar disorder. For the variable of lifetime nonmedical opioid use, the survey item asked the respondents to answer the following question: “Lifetime: Have you used Opioids? [non-medically]”. Respondents were given the response option of “Yes” or “No.”

Data analysis

Analyses were conducted using the IBM Statistical Package for the Social Science (SPSS) V.25, using the add-on module of SPSS Complex Samples to apply the strata, cluster, and weight variables to account for the complex survey sampling design. Descriptive statistics were conducted to describe participants’ sociodemographic and clinical characteristics, as well as to investigate prevalence rates of lifetime nonmedical opioid use rates among respondents with any of four psychiatric disorders (i.e. panic disorder, generalized anxiety disorder, schizophrenia, or bipolar disorder). We also conducted a series of chi-squared tests and independent-samples t-tests to compare the sociodemographic and clinical characteristics of participants with and without any of the four psychiatric disorders. Odds ratios (OR), adjusted ORs, and 95% confidence intervals (CI) were calculated

using hierarchical logistic regression models to test whether any of the four psychiatric disorders (referent = no psychiatric disorder) or the specific psychiatric disorders alone of panic disorder (referent = no panic disorder), generalized anxiety disorder (referent = no generalized anxiety disorder), schizophrenia (referent = no schizophrenia), and bipolar disorder (referent = no bipolar disorder) are associated with lifetime nonmedical opioid use. For model adjustment, sociodemographic and clinical covariates were selected based on prior research among middle-aged and older adults with psychiatric disorders (Brooks, Petersen, Kelly, & Reid, 2019; Brooks, Titus, et al., 2018; Brooks, Umucu, et al., 2018; 2019). The first model was unadjusted (Model 1); the second included the sociodemographic variables of age, gender, race, marital status, education, military history, and geographical location (Model 2); and the third included Model 2 covariates and self-reported health, hypertension, diabetes, coronary heart disease, traumatic brain injury, chronic obstructive pulmonary disorder, ADL impairment, IADL impairment, and history of alcohol use (Model 3). Statistical testing was performed with an α-level of < 0.05 denoting statistical significance.

Results

As shown in Table 1, a total of 1,145 (34.8%) individuals reported having at least one of the four psychiatric disorders (panic disorder, generalized anxiety disorder, bipolar disorder, or schizophrenia). Overall, 1,977 psychiatric disorder diagnoses were reported by this group. Compared to middle-aged and older adults without any psychiatric disorder, more individuals with any psychiatric disorder were more likely to be: (a) within the age range of 45–64, (b) female, (c) non-Hispanic White, (d) not married, and (e) at least a high school graduate. Middle-aged and older adults with psychiatric disorders also had higher rates of hypertension, coronary heart disease, traumatic brain injury, chronic obstructive pulmonary disorder, history of alcohol use, and lifetime nonmedical opioid use. Last, individuals with psychiatric disorders reported poorer health status and higher levels of ADL and IADL impairment.

Table 2 represents rates of lifetime nonmedical opioid use by psychiatric disorder subgroup. Middle-aged and older adults with bipolar disorder had the highest nonmedical opioid use rate (20.8%), followed by those with schizophrenia (19.3%), panic disorder (16.5%), and generalized anxiety disorder (14.5%).

Table 3 shows the results of hierarchical logistic regression analyses. The univariate logistic regression (Model 1) results indicate lifetime nonmedical opioid use was significantly associated with generalized anxiety disorder ($\chi^2 = 4.84$, df = 1, $p < .05$; OR 2.03 95% CI [1.08, 3.83], $p < .05$) and bipolar disorder ($\chi^2 = 6.61$, df = 1, $p < .05$; OR 3.46, 95% CI [1.33, 8.99], $p < .05$). The results of the first multivariate regression analysis (Model 2) also showed that lifetime nonmedical opioid use was associated with generalized anxiety disorder ($\chi^2 = 5.24$, df = 1, $p < .05$; AOR 2.39, 95% CI [1.13, 5.07], $p < .05$) and bipolar disorder ($\chi^2 = 7.78$, df = 1, $p < .05$; AOR 3.67, 95% CI [1.46, 9.19], $p < .05$), as well as any psychiatric disorder ($\chi^2 = 4.14$, df = 1, $p < .05$; AOR 2.35, 95% CI [1.03, 5.38], $p < .05$), even after controlling for age, gender, race, marital status, education, military history, and geographical location. The results from the second multivariate logistic regression analysis

