Clinical factors associated with prescription drug use disorder in urban primary care patients with chronic pain

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Abstract

This study examined characteristics associated with prescription drug use disorder (PDUD) in primary care patients with chronic pain from a cross-sectional survey conducted at an urban academically-affiliated safety-net hospital. Participants were 18–60 years old, had pain for ≥ 3 months, took prescription or non-prescription analgesics, and spoke English. Measurements included the Composite International Diagnostic Interview (PDUD, other substance use disorders (SUD), Post-traumatic Stress Disorder (PTSD)); Graded Chronic Pain Scale, smoking status; family history of SUD; and time spent in jail. Of 597 patients (41% male, 61% black, mean age 46 years), 110 (18.4%) had PDUD of whom 99 (90%) had another SUD. In adjusted analyses, those with PDUD were more likely than those without any current or past SUD to report jail time (OR 5.1, 95% CI 2.8–9.3), family history of SUD (OR 3.4, 1.9–6.0), greater pain-related limitations (OR 3.8,1.2–11.7), cigarette smoking (OR 3.6, 2.0–6.2), or to be white (OR 3.2, 1.7–6.0), male (OR 1.9, 1.1–3.5) or have PTSD (OR 1.9, 1.1–3.4). PDUD appears increased among those with easily identifiable characteristics. The challenge is to determine who among those with risk factors can avoid, with proper management, developing the increasingly common diagnosis of PDUD.

PERSPECTIVE

This article examines risk factors for prescription drug use disorder (PDUD) among a sample of primary care patients with chronic pain at an urban, academic, safety-net hospital. The findings may help clinicians identify those most at risk for developing PDUD when developing appropriate treatment plans.

Authors report no conflict of interest.

Keywords

Primary care; substance abuse; pain

INTRODUCTION

Chronic non-cancer pain affects one-fifth of primary care patients.[23] One pain treatment is opioid analgesic medication, which has been increasingly prescribed over the last decade,[28; 39; 59] despite controversy about effectiveness.[20; 36] Notwithstanding questions of efficacy, one risk to prescribing these medications is the potential of opioid addiction.[26; 36; 57]

The increase in prescribing has co-occurred with increasing misuse and abuse. This phenomenon ranges from misuse (non-medical use, or for reasons other than prescribed) to the prescription drug use disorders (PDUDs) defined as abuse (misuse with consequences) or dependence (abuse with withdrawal or tolerance and/or uncontrolled use)[4]. Rates of opioid misuse have increased since the 1990s, when lifetime misuse of pain relievers was less than 10%.[53] The 2007 National Survey on Drug Use and Health (NSDUH) found that, among people over the age of 12, lifetime misuse of pain relievers increased to 13.3%. While 18.1% of the misused opioid analgesic medication came from legitimate physician prescriptions, 81% came from a friend or relative who was originally prescribed the medication by a physician. [16] Consequently, law enforcement efforts to stop opioid diversion have extended to physicians prescribing opioids for pain, adding fear of legal prosecution to provider concerns.[47] A further correlate of an increase in prescribing of opioids has been an increase in overdose, both intentional and unintentional.[21; 40]

In this atmosphere, physicians report discomfort when prescribing opioid analgesics,[52; 2; 42] with particular concerns over the potential addiction risks and legal implications.[52; 45; 44; 6] When patients have a known substance use disorder (SUD), physician discomfort about prescribing opioid analgesics increases, primarily due to suspicions that patient medication requests are motivated by addiction rather than pain.[37] Given these concerns about prescribing opioids, it would be useful to identify patient characteristics that are associated with prescription drug use disorder (PDUD).

Past research on the prevalence of and risk factors for PDUD among primary care patients with chronic pain is limited by a number of factors: focus on a populations referred for specialized pain treatment or who had been successfully maintained on more than six months of opioid therapy; diagnostic measures that have not been validated; or administrative databases. Ives et. al reported that 32% of patients referred to a primary-care-based chronic pain disease management program were misusing opioids, [26] similar to other studies.[43; 10] Racial and ethnic minorities were a small fraction of patients studied.

