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Association between Substance Use Disorder Status and Pain-Related Function Following 12 Months of Treatment in Primary Care Patients with Musculoskeletal Pain

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Abstract

The goal of this study was to examine relationships between substance use disorder (SUD) history and 12-month outcomes among primary care patients with chronic noncancer pain (CNCP). Patients were enrolled in a randomized trial of collaborative care intervention (CCI) versus treatment-as-usual (TAU) to improve pain-related physical and emotional function. At baseline, 72 of 362 patients (20.0%) had a history of SUD. Compared to CNCP patients without SUD, those with comorbid SUD had poorer pain-related function and were more likely to meet criteria for current major depression and posttraumatic stress disorder (all p-values<0.05). Logistic regression analyses were conducted to examine whether SUD status was associated with clinically significant change over 12 months in pain-related function (30% reduction in Roland Morris Disability Questionnaire Score). The overall model was not significant in the CCI group. However, within the TAU group, participants with a SUD history were significantly less likely to show improvements in pain-related function (OR=0.30, 95% CI=0.11–0.82). CNCP patients with comorbid SUD reported greater functional impairment at baseline. Patients with SUD who received usual care were 70% less likely to have clinically significant improvements in pain-related function 12 months post-baseline, and SUD status did not impede improvement for the CCI group.

Perspective—Chronic non-cancer pain patients with a history of a substance use disorder (SUD) report poorer pain-related functioning and are less likely to experience clinically significant improvements from usual pain treatment. Providers should assess for SUD status and provide more intensive interventions for these patients.

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Keywords

Chronic pain; Substance use disorder; Pain functioning; Treatment; Collaborative care intervention

Introduction

Approximately 35% of patients treated in primary care have chronic non-cancer pain (CNCP).[18] Patients with CNCP are at increased risk of numerous medical14 and psychiatric comorbidities, including anxiety and depressive disorders10,43, suicidal ideation and attempts[16], and decreased quality of life.[28]

Recent reports document the high rates of substance use disorders (SUD) among patients with CNCP[17] and the unique challenges and obstacles of treating CNCP in patients with a history of SUD.37 Opioid therapy is the most commonly prescribed treatment for patients with CNCP.44 However, providers may be particularly apprehensive about prescribing opioid medications to patients with a SUD due to concerns of general efficacy24, as well as misuse, abuse, and diversion[11]. These concerns may be legitimate, as patients with a history of SUD have been shown to have higher rates of aberrant medication use.[25,31] History of SUD may also decrease pain thresholds[8,30] and result in higher doses of pain medications[49], thereby further complicating treatment options. As a consequence, some patients with a history of SUD may be at risk for under-treatment of pain.

Studies of patients enrolled in substance abuse treatment programs indicate that SUD with comorbid CNCP is associated with more severe substance use problems, more severe psychiatric distress, and greater functional impairment than SUD alone.[20,29,36,42] Long-term follow-up data also indicate that these CNCP patients may have poorer substance abuse treatment outcomes than SUD patients without comorbid CNCP.[5,19] However, less is known about long-term pain outcomes among patients with comorbid SUD. As the majority of patients with CNCP are treated in primary care, more data are needed from primary care samples regarding the clinical characteristics of patients with CNCP and SUD. For patients with a history of SUD, more intensive treatment strategies may be indicated to compensate for under-treatment of pain or return to substance use.

Patients included in this study were originally recruited for a randomized trial comparing a collaborative care intervention (CCI) to treatment as usual (TAU) for the treatment of CNCP.[12] CCI is based on the chronic illness model and is designed to enhance patient and provider education and self-efficacy, and provide system support including care management and feedback.2 Unlike many prior studies examining pain outcomes, participants in the present study were not excluded based on SUD status26 providing a unique opportunity to examine the impact of SUD history on long-term functioning. The main results from the initial analyses demonstrated that CNCP patients randomized to CCI had significant improvements in pain-related function, pain intensity, and depression relative to those assigned to TAU.13 The purpose of the current study was to examine the association between comorbid SUD history and baseline characteristics and 12-month treatment outcomes for CNCP patients randomized to either CCI or TAU.

Materials and Methods

Setting

All patients receiving primary care through a Veterans Affairs Medical Center (VAMC) were potentially eligible for study participation. This particular VAMC provides

comprehensive care to approximately 52,000 veterans. The Institutional Review Board of the Portland VAMC approved the study and all enrolled participants provided written informed consent.