revealed that lifetime nonmedical opioid use was only associated with bipolar disorder (χ^2 = 5.70, df = 1, $p < .05$; AOR 2.99, 95% CI [1.21, 7.41], $p < .05$) after controlling for sociodemographic variables and self-reported health, hypertension, diabetes, coronary heart disease, traumatic brain injury, chronic obstructive pulmonary disorder, ADL impairment, IADL impairment, and history of alcohol use.

Discussion

Our main objective was to ascertain the estimated prevalence rates of lifetime nonmedical opioid use among underserved, vulnerable U.S. adults aged 45 years and older with psychiatric disorders from the nationally representative 2014 HCPS. We found that among the health center patients reporting a diagnosis of panic disorder, generalized anxiety disorder, schizophrenia, and/or bipolar disorder, it is estimated that 162 patients (14.1%) also reported a history of lifetime nonmedical opioid use in 2014. The total prevalence of 14.1% for lifetime nonmedical opioid use in health center patients with any psychiatric disorder is about 2.5 times that of health center patients without psychiatric disorders (6.3%) (Schepis & McCabe, 2016). Further, we determined that about one out of five patients with the specific psychiatric disorder of bipolar disorder (20.8%) or schizophrenia (19.3%) reported lifetime nonmedical opioid use. There were also relatively high rate estimates among patients with panic disorder (16.5%) and generalized anxiety disorder (14.5%). Overall, these results reflect that underserved, vulnerable patients with bipolar disorder or schizophrenia are the most likely to report lifetime opioid misuse. However, it is not known whether these patients were prescribed such medications or whether they were taking non-prescription opioids such as heroin for recreational reasons or due to limited access to prescription opioids.

Compared to patients without the specific psychiatric disorder, lifetime nonmedical opioid use was over 3 times as likely in a subgroup of underserved, vulnerable middle-aged and older adults with bipolar disorder, and more than twice as likely in generalized anxiety disorder in univariate regression models. These results draw attention to the particularly high likelihood of lifetime nonmedical opioid use in underserved, vulnerable middle-aged and older adults with certain psychiatric disorders. The rates found in the present study are consistent with or greater than previous cross-sectional and longitudinal dataset studies documenting that adult populations with bipolar, depressive, anxiety, posttraumatic stress, or personality disorders are 1.2 to 4 times as likely to be currently prescribed opioid medications or self-report a history of nonmedical opioid use (Becker, Sullivan, Tetrault, Desai, & Fiellin, 2008; Davis, Lin, Liu, & Sites, 2017; Dowling, Storr, & Chilcoat, 2006; Goesling et al., 2015; Huang et al., 2006; Martins, Keyes, Storr, Zhu, & Chilcoat, 2009; Martins et al., 2012; Saha et al., 2016; Schepis & Hakes, 2011; Schepis & McCabe, 2016). One study also reported that the likelihood of lifetime non-medical opioid use was highest in adults with bipolar disorder and generalized anxiety disorder, which might be due to a propensity for self-medication in these particular disorders (Martins et al., 2009). Even after adjusting for sociodemographic variables and clinical characteristics, lifetime nonmedical opioid use remained over 3 times as likely in bipolar disorder and more than 2 times as likely in participants reporting any psychiatric disorder, compared to those without any of these disorders. Unexpectedly, schizophrenia alone was not significantly associated with

lifetime nonmedical opioid use in the regression models, which might be explained by its overlap with clinical characteristics such as self-reported health, co-morbidities (e.g. traumatic brain injury), ADL or IADL impairment, and history of alcohol use. Another possible explanation for the inability to confirm an association might be due to the small original sample sizes for the group of respondents with schizophrenia ($N = 171$).