Among patients treated with opioid analgesics risk factors for opioid misuse include: SUDs, [43; 38; 26; 34; 56] family history of SUDs,[38; 34] cigarette smoking, [10; 38] legal problems,[38; 26] younger age[43; 34; 19; 36] and higher doses of opioid medication.[38] Evidence of psychiatric comorbidity and higher pain severity were associated with opioid misuse in some studies,[38; 34; 19; 35; 36; 56] but not others.[26]

Other studies have examined the risks for all substance use disorders for patients on opioids. [19] While national surveys have found that persons with PDUD often have overlapping polysubstance use disorders,[49; 50; 11; 13] clinical samples have not examined how patients with PDUD may be similar or different from those with SUDs other than PDUD.

We therefore conducted a study to examine the clinical characteristics of individuals with lifetime PDUD using validated measures among a population of primary care patients with chronic pain drawn from an urban safety-net hospital setting. We also explored whether those with PDUD differ from those with SUDs other than PDUD. We hypothesized that factors similar to those identified in prior clinical studies of referral pain patients as well as epidemiological surveys would be present in an urban, minority sample. If clinicians are aware of relevant risk factors for PDUD in this population, they may be able to provide more informed clinical care.

MATERIALS AND METHODS

Study Design

This was a cross-sectional study of primary care patients with chronic pain, designed to examine characteristics of those with prescription drug use disorder. Participants were recruited from waiting rooms of an academic, urban, safety-net [7] hospital primary care practice that has 80,000 visits and 32,000 unique patients annually. Eligible patients were 18–60 years of age, spoke English, endorsed pain of three months or more, reported use of any analgesic medication (over-the-counter or prescription in the prior month), and had a scheduled primary care appointment. Interviewers included both bachelor and master level research assistants, each trained for 2 weeks with ongoing quality control and principal investigator supervision. Interviewers approached patients in primary care waiting rooms per a predetermined pattern based on location in the waiting rooms and asked potential participants if they were interested in participating in a study on pain and health and to complete written screening questions. Eligible patients were told that the study interview would include questions about pain history, feeling sad or nervous, being hurt by someone and using health care services. Informed consent was administered to eligible patients. Interviews lasted 45–90 minutes and participants were compensated $10. Recruitment occurred between February 2005 and August 2006. The Boston University Medical Center Institutional Review Board approved the study and Certificate of Confidentiality was obtained from the National Institutes of Health.

Participants

Of the 2194 patients who answered the screening questions, 822 (37.4%) were eligible for the study, of whom 620 (75.4%) agreed to participate. Twenty-three participants did not complete enough of the interview due to time constraints including the SUD and PDUD assessment, and were excluded, leaving a sample of 597. When comparing those who enrolled with those who declined, enrollees were more likely to be black (61.0% v. 54.9%, p=0.04), less likely to take over-the-counter pain medication (66.4% vs. 78.5%, p <0.001), and more likely to take opioid pain medication (41% vs. 29.7%, p=0.002).

Key Variables

Unless otherwise noted, all variables were obtained from subject interview.

Dependent Variables—Prescription Drug Use Disorder (PDUD) was defined as meeting DSM-IV criteria for lifetime sedative and/or opioid analgesic prescription drug abuse or dependence as measured by the Composite International Diagnostic Interview (CIDI) v.2.1 module on Drug Disorders. [4; 58] Sedative was explicitly described, and included benzodiazepines and barbituates. Criteria for abuse included social, physical or legal consequences from use. The criteria for dependence additionally included compulsive use, health consequences, and physical dependence (i.e., tolerance or withdrawal). Physical dependence alone would not suffice to meet the diagnosis. Participants with PDUD could also have another SUD.

