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Risk for Prescription Opioid Misuse among Patients with a History of Substance Use Disorder

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Abstract

BACKGROUND—History of substance use disorder (SUD) is associated with risk for prescription opioid misuse in chronic pain patients; however, little data are available regarding risk for prescription opioid misuse within the subgroup of patients with SUD histories.

METHODS—Participants with chronic pain, histories of SUD, and current opioid prescriptions were recruited from a single VA Medical Center. Participants (n=80) completed measures of risk for prescription opioid misuse, pain severity, pain-related interference, pain catastrophizing, attitudes about managing pain, emotional functioning, and substance abuse.

RESULTS—Participants were divided into three groups based on risk for prescription opioid misuse, as assessed by the Pain Medication Questionnaire (PMQ). Participants in the High-PMQ group reported more pain severity, interference, catastrophizing, depressive symptoms, and lowest self-efficacy for managing pain, relative to the Low-PMQ group; the High-PMQ group and Moderate-PMQ group differed on measures of pain severity, catastrophizing, and psychiatric symptoms (all p-values <0.05). The High-PMQ group had the highest rates of current SUD (32% versus 20% and 0, $p=0.009$). A regression analysis evaluated factors associated with PMQ scores: pain catastrophizing was the only variable significantly associated with risk for prescription opioid misuse.

CONCLUSIONS—Among patients with SUD histories, those with higher risk for prescription opioid misuse reported more pain and impairment, symptoms of depression, and were more likely to have current SUD, relative to patients with lower risk for prescription opioid misuse. In

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adjusted analyses, pain catastrophizing was significantly associated with risk for prescription opioid misuse, but current SUD status was not a significant predictor.

Keywords

Prescription opioid misuse; Chronic pain; Substance use disorder; Aberrant medication-related behaviors; Quality of life

1. INTRODUCTION

With the marked increase in the use of prescription opioids to treat chronic pain (Boudreau et al., 2009; Caudill-Slosberg et al., 2004) there has been a concomitant rise in concern about the risk of prescription opioid misuse. Although the rate of developing a substance use disorder (SUD) due to prescription opioids overall may be low (Fishbain et al., 2008), the prevalence of nonmedical use of prescription opioids in the U.S. is profound (Compton and Volkow, 2006). Recent data indicate that prescription opioids are the second most commonly abused substance, following only marijuana, and unintentional overdose deaths quadrupled between 1999 and 2007. In 16 states, more people die from overdose to prescription opioids than from motor vehicle accidents (Centers for Disease and Control, 2009). Recently developed clinical treatment guidelines for treating patients with prescription opioids recommend screening all patients for risk of prescription opioid misuse prior to initiating opioid therapy and regularly during treatment. More frequent monitoring is indicated for patients at higher risk of prescription opioid misuse (Chou et al., 2009; Department of Veterans Affairs/Department of Defense, 2010).

Published studies examining factors associated with prescription opioid misuse have revealed inconsistent findings. Significant associations have been identified among prescription opioid misuse and younger age (Ives et al., 2006), personal or familial history of legal problems (Michna et al., 2004), anxiety (Schieffer et al., 2005), and beliefs about opiate treatment (Schieffer et al., 2005). The most consistent variable that has been associated with prescription opioid misuse is a history of SUD (Turk et al., 2008). Patients with chronic pain and a history of SUD are more likely to receive opioids from more than one source (Reid et al., 2002), report borrowing medications from others and requesting early medication refills (Morasco and Dobscha, 2008), use opioids to alter their mood (Barry et al., 2011), as well as have other indicators of prescription opioid misuse (Becker et al., 2009). Perhaps paradoxically, patients with pain and comorbid SUD are more likely to be prescribed opioids to treat chronic pain and at higher doses, relative to patients without a comorbid SUD (Breckenridge and Clark, 2003; Morasco et al., 2011; Weisner et al., 2009). Importantly, not all chronic pain patients with a history of SUD misuse or develop abuse or dependence to prescription opioids (Fishbain et al., 2008; Morasco and Dobscha, 2008), and there are limited data available about risk factors for prescription opioid misuse within this subset of patients (Price et al., 2011).