Research, clinical, and policy implications

As HRSA-funded health centers provide primary care to over 27 million low-income, uninsured populations across the U.S., the findings from this study have research, clinical, and policy implications for the integration and implementation of primary care-based behavioral health services for the U.S. and other industrialized countries. The lifetime prevalence of nearly 50% for the dual diagnoses of severe psychiatric disorders and either alcohol, cocaine, cannabis, or tobacco use disorder is well documented (Crump, Winkleby, Sundquist, & Sundquist, 2013; Hartz et al., 2014; Volkow, 2009). However, our study is the first to document the rates of lifetime nonmedical opioid use among a nationally representative sample of underserved, vulnerable U.S. adults aged 45 years and older with panic disorder, generalized anxiety disorder, schizophrenia, and/or bipolar disorder from health centers. Because nonmedical opioid use is particularly risky and potentially life-threatening to underserved, vulnerable middle-aged and older patients with psychiatric disorders who use illicit heroin or take opioid medications without a prescription or not as instructed (Huang et al., 2006), it will be important for future work to further explore these links and consequences. Researchers should work to disentangle the specific biopsychosocial causal processes and temporal ordering between psychiatric disorders and nonmedical opioid use in such underserved communities and vulnerable populations. For instance, it is not well known whether varying types of psychiatric disorders are risk factors for prescription opioid medications, consequences of opioid use, or a combination of both (Scherrer et al., 2014). Other biomedical/physical process factors (e.g. severe pain, previous/current opioid medication dose, other specific drug use, shared neuropathology) or psychosocial factors (e.g. limited social support, mental illness severity, low self-efficacy, self-medication or suicidal intent, lack of nonpharmacological treatment options) that may partly explain the risk factors, causes, and short-term or long-term effects of lifetime nonmedical opioid use in underserved, vulnerable middle-aged and older adults with psychiatric disorders could also be investigated (Braden et al., 2009; Chilcoat & Breslau, 1998; Edlund et al., 2010; Martins et al., 2012).

Due to the associations between psychiatric disorders and substance use disorders from biomedical and psychosocial vulnerabilities (Cerdá, Sagdeo, Johnson, & Galea, 2010; Kelly & Daley, 2013; Maria Pelayo-Teran et al., 2012; Nestler, 2014; Tsuang, Francis, Minor, Thomas, & Stone, 2012), efforts to explore system changes to mitigate outcomes still remain of high importance. Both health center practitioners and administrators should pay close attention to patients with psychiatric disorders reporting lifetime nonmedical opioid use. For instance, it may be that this low-income group receives fewer resources for nonpharmacological pain management and opioid use disorder treatment from the health care system or requires additional support to manage stress related to the impact of the aging process. Funding agencies, such as HRSA, might consider investing additional funds toward

peer recovery specialists or behavioral health therapist positions in light of the current opioid misuse epidemic. Brief screening, comprehensive assessments, and monitoring of opioid use should also be prioritized in these underserved, vulnerable middle-aged and older health center patients with psychiatric disorders to evaluate the potential risk for opioid misuse.