Other Substance Use Disorder (Other SUD) was defined as meeting DSM-IV criteria for any lifetime drug (excluding prescription) abuse or dependence measured using CIDI v 2.1 module on Drug Disorders, and/or past year alcohol dependence measured with the CIDI-short form (CIDI-SF) for alcohol dependence.[58] Current alcohol abuse and past alcohol use disorders were not measured as the CIDI-SF was used to reduce respondent time burden. Nicotine dependence was not included among other SUDs. We coded the mutually exclusive 3-level outcome variable as PDUD +/− SUD, Other SUD (SUD alone), or no PDUD or SUD.

Independent Variables—We examined factors that we anticipated would be associated with PDUD or SUD, based on review of literature from clinical and epidemiological studies. We prioritized assessment of variables from a range of potential options based on strength of association with PDUD and SUD. For example, we chose to measure two major mental health disorders: depression and PTSD. Both are associated with pain, and PTSD is strongly associated with SUD. Other anxiety disorders were not measured because of the overlap with PTSD in a prior study in the same population.[33] A variety of specific violence measures were included to examine whether the independent associations with PDUD or SUD would be eliminated when PTSD or depression were considered. High pain severity and physical health related quality of life have been suggested as predictors of PDUD[34] as have prior incarceration[38; 26], cigarette smoking[10; 38] and family history of SUD.[38] The following independent variables were defined as: 1) sociodemographics including age (in years), gender, race/ethnicity (Black, Hispanic, White, other), income (≥ or < $20,000), employment: (unemployed or receiving disability payments vs. other), education (< high school, high school +), marital status (partnered, divorced, single), health insurance (Medicaid/Medicare vs. others-including private and uninsured); 2) pain-related limitations (high vs. others) from the Graded Chronic Pain Scale, a 10-item validated measure of pain and disability;[54] 3) post-traumatic stress disorder (PTSD) diagnosis from the CIDI v. 2.1 PTSD module;[58] 4) major depression from the Patient Health Questionnaire (PHQ) for Depression, a 9-item validated measure correlated with past two week major depression;[30] 5) high adverse childhood experiences (ACE) (≥3 vs. <3 experiences) as adapted from Felitti;[18] (Examples of ACE are physical abuse, neglect, sexual abuse, parental mental illness, single parent household, parental incarceration, witnessing domestic violence); 6) intimate partner violence (IPV) - 1 or more affirmative responses to questions adapted from the Add Health Home Questionnaire;[1] 7) family history of SUD (single question about 1st degree relatives with alcohol or drug problems); 8) jail time (single question about having spent time in jail); 11) SF-12 health-related quality of life physical and mental health composite scores;[55] 10) current cigarette smoking (taken from the Electronic Medical Record (EMR) visit closest to the interview date); and 11) opioid, benzodiazepine or sedative prescription in the past year (from the EMR).

Analysis

Bivariate analyses examined associations between three mutually exclusive groups: 1) lifetime PDUD (with or without other SUD); 2) lifetime other SUD (not including PDUD); and 3) no lifetime SUD or PDUD. If significant associations were found, then pair-wise comparisons were conducted. A multinomial multivariable logistic regression model was then constructed predicting PDUD, other SUD and no lifetime SUD or PDUD entering all independent variables found to be significant at the p< 0.05 level in the bivariate analyses. The results of this model are not shown here. We also included interaction terms which we suspected based on independent correlations and clinical intuition. We tested interactions between every possible pairing of variables within the 2 groupings: 1. Disability-related (3 pairs tested): insurance status, employment status, pain limitation, 2. Mental health/violence exposure (10 pairs tested): depression, SF-12 mental component summary score, PTSD, high-ACE, IPV-victimization. We then fit a subsequent parsimonious model which included all the independent predictors and the one significant interaction (IPV and depression). We also fit a separate logistic

regression model with the same independent variables comparing only PDUD to other SUD. We then calculated the number and percentage of participants with each number of the variables found significant in the multinomial regression analysis in three mutually exclusive groups, PDUD, other SUD (i.e. without PDUD), and no SUD or PDUD. We also calculated the sensitivity and specificity of number of factors for PDUD.

