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Chronic Pain Severity, Impact, and Opioid Use Among Patients With Cancer: An Analysis of Biopsychosocial Factors Using the CHOIR Learning Health Care System

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Abstract

BACKGROUND: Despite the biopsychosocial underpinnings of chronic noncancer pain, relatively little is known about the contribution of psychosocial factors to chronic cancer pain.

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AUTHOR CONTRIBUTIONS

Desiree R. Azizoddin: Conceptualization, data curation, formal analysis, and writing–review and editing. **Kristin Schreiber:** Conceptualization, data curation, formal analysis, and writing–review and editing. **Meghan R. Beck:** Data curation and writing–review and editing. **Andrea C. Enzinger:** Data curation and writing–review and editing. **Valerie Hruschak:** Conceptualization and writing–review and editing. **Beth D. Darnall:** Writing–review and editing. **Robert R. Edwards:** Writing–review and editing. **Matthew J. Allsop:** Data curation and writing–review and editing. **James A. Tulsky:** Writing–review and editing. **Edward Boyer:** Writing–review. **Sean Mackey:** Conceptualization, formal analysis, and writing–review and editing

CONFLICT OF INTEREST DISCLOSURES

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The authors aimed to characterize associations between biopsychosocial factors and pain and opioid use among individuals with chronic pain and cancer.

METHODS: The authors conducted a retrospective, cross-sectional study of 700 patients with chronic pain and cancer seeking treatment at an academic tertiary pain clinic. Patients completed demographic questionnaires and validated psychosocial and pain measures. Multivariable, hierarchical linear and logistic regressions assessed the relative contributions of biopsychosocial factors to the primary dependent variables of pain severity, pain interference, and opioid use.

RESULTS: Participants were 62% female and 66% White with a mean age of 59 ± 15 years, and 55% held a college degree or higher. Older age, African American or “other” race, sleep disturbance, and pain catastrophizing were significantly associated with higher pain severity ($F(5,657) = 22.45$; $P \leq .001$; $R^2 = 0.22$). Depression, sleep disturbance, pain catastrophizing, lower emotional support, and higher pain severity were significantly associated with pain interference ($F(5,653) = 9.47$; $P \leq .001$; $R^2 = 0.44$). Lastly, a poor cancer prognosis ($\text{Exp}(B) = 1.62$) and sleep disturbance ($\text{Exp}(B) = 1.02$) were associated with taking opioids, whereas identifying as Asian ($\text{Exp}(B) = 0.48$) or Hispanic ($\text{Exp}(B) = 0.47$) was associated with lower odds of using opioids.

CONCLUSIONS: Modifiable psychological factors—specifically sleep disturbance, depression, and pain catastrophizing—were uniquely associated with pain and opioid use in patients with chronic pain and diverse cancer diagnoses. Future behavioral pain interventions that concurrently target sleep may improve pain among patients with cancer.

LAY SUMMARY:

- Feeling depressed, worrying about pain, and bad sleep are related to higher pain symptoms in individuals with chronic pain and cancer.
- Specifically, those who struggle to sleep have worse pain and use more opioids.
- Also, individuals who have a bad prognosis for their cancer are more likely to be using opioid pain medications.
- Although race and cancer are related to chronic pain in patients, psychological well-being is also strongly related to this same pain.

Keywords

cancer; cancer pain; catastrophizing; Collaborative Health Outcomes Information Registry (CHOIR); disparities; opioids; sleep

INTRODUCTION

Approximately 40% to 90% of patients with cancer suffer from pain.¹ Pain significantly affects functional, psychological, and social well-being for patients with cancer.² Cancer pain frequently results from malignant growth or treatment³; however, similarly to noncancer pain, data suggest that psychosocial factors may also influence pain associated with cancer.^{4,5} Individuals with cancer experience elevated rates of psychosocial distress after their diagnosis and during cancer treatment, and this possibly exacerbates their pain.⁶ Cancer pain management, however, infrequently engages psychosocial resources in pain

treatment and often exclusively emphasizes pharmacologic analgesia.⁷ A large proportion of patients continue to report undertreated pain.⁸