Patients with chronic pain have high rates of comorbid SUDs. Up to one-third of patients with chronic pain seen in primary care, and 8–35% in specialty pain clinics, have a current SUD (Morasco et al., 2011). These rates of comorbid SUD are consistently higher than the rate of SUDs observed in the general population (Grant et al., 2004). Patients receiving treatment for SUDs also concomitantly report high rates of chronic pain (Potter et al., 2008; Rosenblum et al., 2003). Given the high rates of comorbidity between chronic pain and SUD, and frequent use of prescription opioids to treat chronic pain in this population, it is important to identify clinical factors that are associated with prescription opioid misuse beyond the effects of a history of SUD.

A recent study found that 68% of patients receiving treatment in a residential substance abuse treatment program reported past-month nonmedical use of prescription opioids (Price et al., 2011). However, it is unclear what proportion of these patients received opioids from a prescription by a medical provider, as compared with obtaining them through other (potentially illicit) means. Additional research is needed to examine factors associated with risk for prescription opioid misuse of opioids that have been prescribed, as well as appropriate measures to screen for prescription opioid misuse, among chronic pain patients with a history SUD. The Pain Medication Questionnaire (PMQ; Adams et al., 2004) was developed as a brief measure to screen for risk of prescription opioid misuse. Initial studies evaluating the psychometric properties of the PMQ indicate it is a reliable and valid measure (Adams et al., 2004; Buelow et al., 2009; Holmes et al., 2006). Scores on the PMQ correlate with standardized measures of physical distress and impairment, and the PMQ has been shown to be predictive of treatment adherence (Dowling et al., 2007). The purpose of the present study was to examine the extent to which higher risk for prescription opioid misuse (as measured by the PMQ) is associated with pain intensity, pain-related interference, mental health status, cognitions about managing pain, and comorbid substance use in a sample of chronic pain patients who all have a history of SUD and receive prescription opioids for pain.

2. METHODS

2.1 Participants

Participants in this secondary analysis were recruited for a larger study examining the relationship between chronic pain, hepatitis C virus infection, and SUD. All participants signed informed consent to participate, completed a clinical interview and self-report questionnaires, and received a \$30 store gift card as compensation. This study was approved by the Institutional Review Board of the VA Medical Center. A total of 284 patients were recruited into the larger study. Participants were recruited by posted advertisements in the medical center, letters sent to patients who had pending appointments in primary care, announcements made in mental health classes, and referral from patients being treated in the hospital's Hepatology Clinic.

Inclusion criteria were a history of being tested for hepatitis C (both positive and negative hepatitis C patients were included), at least 18 years of age, and English-speaking. Patients with hepatitis C have high lifetime rates of chronic pain (Morasco et al., 2010; Whitehead et al., 2008) and SUDs (Huckans et al., 2005; el-Serag et al., 2002) making this sample ideal for examining factors associated with risk for prescription opioid misuse among patients with a history of SUD. Exclusion criteria were age over 70 years, pending litigation or disability compensation for pain, advanced liver disease, current suicidal ideation, or other serious psychiatric condition such as untreated bipolar disorder or schizophrenia. Although not an a priori inclusion/exclusion criteria, there were no participants in this study who were currently enrolled in an opiate substitution program at the time of participation. Participants completed evaluations between March 2009 and August 2011.

The present analyses include a subset of 284 participants who had been recruited into the larger study. For inclusion in this analysis, participants must have met diagnostic criteria for a current or past SUD, had current chronic pain, and received a prescription for an opioid medication within the prior 90 days (n=80).