Recruitment strategies and results of the main study have been reported elsewhere.[12,13] In brief, patients were recruited from January 2006 to January 2007. Patients due for primary care appointments were mailed letters outlining the study and inviting them to return postcards or call our research office if interested in being screened for eligibility. Additionally, advertisement flyers were posted around the Medical Center. Patients were eligible for the enrollment interview if they had medical record documentation of a musculoskeletal pain diagnosis, arthritic pain, or neck or joint pain of at least 12-weeks duration, pain intensity and interference item scores indicating moderate to severe pain (≥ 4 out of 10 on the Chronic Pain Grade), and regular access to a telephone. To limit variation in case mix and prognosis, individuals were excluded if they had diagnoses of fibromyalgia, chronic fatigue syndrome, or somatization disorder. We also excluded patients with bipolar disorder, psychotic disorder, or dementia, having a designated guardian or terminal illness, a medical record flag indicating a history of drug-seeking behavior or prior dangerous behavior at the medical center, or had cognitive impairment (participants with scores > 9 on the Short Blessed Test [22] were excluded). We did not exclude patients with active alcohol or substance abuse disorders.

The original study[12] was a cluster randomized controlled trial. Randomization occurred at the provider level; only the patients of providers who agreed to participate were potentially eligible. Forty-six of 54 (85%) eligible primary care providers (PCPs) agreed to participate (four PCPs were ultimately excluded due to either leaving their practices before participant enrollment or because none of their patients enrolled). Prior to patient recruitment, the statistician randomized clinicians to CCI or TAU, nesting patient assignment within provider status. Clinicians were stratified by professional training (physician versus nurse practitioner or physician assistant), location (metropolitan versus non-metropolitan), and proportion of patients in the clinician's panel prescribed opioids. Patients enrolled in the study were assigned to the same group as their PCPs. Of 841 patients completing telephone screening, 442 (53%) completed enrollment interviews. We offered $10 in compensation for time and travel to attend this interview. Patients scoring > 6 on the Roland Morris Disability Questionnaire were invited to enroll; 401 subsequently enrolled in the study (Figure 1). There were no significant demographic or clinical differences between CCI and TAU patients at baseline.[12,13] We report data on the 362 patients who completed baseline and 12-month follow-up evaluations; there were no differences in baseline demographic or clinical factors between participants who did versus did not complete the 12-month evaluation.

Treatment

The CCI has previously been described in more detail.[12] The intervention was based on the chronic care model, and included patient and provider activation and education, patient assessment, outcomes monitoring, and feedback to providers over 12 months. The key members of the intervention team were a full-time psychologist care manager and an internist. All participants received an initial assessment by the psychologist care manager, who collaborated with an internist to develop treatment recommendations, which may have included additional tests or arrangements for more specialized care. Using a stepped-care approach, treatment options could also include referral to the medical center's specialty pain clinic, mental health, physical therapy, or other services. All referrals were at the discretion of patients, the CCI team, and the primary care provider, which differs from traditional multidisciplinary pain treatment where the majority of patients routinely receive these services. CCI participants were also invited to participate in an optional four-session chronic pain workshop, based on a brief activating approach[46] that was designed to encourage

resumption of normal activities and physical exercise by addressing fears of movement that are common in CNCP patients. The workshop was co-facilitated by a psychologist and a physical therapist. All participants randomized to CCI were scheduled for follow-up telephone calls with the psychologist care manager every two months to re-assess status and offer support.

Clinicians randomized to the TAU group completed baseline questionnaires and were notified when patient recruitment began. When their patients entered the study, a note was placed in the medical record. TAU clinicians had access to the medical center's referral-based pain specialty clinic, on-site mental health services, and all ancillary services. TAU clinicians were not provided with recommendations for managing their patients and participants randomized to this condition were contacted by the research team only for follow-up outcome measurements.

Data Collection

The current study utilized baseline and 12-month follow-up data. Research data were collected by trained research assistants blinded to intervention status. Follow-up measures were primarily obtained by mail.