The World Health Organization analgesic ladder designates the use of opioid analgesics as a treatment for cancer pain with a focus on relieving acute pain from active disease/treatment and for palliative treatment of end-stage disease.^{9,10} As advances in cancer treatment extend longevity and increase survivorship, pain management approaches require personalized adjustments to treat pain both effectively and safely.¹¹ For instance, although long-term opioid therapy persists as an appropriate treatment for some patients, most could benefit from less risky approaches that emphasize self-management.^{5,9} This may be especially true for patients with early-stage disease or a high likelihood of a cure, for whom adverse effects associated with long-term opioid use are more likely.^{9,12,13} Although the physical causes of cancer pain are indisputable, understanding the relative influence of biopsychosocial factors may inform treatment personalization to achieve patient-centered cancer pain management.^{14,15}

Investigating psychosocial variables may elucidate modifiable factors that explain undertreated cancer pain. Studies evaluating the role of biopsychosocial influences in cancer pain have primarily focused on acute postsurgical pain^{16–20} or have been limited to smaller cohorts of patients with a single cancer type (primarily breast cancer).^{21–25} These studies show that patients who have higher symptoms of depression and anxiety or are younger, of non-White race, and less educated report higher levels of pain severity and interference^{4,16,18–23,26–31} Yet to date, few studies have simultaneously evaluated the influence of demographic, disease, and psychosocial risk factors on pain symptoms and prescription opioid use, and even fewer have validated these relationships among diverse samples with chronic pain and cancer. Identifying the relative contributions of modifiable psychosocial factors to cancer pain symptoms and opioid use could help to inform the development of effective and patient-centered cancer pain interventions.

The Collaborative Health Outcomes Information Registry (CHOIR) learning health system is an informatics platform that systematically collects pain-relevant biopsychosocial patient-reported outcome measures throughout the course of patient care.^{32,33} This study used CHOIR data from patients with chronic pain and cancer receiving an initial medical evaluation at the Stanford Pain Management Center, an academic tertiary pain clinic. Our goal was to assess and compare the relative associations of sociodemographic, medical, psychological, and social factors with pain symptoms and active opioid use in a diverse sample of patients with chronic pain and cancer.

MATERIALS AND METHODS

The study was approved by the Stanford University School of Medicine and Dana-Farber Cancer Institute institutional review boards.

Procedures

All patients being seen at the Stanford Pain Management Center in Redwood City, California, complete initial and follow-up surveys within their routine care to assess multiple

dimensions of physical, psychological, and social functioning. Patients with chronic pain are referred to this tertiary pain management center from primary and specialty clinics throughout California, including Stanford's Comprehensive Cancer Center, nationally, and internationally.

Patients complete the CHOIR questionnaires at home, through a secure email link the night before, or on a tablet provided during the check-in for their initial evaluation. Patients complete questionnaires evaluating their demographics, pain symptoms, psychosocial measures, and self-reported medication use. CHOIR is an open-source learning health care system platform (<http://choir.stanford.edu>)^{32,33} and integrates computerized adaptive testing; this allows for fewer items to be tested and yields greater precision in domain assessment. This system affords the ability to comprehensively evaluate biopsychosocial patient-reported outcomes for pain disorders in real-world clinical samples.

From the CHOIR data set, we identified 841 patients with a cancer diagnosis identified through *International Classification of Diseases, Ninth Revision (ICD-9)* claims. One hundred forty-one patients with early-stage nonmelanoma skin cancer, thyroid cancer, or carcinoma in situ were excluded because these conditions are infrequent causes of chronic pain. Our final sample included 700 patients with oncologic diagnoses presenting for an evaluation for chronic pain.

Measures

Sociodemographic and clinical characteristics—Demographic data were extracted from electronic medical records. Patients self-reported their level of education, race, and ethnicity. Cancer types were extracted from electronic medical records with the *ICD-9* codes present in medical claims (2016–2019). We further classified *ICD-9* codes for cancer diagnoses by referencing previously published categories.^{34,35} We characterized a patient's cancer as “poor prognosis” if the *ICD-9* code corresponded to a cancer frequently diagnosed at an advanced stage and/or with a high mortality rate (eg, pancreatic cancer, lung cancer, esophagogastric cancer, or acute myeloid leukemia) or if a nonlymphatic metastatic code was present (1960–1991; 20970–20979).^{36–38} All other patients were considered to have a “good prognosis” cancer.

