Social Determinants of Health Among Individuals Receiving Opioids for Pain Management

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Objective: Individuals receiving opioids for pain management are at risk for negative outcomes. However, it is not clear whether social determinants of health (SDOH) predict outcomes a year after starting a prescription opioid. The purpose was to examine associations between SDOH with psychiatric-related, pain-related, and opioid-related outcomes at a 12-month follow-up.

Methods: Participants (N = 783) with a new period of 30 to 90-day opioid use completed baseline and 12-month follow-up questionnaires regarding SDOH, depressive symptoms, pain severity, pain interference, and opioid use. Multivariate adjusted models estimated the association between SDOH and outcomes.

Results: Participants had a mean age of 53.4 years (SD = 11.9), 71.2% White race, and 69.9% women. Older age (OR = 0.97; 0.95, 0.99) and Black race (OR = 0.45; 0.27, 0.76) were inversely associated with depression, while being widowed/divorced/separated (OR = 1.72; 1.01, 2.91) and lacking a college education (OR = 2.43; 1.25, 4.73) were positively associated with depression. Women (OR = 1.56; 1.12, 2.18) and lower income (OR = 2.09; 1.14, 3.85) were associated with greater odds of opioid use, while unemployment was associated with lower odds of opioid use at 12 months (OR = 0.55; 0.34, 0.89). Older age (OR = 0.95; 0.91, 0.99) was inversely associated with opioid use concerns while disability (OR = 4.59; 1.60, 13.11) was positively associated.

Discussion: Several SDOH variables were associated with poorer functioning at baseline and 12 months after individuals were prescribed an opioid. It may be useful for clinicians to screen for SDOH to identify higher-risk individuals.

Key Words: pain, opioid use, depression, race, social determinants of health

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Changes in guidelines for opioid prescribing have led to a reduction in opioid prescriptions; however, many patients continue to receive and use opioids long-term to manage noncancer chronic pain.[1] Long-term use of opioids to manage chronic pain is associated with negative health outcomes, such as new-onset depression,[2,3] opioid use disorder,[4] and overdose and/or death.[5] According to the biopsychosocial model of pain,[6] social (eg, economics and discrimination) and psychological (eg, depression) factors are thought to contribute to patients' perceptions of pain, which, in turn, may be associated with opioid use and related health outcomes. In this context, examining factors contributing to long-term opioid use is important for developing prevention and intervention methods to reduce negative opioid-related outcomes.

Social determinants of health (SDOH) are nonmedical factors that are associated with health outcomes.[7] There are a variety of factors that fall under the SDOH umbrella, including social contexts (ie, discrimination due to sex/gender or race/ethnicity, social support), education level, and economic status (ie, income, employment status/disability) all of which may influence perceptions of pain as well as long-term opioid use and other associated outcomes.[8] Marginalized social or economic experiences (eg, discrimination due to race/ethnicity, poverty, lack of social support, employment status) may contribute to more severe ratings of pain through psychological pathways, such as perceived injustice,[9] psychiatric diagnoses,[10] and/or biological pathways, such as through epigenetic changes to pain processing systems.[11] Further, there are well-documented disparities in both pain severity and opioid prescribing patterns, such that patients who are women, have lower socioeconomic status (SES), and/or from racially minoritized backgrounds are more likely to endorse severe pain or pain-related psychological factors but are less likely to receive opioid prescriptions compared with men, higher SES, and/or White patients.[12–17] Yet there are also growing disparities among some groups in misuse of opioids and associated outcomes (eg, overdose and death).[18,19] Specifically, in recent years, Black men and women are more likely to overdose and/or die from opioid misuse than White men

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and women, respectively.[18,19] Similarly, widowed individuals and individuals with lower SES (eg, on disability, unemployed) are more likely to have fatal overdoses than married individuals or those with higher SES.[20] Despite these disparities, psychiatric-related and pain-related outcomes of new opioid prescriptions in these populations over time remain relatively understudied.

Identifying SDOH that are relevant to opioid use and related pain and psychiatric outcomes may inform safer opioid prescribing practices. By using a large, racially and socioeconomically diverse sample from 2 large hospital systems in Midwestern metro areas, the present study will extend prior findings by considering multiple SDOH exposures and multiple prescription opioid outcomes in the same cohort. In addition, prior work has typically been correlational and examined individuals who already have long-term use or misuse. A prospective, longitudinal examination of individuals who are initiating a new opioid prescription would shed light on predictors of who may be at greater risk of developing adverse pain-related, psychiatric-related, and opioid-related outcomes after beginning a new opioid prescription. This study sought to examine associations between SDOH with pain-related, psychiatric-related, and opioid-related outcomes at baseline and at a 12-month follow-up to inform safer opioid prescribing.

