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ORIGINAL RESEARCH

Engagement in Integrative and Nonpharmacologic Pain Management Modalities Among Adults with Chronic Pain: Analysis of the 2019 National Health Interview Survey

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Objective: To examine variables associated with engagement in (1) integrative health and medicine (IHM) and (2) nonpharmacologic modalities rather than opioids among United States adults with chronic pain.

Methods: Using the 2019 National Health Interview Survey, we examined sociodemographic, pain, and mental health predictors of (1) the sum of IHM modalities (ie, chiropractic care, yoga/Tai Chi, massage, or meditation/guided imagery) used to manage pain and (2) exclusive engagement in nonpharmacologic pain management modalities (ie, IHM, a chronic pain self-management program, support groups, or physical, rehabilitative, occupational, or talk therapy) or opioids in the past 3 months.

Results: Metropolitan residency, higher family income, higher education levels, increased number of pain locations, and increased frequency of pain limiting life/work activities were associated with increased odds of IHM engagement. Older age, male sex, non-Hispanic Black/African American race/ethnicity, and daily opioid use were associated with decreased odds of IHM engagement. Older age, male sex, and increased depressive symptoms were associated with decreases in the count of IHM modalities used to manage pain. Metropolitan residency, higher family income, and higher education levels were associated with increased odds of exclusive nonpharmacologic modality engagement. Older age and increasing frequency of pain limiting life/work activities were associated with decreased odds of exclusive nonpharmacologic modality engagement.

Conclusions: We identified several contrasts between factors prevalent among individuals with chronic pain and factors associated with engagement in nonpharmacologic and IHM modalities. These results support efforts to address barriers to accessing these modalities among subpopulations of adults with chronic pain (eg, older adults, individuals identifying as Black/African American, rural residents, and those with lower levels of education and income).

Plain Language Summary: This study examined factors influencing the use of integrative health and non-drug treatments for chronic pain in the United States. Results revealed that metropolitan residence, higher income, and education were associated with increased use of these treatments, while older age, male sex, daily opioid use, and non-Hispanic Black/African American ethnicity were associated with decreased use. The findings emphasize the importance of addressing barriers to these forms of care, especially among older adults, Black/African American individuals, and those with higher depressive symptoms and lower education and income levels, who are more likely to have chronic pain.

Keywords: integrative medicine, chronic pain, nonpharmacologic, opioids

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Introduction

According to the 2019 and 2020 National Health Interview Surveys (NHIS), 20.8% of adults in the United States (US) report chronic pain (ie, pain on most days or every day during the prior three months).[1] Despite substantial harms[2,3] and lack of effectiveness,[4] opioid use remains prevalent among US adults with chronic pain with 22.1% reporting opioid use in the past three months (2019 NHIS).[5] However, according to the Medical Expenditure Panel Survey, rates of opioid use have decreased from 2011 to 2019, while rates of using nonpharmacologic modalities have increased.[6] Nonpharmacologic modalities include a range of interventions from physical and occupational therapy to self-management programs and integrative health and medicine (IHM) modalities such as chiropractic care, yoga, Tai-Chi, acupuncture, meditation, and music therapy.[2]

A broader understanding of which factors predict engagement in IHM and nonpharmacologic modalities is necessary to improve implementation and identify populations with barriers to accessing these modalities.[3,6,7] For example, lower income is associated with reduced engagement in nonpharmacologic and IHM modalities.[6,8,9] This may be explained by inconsistent Medicare or Medicaid coverage, which presents access challenges for populations with limited discretionary income.[2,10–12] IHM coverage remains inconsistent across health insurance carriers within the US[10–12] and even among nations with different healthcare systems (eg, universal coverage).[13]

A few studies have examined factors potentially associated with use of these modalities among individuals with chronic pain. One recent analysis of the Medical Expenditure Panel Survey (2011–2019) found that female sex and higher levels of education and family income were associated with increased odds of visiting nonpharmacologic providers (eg, acupuncturists and physical therapists) rather than using opioids.[6] Older age, non-White race, Hispanic ethnicity, and having higher levels of pain interference and comorbidities were associated with lower odds of visiting nonpharmacologic providers exclusively.[6] Other studies have found that younger age, female sex, non-Hispanic (NH) White race/ethnicity, and higher levels of education, income, and pain limitations are associated with increased odds of IHM use among subjects with chronic pain,[8] low back or neck pain,[9,14] and arthritis.[7,15]

However, these prior studies are limited in that they did not examine (1) predictors of engagement in IHM (including office visits and personal use) specifically for chronic pain or (2) covariates including proximity to metropolitan areas, mental health measures (eg, Patient Health Questionnaire – 8 [PHQ-8]), opioid use, or number of pain locations. These covariates are important to consider as proximity to metropolitan areas may influence care access (eg, public transportation) or availability of IHM services,[16,17] and depression and opioid dependence are positively associated with chronic pain.[18] Given the limited understanding of variables that influence IHM and nonpharmacologic care utilization, it is important to consider the influence of patient-level physical and mental comorbidities, opioid use, and geographic setting in addition to socio-demographics. To address these gaps, the present study uses the 2019 NHIS to examine which sociodemographic, pain, and mental health variables were associated with engagement in (1) the number of IHM modalities used for pain and (2) exclusively nonpharmacologic modalities rather than opioid utilization among US adults with chronic pain.

Materials and Methods

Data Source

Data from the 2019 NHIS public-use data file were used.[19] The NHIS is conducted to monitor illness and disability trends and track progress toward achieving national health objectives. US households are selected using a multistage area probability sample design with clustering and stratification to ensure the final sample is representative of the US population when sampling weights are used.