Patient data obtained from VA medical records included age, gender, musculoskeletal pain diagnoses, past SUD diagnoses, and prescription medications at the time of enrollment. At the baseline assessment, all participants completed demographic questions, including ethnicity, education, marital status, and duration of chronic pain. The primary study outcome variable was self-reported pain disability assessed by the Roland-Morris Disability Questionnaire (RMDQ), a well-validated 24-item self-report measure that assesses disability due to pain.[33,34] Higher scores on the RMDQ reflect greater functional limitations.

Pain intensity was assessed with the pain severity subscale from the Chronic Pain Grade (CPG).[15,39] The CPG pain severity subscale includes three items, with higher scores indicating greater pain severity.

The Patient Health Questionnaire (PHQ-9) 40 is a 9-item self-report questionnaire used to assess depression severity. The DSM-IV scoring method was used to diagnose major depression.40 The PTSD Checklist (PCL)47,48 is a 17-item self-report measure used to assess posttraumatic stress disorder. Participants met criteria for PTSD if their response to a stem question about trauma was positive and their score on the PCL was ≥ 50. The EQ-5D was used to assess quality of life and was scored using USA, Time Trade Off scoring criteria.1

Current alcohol use was assessed with the three-item AUDIT-C.[4] Scores ≥ 6 were considered positive for active alcohol abuse. The Drug Abuse Screening Test-10 (DAST-10)[7,38] was used to measure current use of illicit substances. Active substance abuse was defined as a DAST-10 score ≥ 2.

Clinical diagnoses and pharmacy data were collected from the Veterans Integrated Service Network-20 Data Warehouse (VISN-20).[45] The Data Warehouse is a collection of databases extracted from the electronic patient medical records at each regional facility, updated monthly and regularly tested for reliability. SUD and CNCP diagnosis information were based on ICD-9 Clinical Modification (CM) codes listed in medical encounter records. Pain diagnoses included in this study were back pain (722*, 724*), rheumatism, arthritis, or osteoarthritis (274*, 712*, 714*, 715*, 716*, 720*, 729*), or chronic neck or joint pain (717*, 718*, 723*, 729*). History of SUD was defined as any of the following ICD-9-CM diagnostic codes entered in the medical record within 10 years preceding entry into the

study: alcohol abuse or dependence (303*, 305.0*), amphetamine abuse or dependence (304.4*, 305.7*), cannabis abuse or dependence (304.3*, 305.2*), cocaine abuse or dependence (304.2*, 305.6*), polysubstance abuse or dependence (304.8*), non-prescribed opiate abuse or dependence (304.0*, 305.5*), or other abuse or dependence (304.1*, 304.5*, 304.6*, 305.3*, 305.4*, or 305.9*).

Statistical Analysis

For the current study, all analyses included only those patients who completed the 12-month follow-up assessment (n = 362). Differences between patients with and without a history of SUD on demographic, clinical, and prescription medication variables were tested using chi-square tests for categorical variables and analysis of variance (ANOVA) for continuous variables. Hierarchical logistic regression analyses were conducted to examine whether history of SUD was associated with clinically significant change over 12 months in pain-related function, after controlling for the effects of other demographic, disease-related, opioid prescription status (yes/no), and mental health variables. Covariates were selected on the basis of hypothesized prognostic importance. Specifically, the variables included were: age and gender, duration of pain and number of pain diagnoses as disease-related variables, whether the patient received an opioid prescription any time during the study year, and diagnoses of PTSD and major depressive disorder given their strong relationship with pain outcomes. We stratified these analyses by intervention status due to substantial differences in pain care received over the 12-month period.[13] For this analysis, a clinically significant change was prespecified as a 30% reduction between baseline and 12 months on the RMDQ score. This criterion has previously been identified as defining a clinically meaningful change on the RMDQ.[21,23,27,41]

Only patients with complete covariate and follow-up data were included in the regression analyses. Age and gender were entered in Step 1. In Step 2, duration of pain and number of pain diagnoses were entered into the model. For Step 3, diagnoses of PTSD, major depressive disorder and history of SUD were entered.