METHODS

Participants and Procedures

This study was a part of a larger project, which was an examination of mental health outcomes among individuals with a new prescription for an opioid for pain management.[21,22] Patients were eligible to participate if they had a new period of prescription opioid use (ie, 30 to 90 d) from a provider at 1 of the 2 participating health systems (Henry Ford Health in Detroit and Saint Louis University in Missouri). Patients were excluded if they had a cancer diagnosis (to ensure the focus was on noncancer pain) or if they had opioid use in the 3 months before the current opioid prescription (to ensure that this was a new opioid prescription). Each participating health system identified potential participants through electronic health records on a weekly basis and eligibility was confirmed through brief screening. Participants provided informed consent and completed baseline measures through Research Electronic Data Capture (REDCap), a web-based platform, or with a trained interviewer by phone. Participants also completed measures through REDCap 12 months following the baseline. Study details have been previously published.[21,22] This study was approved by each of the participating Institutional Review Boards and participants provided informed consent. Participants were compensated for each assessment they completed.

Measures

Social Determinants of Health Variables

Participants self-reported age, gender, race, marital status, employment/disability status, income category, and level of education.

Depression

The depression section of the Semi-structured Assessment for the Genetics of Alcoholism (SSAGA) was adapted for REDCap and used to assess whether a participant met DSM-IV criteria for a major depressive episode over the past year.[23] It was used to measure depression at the 12-month follow-up.

Pain Variables

The Brief Pain Inventory (BPI) was used to measure pain severity and pain interference at the 12-month follow-up.[24] Four items were averaged to create a composite score of pain severity: worst pain in the last 30 days, least pain in the last 30 days, average pain, and current pain. Each item was measured on a 0 (no pain) to 10 scale (pain as bad as you can imagine). Participants were categorized as having severe pain if the score was 7 or greater. Pain interference was also an average of ratings across 7 activities of daily living (general activity, mood, walking ability, normal work, relationships, sleep, and enjoyment of life). Participants rated each activity on a 0 (does not interfere) to 10 scale (completely interferes) for the past 30 days. Participants were categorized as having high pain interference if the score was 8 or greater. The cutoffs for severe pain and high pain interference were based on the distribution of the scores among the sample.

Opioid Variables

Opioid-related variables were measured at the 12-month follow-up. Participants were asked whether they used a prescription opioid in the past 90 days. Those who denied a prescription opioid in the past 90 days were categorized as "no opioid use," and those who reported using a prescription opioid were categorized as having opioid use at the 12-month follow-up. Individuals also reported on the number of days per week they use the opioid. Participants were categorized as "daily use" if they reported using the opioid 7 days per week and were categorized as nondaily use if they reported fewer than 7 days. Participants were also categorized as having higher (≥ 50) or lower (< 50) daily morphine milligram equivalents (MME). Concerns about opioid use were measured with the Concerns subscale on the Prescription Opioids Difficulties Scale (PODS).[25] The Concerns subscale consists of 7 items rated on a 0 to 4 point scale. Participants were considered to have a positive score (ie, a greater likelihood of opioid use problems) if they had a score of 16 or greater.[25]

Analyses

Descriptive statistics and frequencies were conducted for all variables. Multivariate logistic regression models estimated the association between SDOH and odds of severe pain, high pain interference, opioid use, problem opioid use, MME ≥ 50, and depression at the 12-month follow-up (OR; 95% CI). Multivariate regression models estimated the association between SDOH and continuous variables (eg, pain severity and pain interference). Multivariate models simultaneously adjusted for all SDOH variables.

RESULTS

Participant characteristics are presented in Table 1. There were 1047 individuals who enrolled in the study and completed baseline measures. Of these, 783 participants (74.8%) completed the 12-month follow-up measures. Participants were primarily women (69.9%) and White (71.2%) and had a mean age of 53.4 years (SD = 11.9). There were significant differences between those who completed and did not complete the 12-month follow-up. Individuals

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TABLE 1. Participant Characteristics of Those Who Completed and Did Not Complete the 12-Month Follow-Up