2.2 Data Collection

All self-report measures have been used in numerous studies, including samples of chronic pain patients, and have demonstrated good to excellent reliability and validity. Demographic characteristics (age, gender, race, marital status, years of education, and income) were

obtained by self-report. Risk for prescription opioid misuse was evaluated with the PMQ, a self-report measure designed to assess risk for prescription opioid misuse in patients with chronic pain (Adams et al., 2004). The PMQ has high construct and concurrent validity with measures of substance abuse and physicians' risk assessments (Adams et al., 2004) and has been shown to be predictive of problematic medication use variables (Dowling et al., 2007). The original PMQ was a 26-item measure, which has been revised and a new shortened version was developed (Buelow et al., 2009). However, we utilized the original 26-item version in this study, as the alternative edition was not available at the time of study inception. PMQ scores range from 0 to 104 with higher scores representing a greater presence of behaviors associated with prescription opioid misuse. Questions on the PMQ assess beliefs about the amount of pain medication the person feels s/he should be taking, satisfaction in interactions with providers, medication side effects, using more medication than prescribed, and overt misuse behaviors (e.g., receiving medications from others, doctor shopping; Adams et al., 2004).

Pain severity and interference were evaluated with the Multidimensional Pain Inventory (MPI), a frequently utilized and well-validated measure (Kerns et al., 1985). It includes 52 self-report items that make up 12 scales. For parsimony and to focus on the variables of greatest interest, we report data on just the pain severity (three questions) and pain interference (11 questions) scales. Each question is answered on a Likert scale from 0 to 6. The scales are scored by adding each item and dividing by the total number of items. Scale scores on the MPI range from 0 to 6, with higher scores reflecting more severe pain or interference.

Self-efficacy for managing pain was assessed with the Chronic Pain Self-Efficacy Scale (CPSS), a 22-item self-report questionnaire (Anderson et al., 1995). Each question is rated on a Likert scale from 10 (very uncertain) to 100 (very certain). CPSS total scores are obtained by adding patient responses on each item, with higher scores indicating greater self-efficacy for managing pain. Questions on the CPSS reflect self-efficacy for managing pain (beliefs that person can do certain activities), self-efficacy for physical function, and self-efficacy for coping with symptoms.

Pain catastrophizing was assessed with the 13-item Pain Catastrophizing Scale (PCS) (Sullivan et al., 1995). The PCS provides data about exaggerated negative orientation toward pain. Participants are asked to rate each question on a scale of 0 (not at all) to 4 (all the time). Responses are added and total score ranges from 0 – 52, with higher scores reflecting heightened distress responses to pain.

The Beck Depression Inventory – 2 (BDI-II) measured current depressive symptomatology (Beck et al., 1996). The BDI-II is a commonly used and well-validated 21 item self-report questionnaire. Each response is rated on a scale of 0 – 3. The measure is scored by summing responses to each item. Higher scores reflect more severe symptoms of depression.

Current anxiety symptoms were assessed with the Generalized Anxiety Disorder Scale (GAD-7), a seven item self-report measure that assesses the presence of generalized anxiety disorder (Spitzer et al., 2006). Items on the GAD-7 are scored on a scale of 0 (not at all) to 3 (nearly every day). The measure is scored by summing individual items, with higher scores reflecting more severe symptoms of anxiety. Scores on the GAD-7 are strongly correlated with measures of other anxiety disorders including posttraumatic stress disorder, panic disorder, and social anxiety disorder (Kroenke et al., 2007).

SUDs were assessed by the Structured Clinical Interview for DSM-IV (SCID; First et al., 2002). A SUD was considered current if the participant met criteria for abuse or dependence to a substance within the past month. If the participant had previously met criteria for abuse

or dependence, but did not have clinically significant symptoms in the last month, s/he was coded as having a history of SUD. For this study, the SCID was modified slightly to assess for abuse/dependence to prescription opioids and to illicit opioid use (i.e., heroin) differentially, rather than evaluating all opioids as an entire group. SCID interviews were conducted by masters-level research clinicians or students enrolled in graduate-level clinical psychology or social work programs. All interviewers received extensive training by a licensed psychologist. Regular supervision of SCID interviews was conducted to reduce likelihood of coder drift.