RESULTS

Participant characteristics are shown in Table 1. Overall, a majority of the study sample was unemployed or disabled, poor, non-white, and experienced high pain disability. Forty percent had received an opioid prescription in the prior year. One hundred ten (18.4%) met criteria for lifetime PDUD, of whom 99 (90%) had another SUD and 61 (55.5%) met the PDUD diagnostic criteria in the past year. Fifty-five had both lifetime sedative and opioid analgesic use disorders, 44 had opioid analgesic use disorder only and 11 had sedative use disorder only. Seventy-one percent of those with PDUD reported addiction to medications not prescribed for them. One hundred forty-six (24.5%) had lifetime SUDs other than PDUD.

Bivariate Comparisons between PDUD, Other SUDs and No History of SUDs

Participants with PDUD and other SUDs both had higher percentages of participants with the following characteristics compared to participants without SUD: male gender, Medicaid/ Medicare, unemployment/disability, severely limiting pain, PTSD, depression, intimate partner victimization, family history of SUD, time spent in jail, and current smoking. Two measures showed differences between all three groups: mean SF-12 mental health component scores and ≥3 ACEs. In both cases the PDUD group had worse scores or greater exposures, respectively, compared to the other SUD group which in turn was worse than the no SUD group. The PDUD group had a higher percent of whites compared to both other SUD and no SUD. The PDUD group had a higher percentage with current PTSD compared to those with no SUD but was not different compared to those with other SUD. . No other factors differed significantly between the three groups. (Table 1)

Independent Associations with PDUD and other SUDs

In the first multinomial analysis, the following factors were found to be significantly associated with PDUD and/or other SUDs: time spent in jail, current smoking, family history of SUD, male gender, white race, higher limiting pain, PTSD, IPV and depression. The interaction term between IPV and Depression was also statistically significant. In the final parsimonious model which included only those nine factors, time spent in jail, limiting pain, current smoking, family history of SUD, male gender and PTSD were associated with a greater odds of both PDUD and SUD. White race was associated with PDUD. IPV and no depression, and No IPV with depression were associated with other SUDs (Table 2). In a logistic regression analysis comparing PDUD with other SUDs, the only significant association was white race (odds ratio 2.1, 95% CI 1.8–3.9) (other results not shown).

Table 3 shows the prevalence of PDUD and other SUD for each number of factors (0 through all 9). All patients with PDUD had two or more risk factors, and no person without SUD had more than seven risk factors. The sensitivity and specificity of these combinations for PDUD are presented in Table 4.

DISCUSSION

In the primary care practice of an urban safety-net hospital, 18.4% of patients with chronic pain met criteria for a PDUD and an additional 24.5% had other SUDs. The vast majority of participants with PDUD had at least one co-occurring other SUD, and those with PDUD were

virtually indistinguishable from those with other SUDs. Seven patient characteristics were independently associated with PDUD compared to those without any lifetime SUD: time spent in jail, high degree of pain-related limitations, current smoking, family history of SUD, white race, male gender, and PTSD. The only difference between SUD and PDUD was the higher prevalence of white race in PDUD.

The finding that PDUD is highly associated with other SUDs corroborates prior clinical studies which relied on proxy measures for the determination of PDUD. [15; 43; 38; 51; 26; 17] Ives et al. found that prior cocaine or alcohol abuse predicted prescription opioid misuse among patients at a pain management clinic.[26] Studies which included smoking status as a correlate for PDUD found a striking association, as did our study. This reflects the exceptionally high co-morbidity of smoking with alcohol and illicit drug dependence found in other studies.[46; 38]

For physicians who prescribe opioid and sedative medications, a critical concern is differentiating individuals who take medications for the intended therapeutic purposes from those with current, or potentially future, misuse and addiction. This cross-sectional study does not permit a longitudinal analysis of persons prescribed opioid analgesics. However, it does suggest that a propensity toward addiction (other SUD, family history of SUD, cigarette smoking) is a strong correlate of prescription drug use disorder. Fleming and colleagues found that positive urine toxicology screening for cocaine or marijuana and aberrant drug behaviors were among the significant predictors of SUD in primary care patients receiving opioids.[19] Data in our study suggest that those with PDUD have similar characteristics to those addicted to illicit drugs and alcohol. The 2005 report from the Center on Addiction and Substance Abuse at Columbia University corroborates this association in a community sample: 75% of persons who misuse prescription drugs have at least one co-occurring other SUD.[11] Of note, a physician may consider screening patients with pain and other risk factors for prescription drug use disorder even in the absence of prescribing controlled substances as most participants with PDUD in this study obtained the medication from sources other than a treating clinician.