Characteristic	Category	Completed follow-up (n = 783) % (n)	Did not complete (n = 264) % (n)	*P*
Age (at baseline)	Mean (SD)	53.4 (11.9)	50.9 (12.0)	0.003
Gender	Man	30.1 (235)	40.5 (107)	0.002
	Woman	69.9 (545)	59.5 (157)	
Race	White	71.2 (548)	68.2 (178)	0.047
	Black	24.3 (187)	29.9 (78)	
	Other	4.5 (35)	1.9 (5)	
Marital status	Married/live with partner	52.4 (405)	42.5 (111)	0.017
	Never married	18.1 (140)	23.8 (62)	
	Widow/Div/Sep	29.5 (228)	33.7 (88)	
Employment	Disability due to pain	20.7 (161)	20.2 (53)	< .001
	Disability other reason	12.6 (98)	12.9% (34)	
	No work now	18.9 (147)	30.8 (81)	
	Retired	19.8 (154)	15.2 (40)	
	Working now	27.9 (217)	20.9 (55)	
Income	< $20,000	29.5 (216)	44.6 (111)	< .001
	$20,000-$49,999	27.2 (199)	25.3 (63)	
	$50,000-99999	25.7 (188)	20.1 (50)	
	$100K +	17.6 (129)	10.0 (25)	
Education	No college	27.7 (217)	39.8 (105)	< .001
	Some college	47.1 (368)	45.5 (120)	
	Bachelor's or higher	25.2 (197)	14.8 (39)	

more likely to complete the follow-up were older, women, White, married, retired or working, and had a higher income and educational attainment.

Depression

At baseline, 22.5% of participants had depression (Table 2). Individuals who were older and Black had lower odds of depression (Table 3). At the 12-month follow-up, 18.3% had depression (Table 2). At the 12-month follow-up, individuals who were older and Black had lower odds of depression while individuals who were widowed/divorced/separated and lacking a college education had greater odds of depression (Table 4).

Pain Variables

At baseline, nearly 30% reported severe pain (Table 2). Women, Black participants, those who were not married or lived with a partner, had disability due to pain, lower income, and lacking college education were more likely to have higher pain severity (Table 3). Approximately 25% of participants reported severe pain at the 12-month follow-up (Table 2). Women, Black participants, disability due to pain, low income, and lacking college education were each positively associated with having severe pain at the 12-month follow-up (Table 4).

Nearly one-third of participants endorsed high pain interference at baseline (Table 2). At baseline, individuals who were not working and those who did not have a Bachelor's degree were more likely to have higher pain interference (Table 3). There were 132 participants (16.9%) who had high pain interference at the 12-month follow-up. Women, individuals with disability or who were retired, lower income, and lacking college education were more likely to have higher pain interference at the 12-month follow-up (Table 4).

TABLE 2. Descriptives of Outcome Variables at Baseline and the 12-Month Follow-Up

Outcome	Baseline % (n)	12-month follow-up % (n)
Depression	22.5 (176)	18.3 (143)
Pain severity (mean, SD)	5.9 (1.7)	5.1 (2.3)
Severe pain	29.2 (228)	24.4 (191)
Pain interference (mean, SD)	6.7 (2.2)	4.8 (2.8)
High pain interference	32.6 (255)	16.9 (132)
Any opioid use	100 (783)	55.7 (436)
Daily opioid use	67.2 (516)	27.5 (210)
Daily morphine milligram equivalent ≥ 50	17.4 (120)	5.6 (41)
Concerns about opioid use	17.4 (135)	10.1 (40)*

*Only those who reported opioid use at 12 months were given the PODS.

Opioid Variables

Due to the eligibility criteria, all participants were using opioids at baseline. More than half of participants (55.7%) reported opioid use at the 12-month follow-up (Table 2). At the 12-month follow-up, women and individuals with lower income had greater odds of opioid use, while unemployment was associated with lower odds of opioid use at 12 months (Table 4).

Two-thirds of participants endorsed daily opioid use at the baseline assessment (Table 2). Black participants had lower odds of daily opioid use at baseline, whereas those with disability or not working had greater odds of daily opioid use (Table 3). Overall, 27.5% were daily opioid users at 12-month follow-up. Of the individuals who reported opioid use at the 12-month follow-up, nearly half (48.2%, n = 210) reported daily opioid use (Table 2). Individuals with disability due to pain and lower income had greater odds of daily (vs. not-daily) opioid use (Table 4).