Physical, psychological, and social factors—The Patient-Reported Outcomes Measurement Information System (PROMIS) is a National Institutes of Health consensus-based framework that includes validated self-reported health measures.³⁹ CHOIR uses PROMIS measures, including Pain Intensity, Pain Interference, and Sleep Disturbance for physical health; Depression, Anxiety, and Anger for psychological factors; and Emotional Support and Social Isolation for social health. PROMIS measures are standardized with a *t* score of 50, which represents the population mean (standard deviation [SD] = 10; range = 0–100). Pain catastrophizing, the magnification of pain-related negative thoughts, was measured with the validated 13-item Pain Catastrophizing Scale.⁴⁰

Pain symptoms and opioid use—Average pain intensity, pain interference, and current opioid use were used as our primary outcomes. Patients self-reported whether they were currently taking opioid and non-opioid pain medications that were prescribed before their

current appointment. The use of opioids, antidepressants, anxiolytics, and gabapentinoids was included because these medications are commonly prescribed analgesics for chronic pain. Patients self-reported opioid use by responding to “Are you currently taking any opioid medications?” (Vicodin, Oxycontin, oxycodone, methadone, morphine, MS-Contin, codeine, Actiq, methadone, Duragesic, Dilaudid, Percocet, Opana, Nucynta, Stadol, Ultram, and Norco). A binomial response (0 or 1) was used to represent the use of each opioid separately. Patients were asked to rate their average, current, and worst pain intensity in the previous 7 days on an 11-point numerical rating scale ranging from 0 (no pain) to 10 (worst possible pain).⁴¹ Pain interference, a clinically meaningful measure identifying the extent to which pain affects an individual’s function, was evaluated with the PROMIS Pain Interference scale.³⁹

Statistical Analysis

Associations between biopsychosocial variables and average pain intensity and pain interference were evaluated with 2 separate hierarchical linear regressions (model building: 1) sociodemographics, 2) clinical characteristics, 3) social factors, and 4) psychological factors). Hierarchical linear regressions were used because this methodology allows for the differentiation of the unique variance explained by a set of independent variables on the outcome, while controlling for the impact of variables previously applied. Models were built by including theoretically modifiable factors later in the progression of analyses. Sociodemographic and disease variables were added in the first 2 steps to isolate their relative effects on pain outcomes. Social and psychological factors were added thereafter to isolate the impact of each factor on pain symptoms while controlling for sociodemographic/disease associations. The relationship between biopsychosocial factors and opioid use was evaluated with a multiple logistic regression model.

All analyses were conducted with SPSS version 26. Data were screened for outliers and missing data with no remarkable findings. All variables were normally distributed. The data met necessary assumptions for hierarchical linear regression and logistic regression analyses.

RESULTS

Participants were 62% female ($n = 436$) and 66% White ($n = 454$), 55% held a college degree ($n = 388$), and the mean age was 59 years ($SD = 15$ years; range = 19–93 years; see Table 1). Patients had a variety of cancer diagnoses. In total, 56.9% ($n = 398$) reported currently using opioids, with a higher rate of patients with a poor prognosis using opioids (62%; $n = 236$) in comparison with those with a good prognosis (49%; $n = 102$) or hematologic/lymph malignancies (55%; $n = 59$; Fig. 1). Patients reported a mean score of 5.4/10 ($SD = 2.33$) for pain intensity and a mean t score of 62.82/100 (t -score, $SD = 7.72$) for pain interference (Fig. 2).

Pain Intensity

Hierarchical linear regression analysis indicated that sociodemographic, disease, social, and psychological variables significantly explained 22% of the total variance in average

pain intensity ($F(5,657) = 22.45$; R^2 change = 0.10, 0.01, and 0.13, respectively; $P \leq .05$), whereas the cancer prognosis did not significantly contribute to this model (Table 2). Psychological factors uniquely explained 13% of the variance in average pain intensity.

In the final model, significant individual contributors to pain intensity included older age, African American or “other” race, higher sleep disturbance, and higher catastrophizing. (Table 3). Sex, prognostic status, and use of gabapentinoids, antidepressants, or anxiolytics were not significantly associated with pain intensity, nor were specific psychosocial factors, including emotional support, social isolation, depression, anxiety, and anger ($P > .05$).