We reviewed the electronic medical records of all participants to evaluate whether they had received prescription opioids from this hospital in the previous 90 days. Prescription opioid doses were converted to an average daily dose in morphine equivalent (Morasco et al., 2010). We also reviewed medical record data to determine if participants were participating in substance abuse treatment at the time of the study visit. Pain diagnoses were extracted from the electronic medical record using the Veterans Integrated Service Network-20 (VISN-20) Data Warehouse. The VISN-20 Data Warehouse contains extracts of data from the clinical records of regional VA facilities and two national VA databases. Pain diagnoses were obtained using ICD-9-CM codes listed in medical encounter records for the five years prior to the study assessment.

2.3 Data Analysis

We trichotomized the sample into three groups based on the distribution of their PMQ scores, in order to compare groups on their risk for prescription opioid misuse. The purpose of splitting the sample into three equal groups was to determine if the outcome variables of interest were associated with risk for prescription opioid misuse in a graded fashion. Participants who scored 21 or below on the PMQ were in the Low-PMQ group; participants with scores of 22 to 32 were labeled the Moderate-PMQ group; and participants scoring 33 or higher on the PMQ were in the High-PMQ group. This methodology of dividing the sample into equal groups is consistent with prior research with the PMQ (Adams et al., 2004; Buelow et al., 2009; Dowling et al., 2007; Holmes et al., 2006) and was statistically appropriate, as scores on the PMQ in this sample were normally distributed. Prior studies with the PMQ have not identified specific cut-off scores to indicate severity of risk for prescription opioid misuse. Mean scores on the PMQ in this sample were comparable or slightly higher than in prior research studies.

Analyses were conducted using chi-square tests for categorical data and analysis of variance for continuous data. A linear regression model was conducted to examine variables associated with risk for prescription opioid misuse. In this latter analysis, continuous PMQ scores were the outcome variable. Independent variables included age (Step 1); pain severity and interference (Step 2); and current SUD status, depressive symptoms, and pain catastrophizing (Step 3). Other potential independent variables were considered for inclusion (i.e., nicotine use, current anxiety symptoms, self-efficacy for managing pain); however, these ultimately were not included due to significant associations ($p < 0.05$) with variables already included and limited sample size. All analyses were conducted with the Statistical Package for Social Sciences (SPSS, version 19). A significance level of $p < 0.05$ was used for all statistical tests.

3. RESULTS

In the full sample, the mean PMQ score was 28.0 (SD=10.3) and the range of scores was from 8 to 53. There were no differences between the High-PMQ group, Moderate-PMQ group, and Low-PMQ group with regard to age, gender, race, marital status, years of

education, or income. Table 1 provides a summary and comparison of demographic characteristics between participants in the three groups.

The most common pain diagnoses in the full sample were joint pain and low back pain. The only pain diagnosis that differed between groups was arthritis. There were no statistically significant differences between groups in the average daily opioid dose in morphine equivalents (Table 1). The most common prescription opioids in the entire sample were hydrocodone (62.2%), oxycodone (36.6%), and morphine sustained release (9.8%), which did not differ between the three groups.

There were statistically significant differences between the groups on measures of pain severity, pain interference, pain catastrophizing, self-efficacy for managing pain, and symptoms of depression (all p -values < 0.05 ; Table 2). Participants in the High-PMQ group reported the poorest functioning, relative to the Low-PMQ group, on these measures. The High-PMQ group also had more impairment than the Moderate-PMQ group on measures of pain severity, pain catastrophizing, depressive symptoms, and anxiety symptoms. Participants in the Moderate-PMQ group differed from the Low-PMQ group on chronic pain self-efficacy.