Limitations

While this study has notable strengths, such as a large health center patient sample that provided an opportunity to investigate lifetime nonmedical opioid use among underserved, vulnerable middle-aged and older adults with psychiatric disorders, there are some limitations which should be acknowledged. First, the study population of HRSA-funded health center patients might not generalize to all primary care patients. Second, we used cross-sectional survey data, which prevents our ability to make causal inferences about the link between nonmedical opioid use and psychiatric disorder. Third, we were restricted to self-report data on rates of lifetime nonmedical opioid use and psychiatric disorders, which may be negatively impacted by underreporting bias, limited insight, or cognitive limitations and have limited specificity. For instance, the era of use, duration, and severity of the reported history of nonmedical opioid use was unknown. Certain respondents may have also been unfamiliar with the opioid terms due to health literacy issues or might have misunderstood the survey question on nonmedical opioid use. Fourth, due to being confined to a secondary dataset with predetermined measures, this study was only able to assess the outcomes from individuals self-reporting any of the four psychiatric disorders. Future research should also assess whether major depression, the full schizophrenia spectrum, posttraumatic stress disorder, and personality disorders are associated with lifetime nonmedical opioid use in aging adults. Fifth, the survey did not include data on pain, pain conditions, or contraindicated drug use that might confound the results. Last, we were limited to a smaller number of older adults, which prevented our ability to examine age differences in adults from the middle old (75–84 years) and oldest-old (85+) age groups. Longitudinal studies should seek to examine the potential bidirectional effects between nonmedical opioid use and the aging process across middle-aged and older adult age groups, especially in those with painful aging-related conditions. Although we are not able to infer causality from this study, the findings underscore high-risk groups of middle-aged and older adults who may benefit from tailored assessments and interventions.

Conclusions

Despite the recurrent alarms being sounded over the opioid crisis, little is known about the prevalence of lifetime nonmedical opioid use in underserved, vulnerable populations such as middle-aged and older adults with psychiatric disorders, who experience disproportionately high rates of co-occurring painful aging-related medical conditions. Our findings reported high national prevalence rates of lifetime nonmedical opioid use among U.S. health center patients aged 45 years and older with psychiatric disorders. This work underscores the need to continue to evaluate and attend to current risk for nonmedical opioid use in middle-aged and older adults with psychiatric disorders who might have preexisting histories of nonmedical opioid use. Considering the increased lifetime nonmedical opioid use patterns among underserved, vulnerable middle-aged and older adults with mental health symptoms

and disorders, behavioral health specialists and other health center professionals should consider prioritizing opioid misuse risk assessments, opioid use disorder treatments, and nonpharmacological pain management interventions as a part of integrated mental and physical health care for this group.

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Table 1.

Sociodemographic and clinical characteristics of the cohort.

Variables	No Psychiatric Disorder (*N* = 2149)	Any Psychiatric Disorder (*N* = 1145)	p-value*
Age, n (%)			.000*
45–64	1715 (79.8%)	1027 (89.7%)	
65+	434 (20.2%)	118 (10.3%)	
Gender, n (%)			.005*
Male	943 (43.9%)	444 (38.8%)	
Female	1206 (56.1%)	701 (61.2%)	
Race/Ethnicity, n (%)			.000*
Non-Hispanic White	448 (20.8%)	421 (36.8%)	
Non-Hispanic Black	541 (25.2%)	289 (25.2%)	
Non-Hispanic Other	399 (18.5%)	152 (13.3%)	
Hispanic	761 (35.4%)	281 (24.5%)	
Marital Status, n (%)			
Married	764 (35.6%)	213 (18.6%)	
Other	1385 (64.4%)	932 (81.4%)	
Education, n (%)			.000*
Less than High School Graduate	1037 (48.3%)	471 (41.1%)	
High School Graduate and Above	1112 (51.7%)	674 (58.9%)	
Military History, n (%)			.341
Never Served in Active Duty	2040 (94.9%)	1077 (94.1%)	
Served in Active Duty	109 (5.1%)	67 (5.9%)	
Geographical Location, n (%)			.953
Urban	1543 (71.8%)	821 (71.7%)	
Rural	606 (28.2%)	324 (28.3%)	
Self-Reported Health, mean (SD)	2.24 (1.33)	1.82 (1.19)	.000*
Medical Comorbidities, n (%)			
Hypertension	1276 (59.4)	764 (66.7%)	.000*
Diabetes	681 (31.7%)	315 (27.5%)	.013*