Pain Interference

Hierarchical linear regression analysis indicated that sociodemographic, disease, social, and psychological variables significantly explained 44% of the variance in pain interference ($F(5,653) = 9.47$; R^2 change = 0.4, 0.25, 0.06, and 0.12, respectively; $P \leq .05$, $P \leq .001$, $P \leq .001$, and $P \leq .001$, respectively; Table 2). Prognostic status and medication use accounted for 25% of the variance, and psychological factors uniquely explained 12% of the variance in pain interference.

Greater pain intensity, depression, sleep disturbance, pain catastrophizing, and emotional support as well as gabapentinoid use were significantly associated with greater pain interference (Table 3). Age, sex, education, race, prognostic status, using antidepressants or anxiolytics, social isolation, anxiety, and anger were not significantly associated with pain interference ($P > .05$).

Opioid Use

In multivariable logistic regression analysis, race, clinical characteristics, and sleep were significantly related to higher odds of taking opioid medications. Specifically, having a poor prognosis ($\text{Exp}(B) = 1.62$) versus a good prognosis, taking antidepressants ($\text{Exp}(B) = 1.77$), and greater sleep disturbance ($\text{Exp}(B) = 1.02$) were associated with higher odds of taking opioids (see Table 4). Whites ($\chi^2(df=25) = 97.87$; $P < .001$) had 2.03 ($\text{Exp}(B) = 0.474$; CI, 0.284–0.791) and 2.04 ($\text{Exp}(B) = 0.456$; CI, 0.26–0.801) times higher odds of using opioids than Asians and Hispanics, respectively. The odds of opioid use were 2% higher per unit increase in sleep disturbance, and those with a poor prognosis had 1.6 times the odds of taking opioids than those with a good prognosis. Education, sex, social isolation, and other psychological factors were not significantly related to current opioid use ($P \geq .05$).

DISCUSSION

Among a diverse sample of 700 patients with chronic pain and cancer, we explored biopsychosocial correlates of pain and opioid use. Sociodemographic, psychological, and clinical factors explained some of the interindividual variation in pain intensity (22%) and a greater proportion of the variance in pain interference (44%). Sociodemographic and clinical factors significantly predicted which individuals used opioids, whereas psychological symptoms did not significantly contribute to this association. Patients with poor prognoses had a higher odds of using opioids; this was not unexpected in light of current prescribing recommendations for advanced cancer.¹⁵ Notably, sleep disturbance was the only variable

consistently independently associated with pain severity, pain interference, and opioid use, and this indicated a strong relationship between sleep disturbance and pain treatment.

Using a hierarchical approach, we were able to differentiate the relative contributions of psychological factors in comparison with the impact of sociodemographic and clinical variables. Psychological symptoms, specifically pain catastrophizing and sleep disturbance, were consistently associated with increased pain symptoms. Pain catastrophizing sensitizes pain perception after mastectomy in cancer,¹⁸ yet few studies have evaluated its impact in large, diverse cancer pain samples as demonstrated in our study. Our findings varied somewhat from previous smaller studies identifying depression or anxiety^{16,18,20–23,26,30,31} as being importantly associated with cancer pain severity. Although we found that depression was significantly related to interference, anxiety was not independently associated with either pain severity or interference, and this indicated that pain catastrophizing may be more influential for patients with cancer. Our findings implicate psychosocial factors as being uniquely associated with pain interference above and beyond demographic/clinical characteristics, and they suggest that the impact of pain on function may rely heavily on patients' psychological well-being. This is similar to noncancer pain settings in which psychological treatments that target pain catastrophizing often lead to meaningful improvements in pain-related interference.^{43,44}

Few studies have evaluated the role of sleep disturbance in cancer pain,¹⁶ although sleep disturbance is a common experience with cancer treatment.⁴⁵ We found that when we concurrently evaluated biopsychosocial associations, sleep disturbance was the sole factor associated with pain intensity, interference, and opioid use. Undergoing cancer treatment often results in noteworthy sleep disruption.⁴⁶ The significant impact of psychological factors and sleep on pain intensity and interference suggests that cancer pain treatment could benefit from integrated treatments such as cognitive behavioral therapy for pain and insomnia that concurrently address psychological and sleep symptoms.^{5,47} To better define pain intervention targets, future investigations can explore the complex interrelationships between pain, psychological symptoms, and sleep symptoms that are commonly exacerbated during cancer treatment trajectories.