Participants in the High-PMQ group were most likely to meet diagnostic criteria for a current SUD (32.1% versus 20.0% and 0, for the Moderate and Low groups, respectively, $p = 0.009$; Table 3). In the full sample, the most common current SUDs that participants met diagnostic criteria for were abuse or dependence of alcohol (11.2%), marijuana (2.5%), and/or prescription opioids (2.5%). There were no statistically significant differences between groups in the proportion that were currently participating in substance abuse treatment (30.0% versus 16.0% and 24.0%, $p = 0.478$). Of the 14 participants with a current SUD, five (35.7%) were currently enrolled in substance abuse treatment at the VA. The three groups did not differ in rates of history of abuse or dependence to prescription opioids, current abuse or dependence to prescription opioids, or percent that currently smoked cigarettes.

Table 2 includes mean scores, standard deviation, and range for each group on the PMQ. A linear regression analysis was conducted to examine factors associated with risk for prescription opioid misuse (Table 4). Step 1, which included age, was not statistically significant. Step 2, which included pain severity and interference, was statistically significant ($p = 0.001$). Step 3, which added current SUD status, depressive symptoms, and pain catastrophizing, was also statistically significant ($p < 0.001$). The final model accounted for 37% of the variance in risk for prescription opioid misuse. The only variable that was significant in the final model was pain catastrophizing. In the final model, for every one point increase on the Pain Catastrophizing Scale, there was an associated 0.5 point increase on the PMQ total score.

4. DISCUSSION

Within a sample of patients who have a history of SUD and receive prescription opioids to treat chronic noncancer pain, little data are available regarding factors associated with risk for prescription opioid misuse. In this study of patients with mixed chronic pain diagnoses and a history of SUD, we found that while patients with a current SUD had higher scores on a self-report measure of risk for prescription opioid misuse, in our final multivariate model, only pain catastrophizing was significantly associated with increased risk for prescription opioid misuse.

Pain catastrophizing, a maladaptive cognitive style, is the propensity to amplify the potential threat of a painful experience and to have limited confidence in one's ability to tolerate it (Keefe et al., 2004). It has been shown to be significantly associated with pain severity,

pain-related function, and outcomes from pain treatments (Jensen et al., 2011). Results from this study indicate that patients with chronic pain and a history of SUD who score higher on a measure of pain catastrophizing are at greater risk for prescription opioid misuse.

Prior research suggests that cognitions about pain, and thoughts about the effectiveness of opioids, are associated with risk for prescription opioid misuse. For example, in a large heterogeneous sample of patients referred to a chronic pain program, patients with a history of SUD had differing beliefs regarding the anticipated efficacy and need for prescription opioids compared with patients who did not have a SUD history (Schieffer et al., 2005). These stronger beliefs about the effectiveness of prescription opioids, and reported need for higher doses, mediated the relationship between SUD history and prescription opioid misuse. Taken together with findings from the present study, it appears that, in order to most effectively and comprehensively screen for risk for prescription opioid misuse, the assessment should include evaluation of patients' thoughts about the utility of pain medications, cognitions about perceived threat of pain and ability to manage it, as well as demographic characteristics and comorbid psychiatric and SUDs. Increased time for assessments or system support may be needed to assist clinicians in thoroughly assessing for risk of prescription opioid misuse. If these results are replicated in other samples, then cognitions about pain should also be considered as targets for intervention when opioids are being prescribed for patients with chronic pain who have a SUD history. Certain non-pharmacological interventions, such as cognitive-behavioral therapy, may be helpful in altering cognitions about pain, and improving pain-related function, without the risks associated with prescription opioids (Turk et al., 2011).

Although rates of current SUD status significantly differed between the three groups, it did not significantly predict risk for prescription opioid misuse in the regression model. This finding was contrary to expectations, as SUD status has been shown to be a reliable marker for prescription opioid misuse in prior research (Turk et al., 2008). However, in the present study, all participants had a history of SUD and perhaps current substance abuse/dependence does not significantly distinguish risk for prescription opioid misuse among patients with this background. Our findings suggest that one's thoughts about pain, and their perceptions about ability to manage it, may be more associated with risk for prescription opioid misuse within a sample of patients that have a history of SUD.