Approximately 17% of individuals reported using a high level of MME (≥ 50) at baseline, whereas only 6% had high MME at the 12-month follow-up (Table 2). Black participants had lower odds of high MME use at baseline, whereas those with a disability for a reason other than pain

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TABLE 3. Associations of SDOH Variables With Depression, Pain-Related, and Opioid-Related Outcomes at Baseline

SDOH variable	Category	Depression aOR (95% CI)	Pain severity score Beta (95% CI)	Pain interference score Beta (95% CI)	Daily opioid use aOR (95% CI)	Daily MME ≥50 aOR (95% CI)	Concerns about opioid use aOR (95% CI)
Age	Continuous	0.95 (0.94-0.97)*	0.00 (−0.01 to 0.01)	−0.03 (−0.04 to −0.01)	1.00 (0.98-1.02)	1.00 (0.97-1.02)	0.99 (0.97-1.01)
Gender	Women	1.48 (0.96-2.28)	0.45 (0.20- 0.71)*	0.03 (−0.30 to 0.36)	0.68 (0.47-1.00)	0.74 (0.47-1.16)	0.98 (0.64-1.52)
Race	White	ref	ref	ref	ref	ref	ref
	Black	0.55 (0.35-0.89)*	0.50 (0.22- 0.79)*	0.25 (−0.12 to 0.62)	0.51 (0.34-0.76)*	0.49 (0.27-0.89)*	0.84 (0.51-1.39)
	Other	0.82 (0.33-2.00)	0.18 (−0.42 to 0.78)	0.35 (−0.43 to 1.12)	0.72 (0.31-1.63)	1.06 (0.41-2.76)	1.72 (0.72-4.11)
Marital Status	Married/live with partner	ref	ref	ref	ref	ref	ref
	Never married	1.09 (0.61-1.93)	−0.41 (−0.78 to −0.05)*	−0.26 (−0.73 to 0.22)	0.94 (0.55-1.59)	1.22 (0.62-2.41)	0.74 (0.39-1.43)
	Widow/Div/Sep	1.55 (0.95-2.54)	−0.38 (−0.69 to −0.07)*	−0.02 (−0.43 to 0.38)	0.89 (0.57-1.38)	1.27 (0.73-2.24)	0.96 (0.57-1.62)
Employment	No work now	1.18 (0.67-2.10)	−0.05 (−0.41 to 0.31)	1.00 (0.53- 1.47)*	3.28 (1.91-5.64)*	1.54 (0.80-2.96)	1.84 (0.99-3.43)
	Disability due to pain	1.72 (0.97-3.05)	0.44 (0.08- 0.79)*	1.55 (1.09- 2.01)*	2.32 (1.41-3.83)*	1.16 (0.60-2.25)	2.14 (1.17-3.91)*
	Disability other reason	1.22 (0.62-2.42)	0.26 (−0.16 to 0.69)	1.05 (0.50- 1.60)*	2.05 (1.12-3.73)*	1.23 (0.56-2.69)	1.05 (0.46-2.39)
	Retired	1.94 (1.00-3.79)	−0.18 (−0.56 to 0.21)	0.88 (0.38- 1.38)*	1.65 (0.97-2.81)	1.44 (0.71-2.90)	2.03 (1.04-3.94)*
	Working now	ref	ref	ref	ref	ref	ref
Income	< $20,000	1.80 (0.85-3.78)	1.34 (0.87- 1.80)*	0.54 (−0.06 to 1.14)	1.20 (0.61-2.34)	0.70 (0.31-1.58)	0.78 (0.36-1.69)
	$20,000-$49,999	1.01 (0.50-2.00)	0.98 (0.56- 1.39)*	0.37 (−0.17 to 0.91)	1.40 (0.77-2.55)	0.89 (0.43-1.81)	1.00 (0.51-1.95)
	$50,000-99999	1.05 (0.56-1.97)	0.27 (−0.10 to 0.64)	0.12 (−0.37 to 0.60)	0.97 (0.57-1.64)	0.69 (0.36-1.34)	0.87 (0.47-1.59)
	$100K +	ref	ref	ref	ref	ref	ref
Education	No college	0.83 (0.46-1.48)	0.72 (0.36- 1.09)*	0.49 (0.01- 0.96)*	1.08 (0.65-1.80)	1.00 (0.53-1.90)	0.80 (0.43-1.47)
	Some college	0.97 (0.59-1.60)	0.49 (0.18- 0.80)*	0.60 (0.20- 1.00)*	1.35 (0.88-2.09)	0.89 (0.51-1.54)	0.87 (0.52-1.46)
	Bachelor or higher	ref	ref	ref	ref	ref	ref

*$P < 0.05$.
All analyses were adjusted for the SDOH variables.