This sample endorsed higher rates of opioid use in comparison with patients with chronic pain seen at Stanford's pain clinic. Approximately 28% of the total clinic population reported active opioid use (4226 of 14,875 total patients in 2016–2019), whereas 57% did in our current sample. Unsurprisingly, higher rates of opioid use were seen in patients with poor prognoses, and this corresponds to current treatment guidelines for cancer pain.¹⁰ Such use may not be distinctly problematic because patients did not report elevated opioid misuse behaviors, and patients with worse prognoses did not seem to have significantly worse pain; this indicates that opioids may be helpful in managing pain. In this racially diverse sample, our findings also showed that minorities reported significantly greater pain severity but lower rates of opioid use. Although variations in patient-provider dynamics may explain barriers to opioid prescribing,^{48,49} there are striking disparities in pain symptoms and opioid use. It may be the case that minorities in this sample were more hesitant to use opioids^{19,31,50} or that there was an insufficient supply of opioids in their neighborhoods. Psychological symptoms were not directly related to opioid use, and this suggests that

psychological and social symptoms may not be as important in determining opioid use for cancer populations as observed in noncancer pain cohorts.⁵¹ Patients with cancer, especially those with better prognoses and longer life expectancies, may, however, benefit from lower risk therapies. To effectively improve undertreated pain with cancer,¹ pain treatments must acknowledge patient-specific needs and disparities to ensure optimal opioid prescribing and cancer pain care.

An important strength of this study is being one of the first to comprehensively compare the roles of sociodemographic, clinical, and psychosocial factors in pain and opioid use in a large sample of patients with cancer. The diverse demographic and disease makeup of this sample is another strength that allows for greater generalizability in comparison with other evaluations. Additionally, this study used highly validated brief patient-reported outcomes pertinent to clinical pain care.

This study also has several limitations. First, the cross-sectional nature precludes making causal inferences about the reported associations. Many patients are seen for a pain consultation, but not all receive longitudinal care; this limits our ability to evaluate longitudinal outcomes and directionality of effect. For example, it is not clear if being prescribed opioids is a consequence of the identified factors or itself causes the elevation of the identified factors or whether patients have benefitted from opioids. Additionally, disease comorbidities and cancer treatments were not included in our analysis. Such treatments may improve pain, worsen pain, and cause other side effects that increase overall pain expression and opioid use. Future longitudinal studies are required to assess the relationship of sociodemographic and psychosocial factors with changes in pain symptoms, opioid use, and current treatments over time. Importantly, although all patients in this sample had a cancer diagnosis and were being treated for chronic pain, chronicity of pain was not diagnostically confirmed, and these symptoms may not be solely related to their cancer. However, cancer pain management is often complicated by underlying pain disorders predating or unrelated to an individual's cancer diagnosis, and this potentially makes the distinction less important. Determining optimal pain interventions in the presence of multiple pain disorders and a cancer diagnosis remains challenging and may increase the complexity of a patient's pain/opioid management plan. As such, the diversity of our sample acknowledges real-world clinical complexities and can inform such clinical nuances in managing cancer pain. Lastly, other relevant psychosocial factors, including financial, spiritual, and racial distress, were not specifically evaluated, and the rate of African Americans in this sample was low.

Our findings emphasize the need to assess patients' sociodemographic and psychosocial profiles when we are treating chronic pain in cancer because they are related to clinically meaningful differences in pain and opioid use. Providing informed, personalized pain management may be an important step toward reducing disparities in cancer pain treatment. Addressing modifiable psychosocial pain symptoms through targeted behavioral interventions may allow for improved quality of life for patients with cancer.