In this study, participants in the High-PMQ group differed from other participants on important clinical factors. Participants in the High-PMQ group reported having more severe pain, poorer pain-related function, greater pain catastrophizing, lower self-efficacy for managing pain, and more symptoms of depression than participants in the Low-PMQ group; they also had more severe pain, greater pain catastrophizing, and more symptoms of depression and anxiety than participants in the Moderate-PMQ group. The High-PMQ group was also more likely to meet diagnostic criteria for a current SUD. These findings are consistent with prior research (Price et al., 2011) and indicate that risk for prescription opioid misuse is associated with more severe pain, impairment, and psychiatric symptoms in a graded fashion. Patients at high risk for prescription opioid misuse may present with a constellation of clinical concerns, which has significant implications for treatment. Additionally, there were no differences in medication dose between the three groups, although participants in the High-PMQ group reported more pain severity, suggesting potential need to change the intervention approach and/or altering opioid dose may be indicated for some participants. Given the cross-sectional design of this study; however, it is unclear whether increased risk for prescription opioid misuse is the result of more severe pain and greater impairment, if risk for prescription opioid misuse contributes to more pain and impaired functioning, or if there are other factors that increase both risk of prescription opioid misuse and poorer pain-related outcomes.

All participants in this study had received an opioid prescription within the past 90 days, 17.5% (n=14) of the sample met diagnostic criteria for a current SUD, and 35.7% of those with a current SUD (n=5) were enrolled in substance abuse treatment. While having a current SUD is not an absolute contraindication to pain treatment with prescription opioids, as not all will misuse their medications (Fishbain et al., 2008), this is a patient population at elevated risk for prescription opioid misuse (Morasco et al., 2011). Pain treatment guidelines indicate that prescription opioids are contraindicated for patients with current SUD who are not enrolled in substance abuse treatment (Chou et al., 2009; Department of Veterans Affairs and Department of Defense, 2010). If a decision is made to prescribe opioid medications to patients with a current SUD, careful monitoring and more intensive treatment is warranted. Ongoing evaluations with patients who receive prescription opioids for the treatment of chronic pain should include assessment of the effectiveness of medication in improving pain, impact on daily living, adverse events, and any aberrant medication-related behaviors (Passik et al., 2006).

Results from this study extend prior research supporting the utility of the PMQ to screen for risk of prescription opioid misuse. There are a number of other measures available to screen for risk of prescription opioid misuse, including the use of urine drug tests (Katz et al., 2003; Starrels et al., 2010) and standardized questionnaires. Self-report and clinician-administered measures that have received empirical support, in addition to the PMQ, include the Screener and Opioid Assessment for Patients with Pain (Butler et al., 2004), Opioid Risk Tool (Webster and Webster, 2005), Current Opioid Misuse Measure (Butler et al., 2007), and Addiction Behaviors Checklist (Wu et al., 2006), among others. The decision regarding which specific measure to use, with a given patient population, will likely be dictated by time constraints, resources, clinical needs, and research questions of interest. We chose to use the PMQ given prior research supporting its psychometric properties (Adams et al., 2004; Buelow et al., 2009; Dowling et al., 2007; Holmes et al., 2006), our experience with the measure (Morasco and Dobscha, 2008), its comprehensive assessment of risk for prescription opioid misuse, and its inclusion of items that change over time and are not dependent upon static demographic or clinical characteristics (such as history of arrest or personal or familial history of SUD).