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TABLE 4. Associations of SDOH Variables with Depression, Pain-Related, and Opioid-Related outcomes at the 12-Month follow-Up

SDOH variable	Category	Depression aOR (95% CI)	Pain severity score Beta (95% CI)	Pain interference score Beta (95% CI)	Any opioid use aOR (95% CI)	Daily opioid use aOR (95% CI)	Daily MME ≥ 50 aOR (95% CI)	Concerns about opioid use aOR (95% CI)
Age	Continuous	0.97 (0.95-0.99)*	−0.01 (−0.03 to 0.01)	−0.02 (−0.04 to 0.00)	0.99 (0.98-1.01)	0.99 (0.97-1.01)	0.98 (0.95-1.01)	0.95 (0.91-0.99)*
Gender	Women	1.55 (0.97-2.48)	0.72 (0.38-1.06)*	0.62 (0.20- 1.05)*	1.56 (1.12-2.18)*	2.11 (1.25-3.57)*	1.47 (0.65-3.34)	0.83 (0.34-2.00)
Race	White	ref	ref	ref	ref	ref	ref	ref
	Black	0.45 (0.27-0.76)*	0.42 (0.05-0.79)*	−0.23 (−0.70 to 0.24)	0.83 (0.57-1.21)	1.17 (0.72-1.90)	0.60 (0.25-1.46)	0.69 (0.27-1.75)
	Other	0.55 (0.19-1.56)	−0.04 (−0.82 to 0.74)	−0.07 (−1.05 to 0.91)	1.53 (0.67-3.51)	2.17 (0.89-5.27)	1.60 (0.43-5.93)	0.59 (0.11-3.11)
Marital Status	Married/live with partner	ref	ref	ref	ref	ref	ref	ref
	Never married	1.32 (0.72-2.41)	−0.27 (−0.75 to 0.21)	−0.24 (−0.85 to 0.36)	0.75 (0.46-1.21)	1.02 (0.54-1.92)	1.77 (0.63-4.97)	2.26 (0.76-6.73)
	Widow/Div/Sep	1.72 (1.01-2.91)*	−0.21 (−0.62 to 0.19)	0.20 (−0.31 to 0.71)	0.77 (0.51-1.16)	1.12 (0.64-1.96)	1.53 (0.61-3.88)	2.73 (1.00-7.42)
Employment	No work now	0.90 (0.50-1.62)	0.25 (−0.22 to 0.73)	0.52 (−0.08 to 1.12)	0.55 (0.34-0.89)*	0.92 (0.44-1.96)	0.96 (0.28-3.24)	1.35 (0.40-4.53)
	Disability due to pain	0.82 (0.45-1.50)	0.77 (0.30- 1.23)*	1.44 (0.86- 2.02)*	0.81 (0.51-1.29)	2.70 (1.40-5.21)*	2.46 (0.87-6.99)	4.59 (1.60-13.11)*
	Disability other reason	0.79 (0.39-1.60)	0.39 (−0.17 to 0.94)	1.01 (0.31- 1.71)*	0.92 (0.52-1.61)	2.10 (0.99-4.45)	3.24 (1.04-10.13)*	0.95 (0.22-4.14)
	Retired	0.68 (0.32-1.44)	0.10 (−0.41 to 0.60)	0.68 (0.04- 1.31)*	0.76 (0.46-1.26)	1.40 (0.62-3.17)	2.10 (0.61-7.25)	3.11 (0.80-12.12)
	Working now	ref	ref	ref	ref	ref	ref	ref
Income	< $20,000	1.63 (0.69-3.81)	1.68 (1.07- 2.28)*	1.54 (0.78- 2.30)*	2.09 (1.14-3.85)*	3.85 (1.30-11.45)*	1.00 (0.25-3.97)	0.52 (0.11-2.51)
	$20,000-$49,999	1.43 (0.65-3.14)	1.10 (0.56- 1.65)*	1.22 (0.54- 1.90)*	1.84 (1.07-3.17)*	3.10 (1.09-8.81)*	1.01 (0.28-3.62)	1.51 (0.38-6.00)
	$50,000-99999	1.57 (0.76-3.25)	0.49 (0.00- 0.98)	0.48 (−0.13 to 1.10)	1.18 (0.72-1.91)	2.19 (0.78-6.15)	1.02 (0.31-3.30)	1.13 (0.29-4.42)
	$100K +	ref	ref	ref	ref	ref	ref	ref
Education	No college	2.43 (1.25-4.73)*	0.97 (0.49- 1.45)*	0.70 (0.10- 1.30)*	0.69 (0.43-1.11)	3.08 (1.40-6.77)*	0.63 (0.21-1.91)	1.31 (0.38-4.53)
	Some college	1.72 (0.95-3.12)	0.54 (0.14- 0.95)*	0.56 (0.05- 1.07)*	1.03 (0.69-1.55)	2.60 (1.24-5.44)*	1.27 (0.53-3.02)	1.60 (0.59-4.33)
	Bachelor or higher	ref	ref	ref	ref	ref	ref	ref

*$P < 0.05$
All analyses were adjusted for the SDOH variables.