Results

Of the 362 participants, 20.0% (n = 72) had a history of SUD. Past SUD diagnoses included abuse or dependence of alcohol (n=62, 86.1%), cannabis (n=10, 13.9%), non-prescribed opiate (n=6, 8.3%), amphetamine (n=2, 2.8%), cocaine (n=2, 2.8%), or other (n=13, 18.1%). The diagnoses were not mutually exclusive; 55 participants (76.4%) had one SUD diagnosis and 17 (23.6%) had two or more diagnoses. Table 1 provides a summary of comparisons of baseline demographic differences between participants based on a history of SUD. Compared to participants without a history of SUD, those with a history of SUD were younger (57.8 years versus 62.8 years, $p = 0.001$) and less likely to be married or cohabiting (47.2% versus 63.4%, $p = 0.012$). There were no statistically significant differences between the two groups with respect to gender, ethnicity, level of education, or VA service-connected status.

Table 2 summarizes baseline pain and mental health variables between the groups. Types of CNCP diagnoses did not differ. The only pain variable to differ significantly was RMDQ pain disability, as patients with a history of SUD reported greater disability due to pain than participants with no history of SUD (F (1, 361) = 6.31, $p = 0.01$). Patients with SUD were also more likely to meet criteria for PTSD (χ^2 (1) = 5.38, $p = 0.02$), major depressive disorder (χ^2 (1) = 6.26, $p = 0.01$), and current alcohol use disorder (χ^2 (1) = 5.29, $p = 0.02$).

Patients with a history of SUD were more likely to be prescribed an opioid medication (40.3% versus 26.2%; χ^2 (1) = 5.55, $p = 0.02$). For those patients who were prescribed an

opioid, the most common prescriptions were hydrocodone (50.5%), oxycodone (25.7%), morphine (21.0%), and methadone (8.6%). There were no statistically significant differences based on SUD status in the likelihood of being prescribed a long-acting opioid (35.2% versus 22.4%). There were no differences between the groups in rates of prescriptions for benzodiazepines, antidepressants, muscle relaxants, capsaicin, or NSAID/acetaminophen (Table 3).

There was no difference in the proportion of patients with a history of SUD based on group randomization (CCI 18.3% versus TAU 21.2%). Patients randomized to the CCI group were more likely than those randomized to TAU to meet the responder criterion (i.e., 30% reduction in RMDQ scores) at 12-month follow-up (CCI 21.9% versus TAU 14.0%, $p < 0.05$).

Hierarchical logistic regression analyses, stratified by intervention status, were conducted to evaluate whether SUD status was associated with clinically significant change in physical functioning (Table 4). Among patients randomized to the CCI (n=169), the overall model was not significant (χ^2 (8) = 6.93, $p = 0.55$) and no baseline variables predicted response. However, within the TAU group (n=193), the overall model was significant (χ^2 (8) = 17.25, $p = 0.028$) and the Hosmer and Lemeshow goodness-of-fit test indicated good concordance between observed and predicted values (χ^2 (8) = 5.15, $p = 0.74$). In the final model, participants with a history of SUD were less likely to have clinically significant improvements in pain-related disability (OR = 0.30, 95% CI = 0.11 – 0.82). No other baseline variables were significantly associated with treatment response.

Discussion

At enrollment in this randomized controlled trial, patients with CNCP and a history of SUD reported poorer pain-related function, and were more likely to meet criteria for current major depression, PTSD, and alcohol abuse than patients without a history of SUD. For patients assigned to the CCI, prior SUD status was not associated with response over time, indicating that a history of a SUD did not impede response to CCI. However, history of SUD was associated with a 70% decreased likelihood of having a clinically significant improvement in pain-related function 12 months post-baseline for patients who were assigned to usual care. These results remained significant, even after controlling for demographic characteristics, pain-related factors, opioid prescriptions, and baseline diagnoses of depression or PTSD.

Some previous research examining pain treatment outcomes indicates that CNCP patients with SUD have similar outcomes as patients without a history of SUD; however, these studies have examined interventions that are more intensive than usual care. For example, a primary care multidisciplinary disease management program was effective in reducing pain and improving functioning for CNCP patients with and without a history of SUD.[6] A study examining the effectiveness of enrollment in a methadone maintenance program, which included regular group therapy and case management, found that patients with CNCP and comorbid opioid dependence had significant improvements in pain relief and quality of life.[32] These studies indicate that more rigorous treatment options are needed for SUD patients in order to have clinically significant improvement for treatment of CNCP. In the present study, in addition to usual care treatment options, patients assigned to the CCI received individualized assessments from a psychologist with bi-monthly follow-up telephone calls to offer support, identify treatment needs, and encourage compliance, recommendations from an internist, and were eligible to participate in a four-session chronic pain workshop that was co-facilitated by a psychologist and physical therapist. For patients assigned to CCI, SUD history was not associated with a lack of response. The results from this study, combined

with findings from prior research, suggest that CNCP patients with a history of SUD may need more intensive treatment than usual care to experience clinically significant improvements in pain-related function, and that collaborative care may be an appropriate and effective option for these high risk patients. Patients with CNCP and SUD who receive standard pain care may be at greater risk for poor clinical outcomes.