In addition to its cross-sectional design, there are several limitations to this study. We examined a sample of patients recruited from a general medical center, rather than patients specifically seeking treatment for chronic pain, though all patients had received prescription opioids for chronic pain. Further, our sample was composed entirely of veterans and results may not be generalizable to other clinical settings. We obtained prescription opioid data from the electronic medical record and were not able to independently verify whether medications were taken. Information was not obtained on other recent pain treatments that participants may have been prescribed or provided (e.g., anesthetic nerve blocks, transcutaneous electrical nerve stimulation), which may have had an impact on the outcome variables. We had a relatively small sample size for the regression analysis; these results should be interpreted with caution. Replication of the results in other samples would add confidence in study findings. Finally, this study included only patients who had a history of being tested for the hepatitis C virus, and likely has high rates of past intravenous drug use relative to other samples; therefore, results may not generalize to patients with a history of use, abuse, or dependence to other substances, or to patients without a history of substance abuse or dependence.

In summary, we found that, within a sample of patients receiving treatment for chronic pain who have a history of SUD, pain catastrophizing is associated with increased risk for prescription opioid misuse. These results provide important data that may aid in the standardized assessment of risk for prescription opioid misuse. The findings also reveal that

patients with higher risk for prescription opioid misuse have a constellation of pain-related, psychiatric, and substance abuse problems. Patients with higher risk for prescription opioid misuse reported more pain, poorer pain-related function, more symptoms of depression, and were more likely to meet diagnostic criteria for a current SUD, compared with patients at low risk for prescription opioid misuse. Limited data are available about empirically-supported methods of chronic pain management in patients with comorbid SUD (Ling et al., 2011; Morasco et al., 2011). Additional research is needed to provide direction for the best ways to manage patients with chronic pain and elevated risk for prescription opioid misuse, with the goal of providing safe treatment that helps to effectively decrease pain and improve function. Our findings suggest that screening for risk of prescription opioid misuse should not be limited to assessment of traditional demographic and clinical factors, and should include evaluation of an individual's thoughts about the threat of pain and beliefs in ability to manage it.

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Table 1

Comparison of demographic characteristics and pain diagnoses.

	High-PMQ Group (n=30)	Moderate-PMQ Group (n=25)	Low-PMQ Group (n=25)	<i>p</i> -value
Age	55.0 (5.7)	56.1 (6.9)	53.7 (6.2)	0.381
Male gender	91.3% (29)	92.0% (23)	84.0% (21)	0.251
White race	66.7% (20)	84.0% (21)	76.0% (19)	0.332
Marital status				0.449
Single	33.3% (10)	20.0% (5)	12.0% (3)	
Married	16.7% (5)	32.0% (8)	32.0% (8)	
Separated/Divorced	40.0% (12)	40.0% (10)	52.0% (13)	
Widowed	10.0% (3)	8.0% (2)	4.0% (1)	
Years of education	13.4 (3.6)	13.6 (1.6)	13.2 (1.6)	0.860
Income < \$15,000	73.3% (22)	64.0% (16)	44.0% (11)	0.080
Pain Diagnoses				
Arthritis	80.0% (24)	76.0% (19)	48.0% (12)	0.025
Fibromyalgia	16.7% (5)	8.0% (2)	12.0% (3)	0.624
Low Back Pain	86.7% (26)	72.0% (18)	60.0% (15)	0.079
Migraine Headache	30.0% (9)	20.0% (5)	12.0% (3)	0.263
Neck or Joint Pain	90.0% (27)	88.0% (22)	76.0% (19)	0.308
Neuropathy	13.3% (4)	16.0% (4)	4.0% (1)	0.366
Average Daily Opioid Dose (morphine equivalent)	25.7 (46.6)	29.2 (28.7)	36.3 (73.1)	0.754

Note. Scores above indicate mean (standard deviation) for continuous variables or % (n) for categorical variables. PMQ = Pain Medication Questionnaire.

Table 2

Pain and psychiatric variables.