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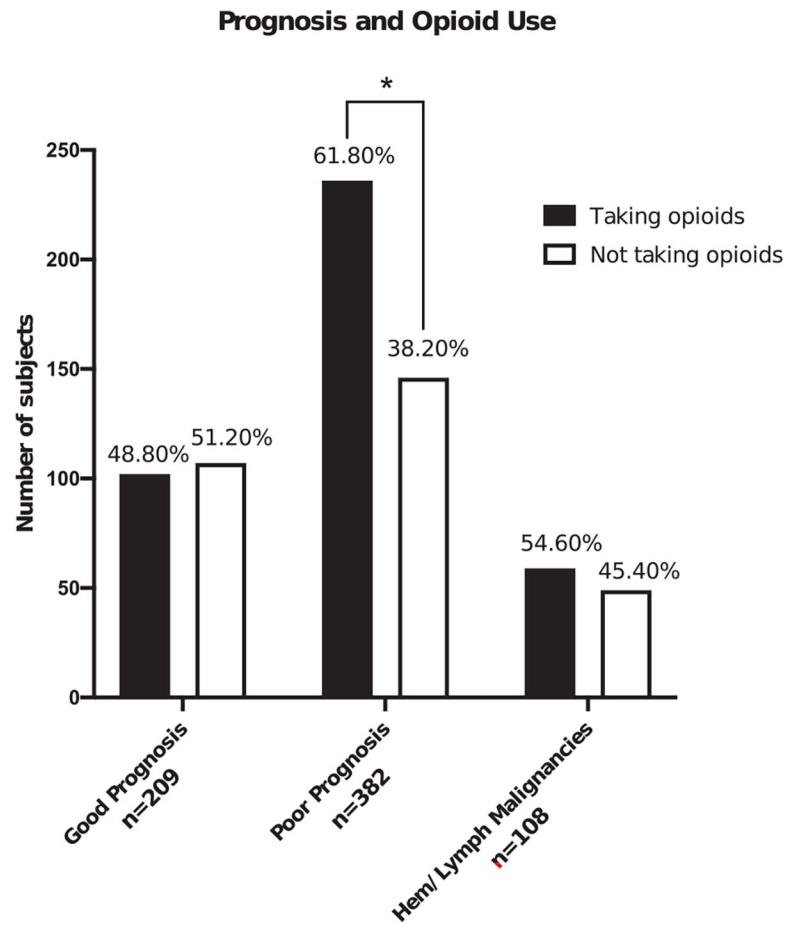


Figure 1.

Frequency of opioid use in patients with chronic pain and cancer. Hem indicates hematologic.

* indicates significance $P \leq 0.05$.

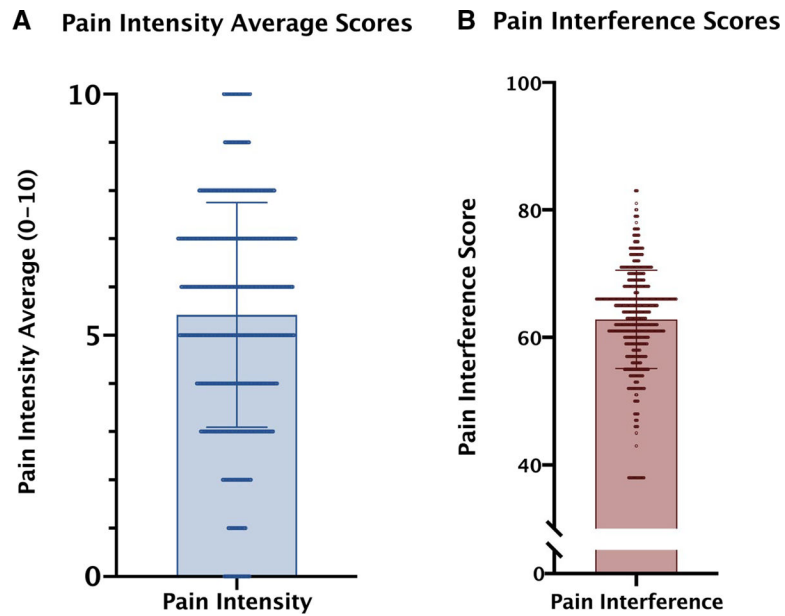


Figure 2.

t scores of patients' self-reported pain scores: (A) pain severity (mean score = 5.42; SD = 2.329; 11-point Likert scale [0–10]) and (B) pain interference (PROMIS Pain Interference measure; mean score = 62.82; SD = 7.721). PROMIS indicates Patient-Reported Outcomes Measurement Information System; SD, standard deviation.

TABLE 1.