The extent to which use of analgesic medications contributed to pain functioning outcomes among CNCP patients in this study is not clear. At baseline, patients with a history of SUD were more likely to be prescribed an opioid analgesic medication. This finding is consistent with results from previous studies.[3,49] Despite the higher likelihood of being prescribed opioid medications, patients with a history of SUD receiving usual care were less likely to have clinically significant improvements in pain-related function and opioid prescription status was not significantly associated with treatment outcome in the regression models. There were no differences between groups in prescriptions for other analgesic medications. Patients with a history of SUD were also less likely to report being married or having a partner, an important observation given that a stable and helpful social support network has the potential to improve chronic pain treatment outcomes.[35]

Although results from this study suggest history of SUD is associated with poorer long-term pain outcomes, there are limitations. All participants were seeking care at a VA Medical Center and results may not generalize to other settings or to non-veterans. Additionally, this sample was older (mean age=61.8, SD=11.8), primarily included white men, and the average duration of pain in this sample exceeded 14 years, indicating this group may represent a unique subset of patients. Patients enrolled in this study had to call to participate, which may represent a subset of patients that are more highly motivated and thus be potentially more likely to engage in additional treatment services than other groups of patients with chronic pain. In this study, history of SUD was obtained using ICD-9-CM codes from electronic records maintained over the past 10 years, and was not verified with structured clinical interviews. This methodology may result in either under-reporting or over-reporting of these diagnoses.

Despite these limitations, there are several strengths of the study, including the relatively large sample recruited from a primary care sample, randomized design, statistical control for potential confounding factors, and use of psychometrically validated outcome measures. The findings suggest that primary care patients with CNCP and a history of SUD have poorer pain-related function and more severe psychological comorbidities at baseline, and may need more intensive interventions to attain long-term clinically significant improvements in pain-related function. Clinicians providing treatment for CNCP should assess patients for SUD history at the initial visit and augment usual care with supplementary treatments. Treatments that show promise for CNCP patients with comorbid SUD might include integrated collaborative or stepped care and/or integration of chronic pain interventions with relapse prevention for SUD.[9]

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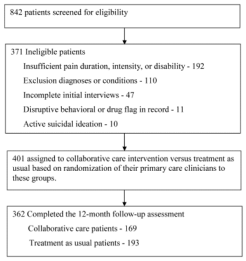

Figure 1.
Participant Flow.

Table 1

Comparison of Demographic Characteristics between Chronic Non-Cancer Pain Patients based on History of Substance use Disorder (SUD).

	Pain and SUD (n=72)	**Pain only (n=290)**	**Test (df)**	***p*-value**
Age	57.8 (9.8)	62.8 (12.0)	F (1, 361) = 10.44	0.001
Male Gender	66 (91.7%)	267 (92.1%)	χ^2 (1) = 0.01	0.91
Married/Cohabitating	34 (47.2%)	184 (63.4%)	χ^2 (1) = 6.34	0.012
Ethnicity – Caucasian	65 (90.3%)	258 (89.0%)	χ^2 (1) = 0.10	0.75
Completed at least some college	51 (70.8%)	223 (76.9%)	χ (1) = 1.15	0.28
VA Service-Connected	38 (52.8%)	150 (51.7%)	χ^2 (1) = 0.03	0.87

Table 2

Comparison of Baseline Pain Diagnoses and Mental Health Variables between Chronic Non-Cancer Pain Patients Based on History of Substance Use Disorder (SUD).