A strong association of both PDUD and other SUDs was having spent time in jail. Almost two-thirds of those with PDUD reported having spent time in jail, compared to 15.3% of those with no SUD. The relationship between criminal activity and prescription drug abuse has been suggested in prior studies.[11; 26] Akbik and colleagues reported prior legal problems predict subsequent opioid misuse among patients starting opioids for chronic pain.[3] It is not known whether the jail history was due to crimes related to drug use, possession, manufacture or sale, which would suggest a history of SUD. It also may be a proxy for anti-social behavior, which is associated with PDUD.[24]

The associations of white race and male gender with PDUD in this sample reflect findings in other clinical and population samples.[13; 24; 8] Whites are prescribed more opioid medications in Emergency Departments and primary care practices, perhaps reflecting a cultural bias by patients and physicians toward use of prescription opioids.[12; 41] Male gender predominance reflects epidemiology of SUDs in general, although some data suggest more gender balance in PDUD. These trends suggest that future research should explore the social context, including gender and racial differences, of these associations.

Patients with PDUD reported a greater degree of pain-related limitation. Others have found low pain intolerance among those with active[14] and past addictions[32] compared to non-addicted controls. It may be that lower pain threshold is an increased risk for developing addiction, or that addiction itself lowers the pain tolerance. This may complicate pain management among those with PDUD.

Among this sample of urban primary care patients with chronic pain, PTSD was associated with PDUD. PTSD is known to be associated with SUD in clinical and community samples,

[29; 9; 27; 33] but the relationship with PDUD has not been described. The scientific evidence for neurological and physiological changes in PTSD,[25; 48] pain [5; 31; 6] and substance use disorders[22] is growing. Exploring these overlapping phenomena may allow development of tailored interventions.

Intimate partner violence and depression appeared to be individually associated with SUD but not PDUD, when accounting for the interaction between these phenomena. These associations may function differently in gender specific analyses which should be explored in future studies. The fact that Adverse Childhood Experiences were not independently associated with either PDUD or SUD after controlling for other variables suggests that its effect is mediated through other variables such as PTSD which remained significant in the final model.

These data strongly suggest that physicians treating patients with pain should assess for SUD. This can help direct care, including treatment for pain and substance use disorders. Specialty pain practices who commonly prescribe opioid analgesics are likely to screen for this, but primary care settings may not be as aware of the overlap between pain and addictions. Furthermore, patients do not always admit to SUD, particularly if they are intent on deceiving the treating physician to obtain prescription medication. Potential screening questions for patients with chronic pain could include assessment of smoking and specific questions used in this study: "Do you have a family history of alcohol or drug problems?", "Have you ever spent time in jail?" Evaluations for pain disability and PTSD may be additional clinical tools to help identify those at highest risk for PDUD.

After identifying a patient with risk factors, should clinicians prescribe opioid medications? In an observational study, Wiedemer and colleagues examined the impact of a structured opioid clinic for patients with risk factors, including psychiatric and substance use problems.[57] All patients with SUD but no aberrant behaviors were safely maintained on opioids.[57] Clinical trials testing methods of opioid medication monitoring could inform clinicians about how to safely prescribe them to high risk patients.

This study adds to the literature in three ways. First, it examines an urban, largely poor and minority sample, which is underrepresented in the literature. Secondly, validated measures of PDUD used in this study improve upon the use of proxy measures that most other studies have employed. Finally, subjects were primary care patients with chronic pain, not limited to those being prescribed chronic opioid medication. This can illuminate issues about patients who may require opioid analgesics in the future, common clinical concerns of urban primary care pain patients.