	High-PMQ Group (n=30)	Moderate-PMQ Group (n=25)	Low-PMQ Group (n=25)	p-value
Pain Variables				
Pain Severity	4.5 (1.1) ^a	3.7 (1.0) ^b	3.3 (1.4) ^b	0.002
Pain Interference	4.7 (1.1) ^a	4.2 (1.4) ^{a,b}	3.8 (1.4) ^b	0.036
Chronic Pain Self-Efficacy	1105 (382) ^a	1174 (292) ^a	1447 (351) ^b	0.001
Pain Catastrophizing	34.2 (10.3) ^a	24.0 (9.5) ^b	18.4 (12.6) ^b	< 0.001
Psychiatric Variables				
Depressive symptoms	24.9 (12.7) ^a	14.7 (8.5) ^b	15.6 (13.7) ^b	0.003
Anxiety symptoms	11.2 (6.4) ^a	6.6 (5.2) ^b	7.4 (6.4) ^{a,b}	0.013
PMQ score – Risk for prescription	38.7 (5.6) ^a	27.1 (3.1) ^b	16.2 (4.1) ^c	< 0.001
opioid misuse (range)	(33 – 53)	(22 – 32)	(8 – 21)	

Note. Scores above represent the mean (standard deviation) on each measure. Scores with different superscripts differed significantly ($p < 0.05$) in post-hoc testing. PMQ = Pain Medication Questionnaire.

Table 3

Comparison of current and lifetime substance use disorders (SUD) between groups.

	High-PMQ Group (n=30)	Moderate-PMQ Group (n=25)	Low-PMQ Group (n=25)	p-value
Current Alcohol	23.3% (7)	8.0% (2)	0	0.020
Lifetime Alcohol	96.7% (29)	96.0% (24)	96.0% (24)	0.989
Current Marijuana	3.3% (1)	4.0% (1)	0	0.617
Lifetime Marijuana	80.0% (24)	56.0% (14)	56.0% (14)	0.093
Current Sedatives	0	0	0	
Lifetime Sedatives	24.1% (7)	20.0% (5)	20.0% (5)	0.926
Current Stimulants	3.3% (1)	0	0	0.430
Lifetime Stimulants	63.3% (19)	44.0% (11)	48.0% (12)	0.310
Current Heroin	0	0	0	
Lifetime Heroin	33.3% (10)	28.0% (7)	36.0% (9)	0.827
Current Cocaine	3.3% (1)	0	0	0.418
Lifetime Cocaine	69.0% (20)	48.0% (12)	52.0% (13)	0.250
Current Hallucinogens	3.3% (1)	0	0	0.430
Lifetime Hallucinogens	46.7% (14)	24.0% (6)	24.0% (6)	0.111
Current Polysubstance	0	0	0	
Lifetime Polysubstance	13.3% (4)	20.0% (5)	8.0% (2)	0.467
Current Prescription Opioids	0	8.0% (2)	0	0.105
Lifetime Prescription Opioids	20.0% (6)	24.0% (6)	20.0% (5)	0.921
Any Current SUD	32.1% (9)	20.0% (5)	0	0.009
Current Nicotine Use	56.7% (17)	36.0% (9)	60.0% (15)	0.179

Note. Substance use disorder diagnoses reflect abuse and/or dependence. Scores above indicate % (n) for each variable. PMQ = Prescription Medication Questionnaire.

Table 4

Regression model examining factors associated with risk for prescription opioid misuse.

	Adjusted R ²	R ² Change	B	Standard Error	p-value
Step 1	−0.01	0.01			0.480
Age			0.3	0.2	0.078
Step 2	0.14	0.17			0.001
Pain Severity			0.4	1.2	0.738
Pain Interference			−0.5	1.1	0.682
Step 3	0.37	0.25			<0.001
Current SUD			0.4	2.6	0.868
Depressive Symptoms			0.1	0.1	0.494
Pain Catastrophizing			0.5	0.1	<0.001

Note. *p*-values for the individual variables represent statistical significance in the final model (rather than *p*-value at each step). SUD = Substance use disorder.