	Pain and History of SUD (n=72)	**Pain only (n=290)**	**Test (df)**	***p*-value**
Back Pain Diagnosis	52 (72.2%)	189 (65.2%)	χ^2 (1) = 1.29	0.26
Arthritis Diagnosis	33 (45.8%)	146 (50.3%)	χ^2 (1) = 0.47	0.49
Neck or Joint Pain Diagnosis	42 (58.3%)	191 (65.9%)	χ^2 (1) = 1.43	0.23
Duration of Pain in Years	14.3 (11.0)	14.7 (13.0)	F (1, 361) = 0.07	0.80
Pain Intensity	67.5(12.0)	66.7 (13.5)	F (1, 361) = 0.24	0.63
Pain Disability	15.7 (4.3)	14.3 (4.4)	F (1, 361) = 6.31	0.01
Major Depressive Disorder	19 (26.4%)	41 (14.1%)	χ^2 (1) = 6.26	0.01
Posttraumatic Stress Disorder	18 (25.0%)	40 (13.8%)	χ^2 (1) = 5.38	0.02
Current alcohol use disorder	8 (11.1%)	12 (4.2%)	χ^2 (1) = 5.29	0.02
Current substance use disorder	1 (1.4%)	3 (1.0%)	χ^2 (1) = 0.07	0.80
Quality of Life	0.64 (0.17)	0.65 (0.17)	F (1, 361) = 0.13	0.72

Table 3

Comparison of the Proportion of Patients Prescribed Medications at Baseline between Chronic Non-Cancer Pain Patients Based on History of Substance Use Disorder (SUD).

	Pain and SUD (n=72)	**Pain only (n=290)**	**Test (df)**	***p*-value**
Any Opioid	29 (40.3%)	76 (26.2%)	χ^2 (1) = 5.55	0.02
Any Benzodiazepine	3 (4.2%)	10 (3.4%)	χ^2 (1) = 0.09	0.77
Antidepressant	27 (37.5%)	97 (33.4%)	χ^2 (1) = 0.42	0.52
Muscle Relaxant	7 (9.7%)	21 (7.2%)	χ^2 (1) = 0.50	0.48
Capsaicin	0	4 (1.4%)	χ^2 (1) = 1.00	0.32
NSAID/Acetaminophen	28 (38.9%)	85 (29.3%)	χ^2 (1) = 2.47	0.12

Table 4

Correlates of Clinically Significant Improvement in Pain Disability at 12 Months.

	Beta (standard error)	Wald	Significance	Odds Ratio (95% Confidence Interval)
Model 1. Participants Randomized to Collaborative Care Intervention (n=169)				
Step 1				
Age	−0.02 (.02)	0.74	0.39	0.99 (0.95 – 1.02)
Male Gender	−0.09 (.71)	0.02	0.90	0.91 (0.23 – 3.67)
Step 2				
Duration of Pain	0.01 (.02)	0.21	0.65	1.01 (0.98 – 1.04)
Number of Pain Diagnoses	0.04 (.27)	0.02	0.89	1.04 (0.61 – 1.77)
Opioid Prescription	−0.51 (.39)	1.68	0.20	0.60 (0.28 – 1.30)
Step 3				
PTSD	−0.31 (.61)	0.27	0.61	0.73 (0.22 – 2.40)
Major Depressive Disorder	1.31 (.81)	2.67	0.10	3.72 (0.77 – 18.04)
History of Substance Use Disorder	0.06 (.53)	0.01	0.91	1.06 (0.37 – 3.01)
Model 2. Participants Randomized to Treatment as Usual (n=193)				
Step 1				
Age	−0.01 (.02)	0.21	0.65	0.99 (0.95 – 1.03)
Male Gender	0.45 (.87)	0.26	0.61	0.64 (0.12 – 3.51)
Step 2				
Duration of Pain	−0.04 (.02)	3.34	0.07	0.96 (0.92 – 1.00)
Number of Pain Diagnoses	−0.61 (.35)	2.98	0.08	0.55 (0.28 – 1.09)
Opioid Prescription	−0.34 (.48)	0.50	0.48	0.72 (0.28 – 1.81)
Step 3				
PTSD	1.50 (.92)	2.62	0.11	4.46 (0.73 – 27.22)
Major Depressive Disorder	0.23 (.76)	0.09	0.76	1.26 (0.28 – 5.60)
History of Substance Use Disorder	−1.21 (.51)	5.56	0.02	0.30 (0.11 – 0.82)

Note. Opioid prescription status indicates whether a patient was prescribed an opioid any time during the study period. Clinically significant improvement in pain disability was defined as a 30% reduction between baseline and 12 months on the Roland Morris Disability Questionnaire.