The study limitations include possible misclassification of PDUD in individuals with pseudo-addiction, i.e. behaviors that resemble addiction but result from inadequate treatment of pain. [15] We believe that this is not a significant limitation as the diagnostic criteria demand social or physical problems and compulsive use, which are not characteristic of pseudo-addiction. Furthermore, 71% had addictions to medications that were not prescribed for them, which lowers the probability of misclassification. Another limitation was that lifetime alcohol use disorders were not measured which should attenuate any associations found because of misclassification bias. Since numerous independent predictors of PDUD and SUD were found, it is not clear how information on lifetime alcohol disorders would change the associations. The cross-sectional design limits conclusions regarding cause and effect; the findings would be strengthened by studying a longitudinal cohort. The recruitment strategy may limit the generalizability of the findings. However, as this was a study of PDUD risk factors and not prevalence, the associations should remain stable in a similar sample. Another limitation is that no corroborating evidence of prescription drug misuse was obtained, such as urine toxicology screening. Such testing can be helpful as a supplement to self-report.

In an urban cohort of primary care patients with high levels of pain disability, unemployment and psychosocial stressors, PDUD was concentrated among those with a: family history of SUDs, having spent time in jail, current cigarette smoking, male gender, white race, pain-related functional limitations and PTSD. The vast majority had co-occurring other SUDs. This suggests that clinicians could gain clinical insight by carefully evaluating such patients for these risk factors when developing a comprehensive pain management strategy. It may also suggest which patients would benefit from a structured program for use of opioid medications. Refining the knowledge base on co-occurrence of addiction and pain could maximize safe and effective pain relief strategies.

Acknowledgments

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Table 1

Participant characteristics, stratified by presence or absence of Prescription Drug Use Disorder and Substance Use Disorder diagnoses (n=597)

Variable	Group 1 Prescription Drug Use Disorder (PDUD) N= 110 N(%)	Group 2 Other Substance Use Disorder* N=146 N(%)	Group 3 No Substance Use Disorder N=341 N (%)	Global P-value	Pairwise Comparison		
					Group 1 vs. 2	Group 1 vs. 3	Group 2 vs. 3
Age in Years Mean (SD)	44.4 (9.0)	46.1 (8.1)	46.1 (10.4)	0.2			
Sex							
Male	60 (54.5)	83 (56.9)	104 (30.5)	**<0.0001**	0.71	**<0.0001**	**<0.0001**
Female	50 (45.5)	63 (43.1)	237 (69.5)				
Race							
Black	51 (46.4)	90 (62.0)	222 (65.3)	**<0.0001**	**0.02**	**<0.0001**	0.12
Hispanic	10 (9.1)	14 (9.7)	35 (10.3)				
White	39 (35.4)	27 (18.6)	37 (10.9)				
Other	10 (9.1)	14 (9.7)	46 (13.5)				
Income							
<$20,000	62 (56.4)	89 (61.0)	214 (62.8)	0.49			
≥$20,000	48 (43.6)	57 (39.0)	127 (37.2)				
Employment							
Employed	33 (30.0)	43 (29.5)	160 (46.9)	**0.0001**	0.92	**0.002**	**0.0004**
Unemployed	77 (70.0)	103 (70.5)	181 (53.1)				
Health Insurance							
Medicaid	80 (72.7)	100 (68.5)	183 (53.7)	**0.002**	0.83	**0.007**	**0.007**
Medicare	6 (5.5)	10 (6.9)	14 (4.1)				
Private Insurance	3 (2.7)	4 (2.7)	17 (5.0)				
Uncompensated Care State Fund	19 (17.3)	31 (21.2)	113 (33.1)				
Other	2 (1.8)	1 (0.7)	14 (4.1)				
Education							
<High School	26 (23.6)	46 (31.5)	94 (27.6)	0.38			
≥High School	84 (76.4)	100 (68.5)	247 (72.4)				
Marital Status							