Variables	No Psychiatric Disorder (*N* = 2149)	Any Psychiatric Disorder (*N* = 1145)	p-value*
Coronary Heart Disease	106 (4.9%)	93 (8.1%)	.000*
Traumatic Brain Injury	57 (2.7%)	115 (10.0%)	.000*
Chronic Obstructive Pulmonary Disorder	168 (7.8%)	235 (20.5%)	.000*
ADL Impairment, mean (SD)	0.08 (0.17)	0.18 (0.24)	.000*
IADL Impairment, mean (SD)	0.08 (0.26)	0.25 (0.44)	.000*
History of Alcohol Use, n (%)			.000*
Yes	1550 (72.1%)	933 (81.5%)	
No	595 (27.7%)	210 (18.3%)	
Lifetime Nonmedical Opioid Use, n (%)			.000*
Yes	135 (6.3%)	162 (14.1%)	
No	2009 (93.5%)	981 (85.7%)	

Note. Any psychiatric disorder = panic disorder, generalized anxiety disorder, schizophrenia, or bipolar disorder. Means ± standard deviations are presented for continuous variables; Counts and percentages for categorical variables.

*p-values less than .05 were considered statistically significant for t-tests (df = 157) and Pearson Chi-Square tests (df = 1).

Table 2.

Rates of psychiatric disorders with and without lifetime nonmedical opioid use (*N* = 1977).

	Respondents, N (%)	
Specific Psychiatric Disorder	**Including Lifetime Nonmedical Opioid Use (*N* = 328)**	**Excluding Lifetime Nonmedical Opioid Use (*N* = 1649)**
Panic disorder (*N* = 490)	81 (16.5%)	409 (83.5%)
Generalized anxiety disorder (*N* = 951)	138 (14.5%)	813 (85.5%)
Bipolar disorder (*N* = 365)	76 (20.8%)	289 (79.2%)
Schizophrenia (*N* = 171)	33 (19.3%)	138 (80.7%)

Note. The sample sizes (N) for specific psychiatric disorders do not represent unique cases; respondents might have multiple psychiatric disorder diagnoses.

Table 3.

Weighted odds ratios for the associations between psychiatric disorders and lifetime nonmedical opioid use outcome.

Psychiatric Disorder[1]	Model 1 – Unadjusted OR (95%)	Model 2 – Adjusted[2] OR (95%)	Model 3 – Adjusted[3] OR (95%)
Any psychiatric disorder	2.10 (0.97 – 4.55)	2.35 * (1.03 – 5.38)	1.94 (0.77 – 4.87)
Panic disorder	1.24 (0.60 – 2.56)	1.44 (0.67 – 3.09)	0.98 (0.39 – 2.43)
Generalized anxiety disorder	2.03 * (1.08 – 3.83)	2.39 * (1.13 – 5.07)	1.99 (0.79 – 5.01)
Bipolar disorder	3.46 * (1.33 – 8.99)	3.67 * (1.46 – 9.19)	2.99 * (1.21 – 7.41)
Schizophrenia	2.59 (0.79 – 8.48)	1.85 (0.46 – 7.36)	1.91 (0.43 – 8.54)

Note. Any psychiatric disorder = panic disorder, generalized anxiety disorder, schizophrenia, or bipolar disorder.

[1] Psychiatric disorders are categorized as following: any psychiatric disorder (0 = no psychiatric disorder), panic disorder (0 = no panic disorder), generalized anxiety disorder (0 = no generalized anxiety disorder), bipolar disorder (0 = no bipolar disorder), and schizophrenia (0 = no schizophrenia).

[2] Adjusted for sociodemographic variables (i.e. age [1 = 65 and older], gender [female = 1], race/ethnicity [Non-Hispanic White = 1], marital status [married = 1], education [less than high school = 1], military history [served in active duty = 1], and geographic location [urban = 1]);

[3] Adjusted for the aforementioned sociodemographic variables, in addition to clinical characteristics (self-reported health, hypertension, diabetes, coronary heart disease, traumatic brain injury, chronic obstructive pulmonary disorder, ADL impairment, IADL impairment, history of alcohol use).

* p-values less than .05 were considered statistically significant for Wald Chi-Square tests (df = 1).