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were more likely to have high MME compared with those who were working at the 12-month follow-up (Tables 3 and 4).

At baseline, about 17% of participants reported concerns about opioids as measured by the PODS (Table 2). Individuals with disability due to pain or those who were retired had greater odds of having concerns compared with those who were working (Table 3). Among those who were using an opioid at the 12-month follow-up, ~1 in 10 participants reported concerns about opioids. Individuals who were older had lower odds of opioid use concerns, while those with disability due to pain had greater odds (Table 4).

DISCUSSION

The purpose of this study was to examine whether SDOH variables (ie, age, gender, race, marital status, employment status, income, and education level) were associated with pain-related, psychiatric-related, and opioid-related outcomes at baseline and ~12-months after a period of new prescription opioid use. This study was novel in that it prospectively examined the independent associations of several SDOH variables among individuals who were receiving a new opioid prescription. The eligible sample was selected to be at higher risk for long-term opioid therapy because we required potential participants to have 30 to 90 days of prescribed opioids to be eligible for the study.

Several demographic variables were associated with outcomes at baseline and at 12 months after opioid prescription initiation, including age, gender, and race. Individuals who were younger were at increased risk for experiencing depression at baseline and the follow-up; however, having concerns regarding their opioid use was only significant at the follow-up. Past work has found high rates of opioid misuse among younger and middle-aged adults,[26,27] and despite newer opioid prescription guidelines, findings from this study suggests that this pattern may still exist.

Women were more likely to have greater pain severity at baseline and the 12-month follow-up, but were also likely to report higher pain interference, persistent opioid use, and daily opioid use at the 12-month follow-up compared with men. This is consistent with prior studies suggesting that women experience greater pain severity and interference and also suggests that women may be at greater risk for persistent opioid use.[28,29] Though prior work has suggested that women may be at increased risk for comorbid pain and depression,[30] the current study did not find a significant association between gender and depression. The relationship between gender and depression may be attenuated when accounting for other SDOH.

Black participants were less likely to have depression, yet were more likely to report higher pain severity at both baseline and the 12-month follow-up. In addition, Black individuals were less likely to have daily opioid use and high MME at baseline, but this was no longer significant at the follow-up. Though it has previously been found that Black patients report significantly higher pain severity than White patients and are more likely to have inadequate pain management,[14,31] this study differed from prior work in that Black patients with chronic noncancer pain were less likely to have comorbid depression than White patients.[30] Despite a ower risk of depression among Black patients, these patients had a higher risk for reporting severe pain, suggesting that alternative mechanisms aside from depression may better explain pain-related disparities in this group. Further, the measure of depression was limited to meeting the DSM-IV criteria for major depressive disorder as measured by the SSAGA, and the SSAGA may underestimate the prevalence of depression among Black adults.[32] It may be that other social/psychological experiences, such as discrimination or beliefs about pain, are more relevant to Black participants' pain experiences than depression.[33,34]

Marital status was generally not associated with outcomes. Though social support has previously been identified with better psychiatric outcomes among individuals with pain,[35] marital status may not be an appropriate proxy of social support. Future work should consider examining perceived social support, as this may be associated with outcomes, and if so, could be a potential target of intervention.

Socioeconomic variables independently associated with poorer outcomes included employment status (ie, disability due to pain), lower income, and lower education levels. Individuals who were in these categories were generally more likely to have poorer pain outcomes and were more likely to have daily opioid use at the 12-month follow-up. Those who are considered to have marginalized economic status are at greater risk for chronic pain,[36] and this study suggests that risk for poorer longer-term pain and opioid outcomes (ie, pain severity, interference, and persistent opioid use) may also be higher. Those with lower education may have more physically-intensive occupations or positions in which repetitive movements are a focus, which could exacerbate pain and lead to increased opioid use.[37] Moreover, pain could also bidirectionally contribute to disability status and lower income. Finally, access to nonpharmacological pain interventions are limited to those with access (ie, time and financial), which could also explain the poorer long-term pain and opioid outcomes.[38]

There are several limitations of this study that are important to note. Approximately 25% of participants did not complete the 12-month follow-up. There were significant differences between those who completed and did not complete the follow-up, which may have impacted results. It is possible that those who did not participate in the 12-month follow-up had poorer outcomes at 12-months, which interfered with their participation. However, using multiple imputation within this data set to address missing values produced the same results, which mitigates this concern.[39,40] In addition, we did not directly ask about nonprescribed opioid use. Findings may differ for nonprescribed or illicit opioid use. Finally, though we recruited a sample with good representation of socioeconomic, educational, and occupational diversity from 2 health care systems, most were White and women and as such, findings may not generalize to all patients receiving a new opioid prescription.