Variable	Group 1 Prescription Drug Use Disorder (PDUD) N=110 N(%)	Group 2 Other Substance Use Disorder* N=146 N(%)	Group 3 No Substance Use Disorder N=341 N (%)	Global P-value	Group 1 vs. 2	Group 1 vs. 3	Group 2 vs. 3
Partnered	23 (20.9)	38 (26.0)	105 (30.8)	0.28			
Separated/ Divorced/ Widowed	42 (38.2)	46 (31.5)	111 (32.5)				
Single	45 (40.9)	62 (42.5)	125 (36.7)				
Limiting Pain							
Yes	104 (94.5)	136 (93.1)	295 (86.5)	**0.02**	0.65	**0.03**	**0.04**
No	6 (5.5)	10 (6.9)	46 (13.5)				
Lifetime PTSD							
Yes	52 (47.3)	67 (45.9)	100 (29.3)	**0.0001**	0.82	**0.0006**	**0.0005**
No	58 (52.7)	79 (54.1)	241 (70.7)				
Current PTSD							
Yes	31 (28.2)	33 (22.6)	59 (17.3)	**0.04**	0.31	**0.01**	0.17
No	79 (71.8)	113 (77.4)	282 (82.7)				
Depression							
Yes	55 (50.0)	67 (45.9)	127 (37.2)	**0.03**	0.5	**0.02**	0.07
No	55 (50.0)	79 (54.1)	214 (62.8)				
≥3 ACE							
Yes	70 (63.6)	73 (50.0)	106 (31.1)	**<0.001**	**0.03**	**<0.0001**	**<0.0001**
No	40 (36.4)	73 (50.0)	235 (68.9)				
IPV Victim							
Yes	70 (63.6)	86 (58.9)	145 (42.5)	**<0.0001**	0.44	**0.0001**	**0.001**
No	40 (36.4)	60 (41.1)	196 (57.5)				
Family History of SUD							
Yes	76 (69.1)	96 (65.8)	114 (33.4)	**<0.0001**	0.57	**<0.0001**	**<0.0001**
No	34 (30.9)	50 (34.2)	227 (66.6)				
Time in Jail							
Yes	70 (63.6)	81 (55.5)	52 (15.3)	**<0.0001**	0.19	**<0.0001**	**<0.0001**
No	40 (36.4)	65 (44.5)	289 (84.7)				
Smoking							

Pairwise Comparison

Variable	Group 1 Prescription Drug Use Disorder (PDUD) N= 110 N(%)	Group 2 Other Substance Use Disorder* N=146 N(%)	Group 3 No Substance Use Disorder N=341 N (%)	Global P-value	Pairwise Comparison		
					Group 1 vs. 2	Group 1 vs. 3	Group 2 vs. 3
Never	24 (23.3)	40 (28.6)	198 (61.5)	<0.0001	0.28	<0.0001	<0.0001
Previously	8 (7.8)	17 (12.1)	30 (9.3)				
Current	71 (68.9)	83 (59.3)	94 (29.2)				
Opioid Prescription in the Past Year							
Yes	47 (42.7)	59 (41.8)	132 (39.2)	0.75			
No	63 (57.3)	82 (58.2)	205 (60.8)				
Benzodiazepine Prescription in the Past Year							
Yes	14 (12.7)	18 (12.8)	26 (7.7)	0.13			
No	96 (87.3)	123 (87.2)	311 (92.3)				
Hypnotics Prescription in the Past Year							
Yes	7 (6.4)	7 (5.0)	17 (5.0)	0.85			
No	103 (93.6)	134 (95.0)	320 (95.0)				
Pain Duration, years Mean (SD)	8.7 (8.6)	7.7 (8.3)	8.0 (9.1)	0.6			
SF-12 Physical Health Mean (SD)	35.7 (11.1)	36.1 (11.5)	36.9 (11.9)	0.6			
SF-12 Mental Health Mean (SD)	38.7 (11.5)	40.4 (12.3)	43.9 (12.9)	**0.0001**	**0.03**	**0.0002**	**0.004**