Patient Sociodemographic, Disease, Psychosocial, and Pain Factors (n = 700)

Parameter	No. (%)
Age, mean (SD), years	59 (15.3)
Sex	
Female	436 (62.3)
Male	264 (37.7)
Education	
High school	95 (13.6)
Some college	207 (29.6)
Bachelor's degree	182 (26.0)
Master's degree	126 (18.0)
Doctorate	80 (11.4)
Race/ethnicity	
White	454 (65.6)
African American	23 (3.3)
American Indian/Alaska Native	6 (0.90)
Asian	90 (13.0)
Other race	35 (5.1)
Hispanic	84 (12.1)
Disease type	
Breast	141 (20.1)
Hematologic/lymph	109 (15.6)
Bone/connective tissue	72 (10.3)
Colorectal	66 (9.4)
Brain/CNS	53 (7.6)
Genital (male)	43 (6.1)
Thoracic	43 (6.1)
Urologic	38 (5.4)
Genital (female)	34 (4.9)
Head/neck	31 (4.4)
Unknown	27 (3.9)
Liver	22 (3.1)
Melanoma	21 (3.0)
Prognosis	
Good prognosis	209 (29.9)
Poor prognosis	382 (54.6)
Hematologic/lymph	108 (15.4)
Medications	
Gabapentinoid use	179 (25.6)
Antidepressant use	185 (26.4)
Anxiolytic use	121 (17.3)

Opioid use	398 (56.9)	
Aberrant opioid use behaviors		
“Taking more than prescribed”	23 (3.3)	
“Changing the dosing frequency”	25 (3.6)	
“Stockpiling medications for a rainy day”	9 (1.3)	
“Getting additional pills from friends and family”	4 (0.6)	
Currently smoking	33 (4.4)	
	Mean	SD
Pain variables		
Average pain intensity	5.42	2.329
Pain interference	62.82	7.721
Psychosocial variables		
Emotional support	50.52	9.420
Social isolation	45.69	9.006
Satisfactional roles	43.41	9.139
Depression	52.67	9.779
Anxiety	53.90	9.704
Sleep impairment	54.94	9.389
Sleep disturbance	55.19	9.146
Anger	48.26	9.966
Fatigue	57.52	9.399
Pain catastrophizing	20.37	12.335

Abbreviations: CNS, central nervous system; PROMIS, Patient-Reported Outcomes Measurement Information System; SD, standard deviation.

Psychosocial variables were measured with the PROMIS scales and the Pain Catastrophizing Scale. The pain intensity was measured with an 11-point numerical rating scale ranging from 0 (no pain) to 10 (worst possible pain). The aberrant drug-taking behavior scale was adapted from the Potential Aberrant Drug-Related Behavior section of the Pain Assessment and Documentation Tool⁴²: “Are you taking your opioid pain medications any differently than prescribed by your doctor?” (0 = no; 1 = yes).

TABLE 2.

Hierarchical Linear Regression Model Summaries

Dependent Variable	Model No.	Model Variables	Adjusted R^2	$R^2 \Delta$	F Change (df)	P
Pain intensity	1	Sociodemographics	0.082	0.095	7.028 (10,668)	.000
	2	Clinical/medications	0.078	0.004	0.532 (5,663)	.752
	3	Social factors	0.084	0.008	3.059 (2,661)	.048
	4	Psychological factors	0.216	0.125	21.293 (5,656)	.000
Pain interference	1	Sociodemographics	0.020	0.034	2.355 (10,668)	.010
	2	Clinical/medications	0.266	0.249	38.344 (6,662)	.000
	3	Social factors	0.325	0.060	29.885 (2,660)	.000
	4	Psychological factors	0.442	0.118	28.749 (5,655)	.000

TABLE 3.

Final Hierarchical Linear Regressions for Pain Intensity and Pain Interference Outcomes

Dependent Variable	Final Model Variables	Standardized <i>b</i>	<i>t</i> Value
Pain intensity	Sociodemographics		
	Age	0.082 ^a	2.168
	Female	0.056	1.580
	Education		
	College	0.024	0.445
	Bachelor's degree	−0.100	−1.859
	Master's degree	−0.054	−1.085
	Doctorate	−0.103 ^a	−2.207
	Race/ethnicity		
	African American	0.102 ^b	2.881
	Asian	−0.049	−1.346
	Other race	0.081 ^a	2.259
	Hispanic	0.061	1.596
	Clinical/medication factors		
	Prognosis		
	Poor prognosis	0.033	0.817
	Hematologic/lymph	0.011	0.285
	Gabapentinoid use	−0.005	−0.139
	Antidepressant use	−0.013	−0.370
	Anxiolytic use	−0.002	−0.065
	Social factors		
	Emotional support	−0.027	−0.686
	Social isolation	−0.074	−1.461
	Psychological factors		
	Depression	−0.043	−0.655
	Anxiety	0.059	0.873