In conclusion, there are SDOH that are associated with increased vulnerability to negative outcomes around the time of a new opioid prescription that also continue to exist ~12-months after a new period of prescription opioid use. Providers who are prescribing opioids for pain management may want to consider evaluating SDOH variables. Though decreasing opioid prescriptions among certain subgroups could increase the disparities in pain management,[41] closer monitoring of patients could be useful. More specifically, individuals who are younger,

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female, and of marginalized economic status may benefit from closer monitoring of their pain, depression, and opioid use while receiving a prescription opioid to examine for negative factors. Patients can be referred to non-pharmacological pain management treatments to help optimize pain or psychiatric outcomes while decreasing reliance on opioids (ie, psychotherapy and physical therapy). Future research should examine methods to increase access to nonopioid treatments, as those who may benefit from these are also the individuals who may have more difficulty accessing such treatments. Future work could also evaluate whether routine screening of SDOH and monitoring of patients could lead to better outcomes.

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REFERENCES

1. Bohnert ASB, Guy Jr GP, Losby JL. Opioid prescribing in the United States before and after the Centers for Disease Control and Prevention's 2016 opioid guideline. *Ann Intern Med*. 2018; 169:367–375.
2. Scherrer JF, Salas J, Copeland LA, et al. Prescription opioid duration, dose, and increased risk of depression in 3 large patient populations. *Ann Fam Med*. 2016;14:54–62.
3. Scherrer JF, Salas J, Miller-Matero LR, et al. Long-term prescription opioid users' risk for new-onset depression increases with frequency of use. *Pain*. 2022;163:1581–1589.
4. Von Korff M, Walker RL, Saunders K, et al. Prevalence of prescription opioid use disorder among chronic opioid therapy patients after health plan opioid dose and risk reduction initiatives. *Int J Drug Policy*. 2017;46:90–98.
5. Franklin GM. Opioids for chronic noncancer pain: a position paper of the American Academy of Neurology. *Neurology*. 2014;83:1277–1284.
6. Gatchel RJ, Peng YB, Peters ML, et al. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull*. 2007;133:581.
7. Town M, Eke P, Zhao G, et al. Racial and ethnic differences in social determinants of health and health-related social needs among adults—Behavioral Risk Factor Surveillance System, United States, 2022. *MMWR Morb Mortal Wkly Rep*. 2024;73: 204–208.
8. Do VM, Simpson S, Fisch KM, et al. Associations between social determinants of health and opioid-use disorder among chronic pain patients from a multi-institutional dataset. *Anesthes Analg*. 2024;10:1213; in press.
9. Carriere JS, Donayre Pimentel S, Yakobov E, et al. A systematic review of the association between perceived injustice and pain-related outcomes in individuals with musculoskeletal pain. *Pain Med*. 2020;21:1449–1463.
10. Hammett PJ, Eliacin J, Saenger M, et al. The association between racialized discrimination in health care and pain among black patients with mental health diagnoses. *J Pain*. 2024;25:217–227.
11. Aroke EN, Joseph PV, Roy A, et al. Could epigenetics help explain racial disparities in chronic pain? *J Pain Res*. 2019;12: 701–710.
12. Joynt M, Train MK, Robbins BW, et al. The impact of neighborhood socioeconomic status and race on the prescribing of opioids in emergency departments throughout the United States. *J Gen Intern Med*. 2013;28:1604–1610.
13. Lacey RJ, Belcher J, Croft PR. Does life course socio-economic position influence chronic disabling pain in older adults? A general population study. *Eur J Public Health*. 2013;23: 534–540.
14. Mossey JM. Defining racial and ethnic disparities in pain management. *Clin Orthop Rltd Res*. 2011;469: 1859–1870.
15. Overstreet DS, Pester BD, Wilson JM, et al. The experience of BIPOC living with chronic pain in the USA: biopsychosocial factors that underlie racial disparities in pain outcomes, comorbidities, inequities, and barriers to treatment. *Curr Pain Headache Rep*. 2023;27:1–10.
16. Thurston KL, Zhang SJ, Wilbanks BA, et al. A systematic review of race, sex, and socioeconomic status differences in postoperative pain and pain management. *J Perianesth Nurs*. 2023;38:504–515.
17. Zajacova A, Grol-Prokopczyk H, Fillingim R. Beyond Black vs White: racial/ethnic disparities in chronic pain including Hispanic, Asian, Native American, and multiracial US adults. *Pain*. 2022;163:1688–1699.
18. Britz JB, O'Loughlin KM, Henry TL, et al. Rising racial disparities in opioid mortality and undertreatment of opioid use disorder and mental health comorbidities in Virginia. *AJPM focus*. 2023;2:100102.
19. Lynch S, Katkhuda F, Klepacz L, et al. Racial disparities in opioid use disorder and its treatment: a review and commentary on the literature. *J Ment Health Clin Psychol*. 2023;7:13–18.
20. Altekruse SF, Cosgrove CM, Altekruse WC, et al. Socio-economic risk factors for fatal opioid overdoses in the United States: findings from the Mortality Disparities in American Communities Study (MDAC). *PLoS One*. 2020;15:e0227966.
21. Scherrer JF, Ahmedani B, Autio K, et al. The prescription opioids and depression pathways cohort study. *J Psychiat Brain Sci*. 2020;5:e200009.
22. Secrest S, Miller-Matero LR, Chrusciel T, et al. Baseline characteristics from a new longitudinal, United States, cohort of patients with non-cancer pain and chronic opioid use. *J Pain*. 2024;25:984–999.
23. Bucholz KK, Cadoret R, Cloninger CR, et al. A new, semi-structured psychiatric interview for use in genetic linkage studies: a report on the reliability of the SSAGA. *J Stud Alcohol*. 1994;55:149–158.
24. Cleeland CS, Ryan K. The Brief Pain Inventory. *Pain Res Group*. 1991;20:143–147.
25. Banta-Green CJ, Von Korff M, Sullivan MD, et al. (The Prescribed Opioids Difficulties Scale: a patient-centered assessment of problems and concerns. *Clin J Pain*. 2010;26:489
26. Han BH, Sherman SE, Palamar JJ. Prescription opioid misuse among middle-aged and older adults in the United States, 2015–2016. *Prev Med*. 2019;121:94–98.
27. Jordan AE, Blackburn NA, Des Jarlais DC, et al. Past-year prevalence of prescription opioid misuse among those 11 to 30 years of age in the United States: a systematic review and meta-analysis. *J Subst Abuse Treat*. 2017;77:31–37.
28. Barry DT, Pilver C, Potenza MN, et al. Prevalence and psychiatric correlates of pain interference among men and women in the general population. *J Psychiatr Res*. 2012;46: 118–127.
29. Osborne NR, Davis KD. Sex and gender differences in pain. *Int Rev Neurobiol*. Elsevier; 2022;164:277–307.
30. Miller LR, Cano A. Comorbid chronic pain and depression: who is at risk? *J Pain*. 2009;10:619–627.
31. Chen I, Kurz J, Pasanen M, et al. Racial differences in opioid use for chronic nonmalignant pain. *J Gen Intern Med*. 2005;20: 593–598.
32. Barnes DM, Bates LM. Do racial patterns in psychological distress shed light on the Black–White depression paradox? A systematic review. *Soc Psychiatry Psychiatr Epidemiol*. 2017;52: 913–928.
33. Burgess DJ, Grill J, Noorbaloochi S, et al. The effect of perceived racial discrimination on bodily pain among older African American men. *Pain Med*. 2009;10:1341–1352.
34. Shavers VL, Bakos A, Sheppard VB. Race, ethnicity, and pain among the US adult population. *J Health Care Poor Underserved*. 2010;21:177–220.