*
Other Substance Use Disorder includes participants with any substance use disorder, excluding prescription drug use disorder

PTSD = Post-traumatic Stress Disorder

ACE = High Adverse Childhood Experiences

IPV = Intimate Partner Violence

SUD = Substance Use Disorder

SF-12 Physical and Mental Health = Short Form-12 Physical and Mental Health Quality of Life

Table 2

Independent associations with Prescription Drug Use Disorder and Other Substance Use Disorder compared to participants with no history of Substance Use Disorder[*] (n=597)

Effect	PDUD Odds Ratio	95% CI	Other SUD Odds Ratio	95% CI
Time in Jail	5.11	2.80–9.34	3.82	2.22–6.57
Pain	3.77	1.21–11.72	2.76	1.10–6.91
Smoking	3.57	2.04–6.23	2.69	1.65–4.36
Family History Substance Abuse	3.40	1.93–6.00	3.41	2.08–5.60
White	3.17	1.68–6.01	1.48	0.79–2.80
Male	1.94	1.07–3.53	2.37	1.39–4.03
PTSD	1.93	1.09–3.43	1.91	1.14–3.18
IPV and Depression	1.33	0.62–2.87	1.12	0.56–2.28
IPV and No Depression	1.92	0.90–4.10	2.38	1.23–4.61
Depression and No IPV	1.84	0.77–4.39	2.81	1.27–5.75

[*] Multivariable multinomial logistic regression analyses, Pseudo $R^2 = 0.42$

PDUD = Prescription Drug Use Disorder

SUD = Substance Use Disorder

IPV = Intimate Partner Violence

PTSD = Post-traumatic Stress Disorder

CI=confidence interval

Reference group for IPV and depression interaction is the absence of IPV and depression.

Table 3

Prevalence of Prescription Drug Use Disorder (PDUD) and Other Substance Use Disorder Among Primary Care Patients by Number of Risk Factors[*] for PDUD and Other SUD (n=597)

Number of Risk Factors[*]	Prescription Drug Use Disorder n=110 N (%)	Other Substance Use Disorder n=146 N (%)	No Substance Use Disorder n=341 N (%)
0 (n=9)	0 (0.0)	0 (0.0)	9 (100.0)
1 (n=39)	0 (0.0)	2 (5.1)	37 (94.9)
2 (n=94)	7 (7.5)	6 (6.4)	81 (86.2)
3 (n=106)	10 (9.4)	19 (17.9)	77 (72.6)
4 (n=125)	16 (12.8)	30 (24.0)	79 (63.2)
5 (n=81)	14 (17.3)	32 (39.5)	35 (43.2)
6 (n=80)	32 (40.0)	34 (42.5)	14 (17.5)
7 (n=48)	24 (50.0)	15 (31.2)	9 (18.8)
8 (n=10)	4 (40.0)	6 (60.0)	0 (0.0)
9 (n=5)	3 (60.0)	2 (40.0)	0 (0.0)

[*] Risk Factors include: time spent in jail, family history of substance use disorder, smoking, white race, male gender, lifetime post-traumatic stress disorder, limiting pain, depression, intimate partner violence

Table 4

Sensitivity and Specificity of Number of Risk Factors[*] for Prescription Drug Use Disorder (PDUD) (n=451)

Number of Risk Factors[*]	Sensitivity %	Specificity %
>=1 (n=39)	100.0	<13.5
>=2 (n=94)	100.0	13.5
>=3 (n=106)	93.6	37.2
>=4 (n=125)	84.5	59.8
>=5 (n=81)	70.0	83.0
>=6 (n=80)	57.0	93.3
>=7 (n=48)	28.0	97.4
>=8 (n=15)	6.0	100.0

[*] Risk Factors include: time spent in jail, family history of substance use disorder, smoking, white race, male gender, lifetime post-traumatic stress disorder, limiting pain, depression, intimate partner violence