Dependent Variable	Final Model Variables	Standardized <i>b</i>	<i>t</i> Value
Pain interference	Sleep disturbance	0.148 ^c	3.811
	Anger	−0.024	−0.481
	Pain catastrophizing	0.338 ^c	7.572
	Sociodemographics		
	Age	0.014	0.453
	Female	−0.052	−1.769
	Education		
	Some college	0.044	0.981
	Bachelor's degree	0.015	0.328
	Master's degree	0.01	0.25
	Doctorate	0.019	0.488
	Race/ethnicity		
	African American	0.003	0.094
	Asian	−0.049	−1.607
	Other	−0.03	−0.991
	Hispanic	−0.022	−0.668
	Clinical/medication factors		
	Prognosis		
	Poor prognosis	0.043	1.275
	Hematologic/lymph	0.013	0.386
	Gabapentinoid use	0.094 ^b	3.178
	Antidepressant use	0.02	0.666
	Anxiolytic use	−0.027	−0.912
	Pain intensity (average)	0.348 ^c	10.641
	Social factors		
	Emotional support	0.095 ^b	2.848
	Social isolation	0.048	1.128
	Psychological factors		
	Depression	0.284 ^c	5.091

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Dependent Variable	Final Model Variables	Standardized <i>b</i>	<i>t</i> Value
	Anxiety	0.023	0.407
	Sleep disturbance	0.147 ^c	4.447
	Anger	−0.069	−1.619
	Pain catastrophizing	0.163 ^c	4.181

The reference groups were a high school degree or lower for education, White race for Race, and a good prognosis for current prognosis.

^a*P* ≤.05.

^b*P* ≤.01.

^c*P* ≤.001.

TABLE 4.

Multivariable Logistic Regression for Current Opioid Use

		95% Exp(B) CI			
	Wald	Exp(B)	Lower	Upper	Standard Error
Sociodemographics					
Age	1.839	0.992	0.980	1.004	0.006
Female	2.966	0.734	0.517	1.044	0.179
Education					
College	1.958	1.489	0.853	2.601	0.285
Master's degree	0.507	0.802	0.438	1.471	0.309
Doctorate	1.409	0.657	0.328	1.315	0.354
Bachelor's degree	0.171	1.13	0.633	2.016	0.295
Race					
African American	2.285	0.486	0.191	1.238	0.477
Asian	8.178	0.474 ^a	0.284	0.791	0.261
Other	0.227	0.832	0.39	1.775	0.387
Hispanic	7.456	0.456 ^a	0.26	0.801	0.287
Clinical/medication factors					
Prognosis					
Poor prognosis	6.027	1.616 ^b	1.102	2.37	0.195
Hematologic/lymph	0.293	1.152	0.69	1.926	0.262
Gabapentinoid	1.206	1.245	0.842	1.841	0.200
Antidepressant	7.734	1.772 ^a	1.184	2.651	0.206
Anxiolytic	2.397	1.443	0.907	2.296	0.237
Pain intensity average	3.306	1.077	0.994	1.166	0.041
Social factors					
Emotional support	2.025	1.015	0.994	1.036	0.010
Social isolation	0.005	0.999	0.972	1.026	0.014
Psychological factors					
Depression	2.683	1.028	0.995	1.062	0.017

	Wald	Exp(B)	95% Exp(B) CI		Standard Error
			Lower	Upper	
Anxiety	0.457	0.988	0.955	1.022	0.017
Sleep disturbance	4.249	1.022 ^b	1.001	1.043	0.01
Anger	2.134	1.018	0.994	1.044	0.013
Pain catastrophizing	0.285	1.005	0.987	1.023	0.009

The reference groups were a high school degree or lower for education, White race for Race, and a good prognosis for Prognosis.

^a $P \leq .01$.

^b $P \leq .05$.