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35. McKillop AB, Carroll LJ, Jones CA, et al. The relation of social support and depression in patients with chronic low back pain. *Disabil Rehabil*. 2017;39:1482–1488.
36. Prego-Domínguez J, Khazaeipour Z, Mallah N, et al. Socioeconomic status and occurrence of chronic pain: a meta-analysis. *Rheumatology*. 2021;60:1091–1105.
37. Pal A, Dasgupta A, Bandyopadhyay L, et al. How common are aches and pains among garment factory workers? A work-related musculoskeletal disorder assessment study in three factories of South 24 Parganas district, West Bengal. *J Family Med Prim Care*. 2021;10:917–921.
38. Becker WC, Dorflinger L, Edmond SN, et al. Barriers and facilitators to use of non-pharmacological treatments in chronic pain. *BMC Fam Pract*. 2017;18:41.
39. Sullivan MD, Wilson L, Amick M, et al. Social support and the association between post-traumatic stress disorder and risk for long-term prescription opioid use. *Pain*. 2022;165:2379–2386.
40. Miller-Matero LR, Pappas C, Altairi S, et al. Alcohol, tobacco, and marijuana use among individuals receiving prescription opioids for pain management. *Clin J Pain*. 2025;41:e1257.
41. Nguyen LH, Dawson JE, Brooks M, et al. Disparities in pain management. *Anesthesiol Clin*. 2023;41:471–488.

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