Ethics Statement

All aspects of data collected for the 2019 NHIS were approved by the National Center for Health Statistics (NCHS) Research Ethics Review Board.[1] This study was conducted using an anonymous public access dataset, and confidentiality was maintained at all times. Thus, it was not necessary to obtain the approval of an Institutional Review Board.

Study Population

Of the 31,997 NHIS adult participants (≥18 years), 7114 had chronic pain, defined by responding "most days" or "every day" to the question, "In the past 3 months, how often did you have pain?"[20] without missing data on the study outcomes.

Data Management

Statistical analyses were performed in R Version 4.3.1 and RStudio Version 2023.09.1+494. Following data ingestion, recoding, and filtering, covariates were examined for missingness, with all missing data assumed to be missing at random. Of 7114 subjects, only 203 (2.9%) had missing values, with the maximum percentage of missingness within any variable being 1.5% of PHQ-8 total score values. Single imputation procedures were performed using robust linear regression, decision tree, and predictive mean matching from the "simputation" package.[21]

Model 1: Engagement in IHM

For this model, the outcome was defined as the sum (ie, 0–4 modalities) of the number of questions in which subjects responded "yes" to having engaged in (1) chiropractic care, (2) yoga or Tai Chi, (3) massage, or (4) meditation, guided imagery, or other relaxation techniques to manage pain in the past 3 months. Covariates were included based on their use in prior literature examining predictors of IHM use[7–9,14,15] and clinical relevance to individuals with chronic pain. Socio-demographic variables included: (1) age, (2) sex (male or female), (3) race/ethnicity (NH White Only, Hispanic, NH Black/African American only, or other single and multiple races), (4) education (less than high school; high school graduate/general equivalency diploma [GED]; some college, no degree; associate's or bachelor's degree; or master's, doctoral or professional degree), (5) family income, and (6) proximity to metropolitan area (nonmetropolitan, medium and small metropolitan, large fringe metropolitan, or large central metropolitan). Pain-related variables included the number of locations in which the subject reported being bothered at least "a little" by pain in the past three months (0–6 scale), and the frequency with which the subject reported pain limiting their life or work activities and using opioids in the past three months (ie, never, some days, most days, or every day). Total PHQ-8 score was included as a covariate for mental health (ie, depressive symptoms).

Groups were compared using Chi-square tests with Rao & Scott's second-order correction and Wilcoxon rank-sum tests for complex survey samples. Weighted bivariate comparisons between the full sample of subjects engaging in zero and at least one IHM modality were conducted using the "tbl_svysummary" function from the gtsummary package.[22]

Prior to multivariable analysis, the sample was split into training and testing samples, each containing 50% of the full sample to facilitate validation in the testing sample. Following a comparison of six modeling strategies using the training data, a weighted hurdle Poisson regression model was chosen based on an examination of rootograms, R^2, root mean squared error (RMSE), and Akaike information criterion. A hurdle model is a two-part model that specifies one process for zero counts and another process for positive counts. The model assumes that positive counts occur once a threshold (ie, hurdle) is crossed (ie, engaging in ≥1 IHM modality).[23] The model was fit using the "hurdle" function from the pscl package.[24,25] Tables and plots were used to summarize adjusted odds ratios (aOR) for engaging in at least one IHM modality, relative changes in the count of IHM modalities assuming engagement in ≥1 IHM modality, and 95% confidence intervals (CI) associated with each covariate. The model was then applied to the testing data to generate tables and plots comparing observed and predicted values, R^2, and RMSE within each sample.

Model 2: Nonpharmacologic Modalities Only Vs Opioids Only

For this model, the outcome was defined as engagement in nonpharmacologic modalities only (ie, engaging in IHM, a chronic pain self-management program, support groups, or physical, rehabilitative, occupational, or talk therapy while never using opioids) rather than opioids only (ie, using opioids on at least some days while not using any nonpharmacologic modalities). Data were filtered to include the 3300 subjects engaging in either nonpharmacologic only or opioids only. Covariates for Model 2 included all those defined previously minus frequency of opioid use. Following a bivariate comparison using the same methods described in Model 1, a weighted logistic model was fit using the "lrm" function from the rms package.[26] Bootstrap validation was then applied to the model using the "validate" function from the rms package[26] to obtain a validated c-statistic.

Results

Model 1: Engagement in IHM

Table 1 summarizes the socio-demographic, pain, and mental health variables among all adults with chronic pain providing complete outcome data (weighted total *N*=49,695,212). Substantial between-group differences ($p<0.001$)

Table 1 Socio-Demographic, Pain, and Mental Health Characteristics by IHM Engagement

Weighted Variable	All with Chronic Pain	IHM	No IHM	*p* Value
Total, n	49,695,212	17,610,400	32,084,812	
Age in years, mean	55.4 (54.9–55.9)	51.8 (51.0–52.6)	57.3 (56.7–57.9)	<0.001[a]
Sex, %				<0.001[b]
Female	54.9 (53.5–56.3)	60.3 (57.9–62.6)	52.0 (50.2–53.7)	
Male	45.1 (43.7–46.5)	39.7 (37.4–42.1)	48.0 (46.3–49.8)	
Race/Ethnicity, %				0.005[b]
NH White only	73.2 (71.9–74.5)	74.8 (72.7–76.8)	72.3 (70.6–73.9)	
Hispanic	10.5 (9.59–11.5)	10.1 (8.79–11.6)	10.7 (9.52–12.0)	
NH Black/African American only	11.0 (10.1–11.9)	9.0 (7.73–10.5)	12.1 (11.0–13.3)	
Other single and multiple races	5.3 (4.66–6.03)	6.1 (5.01–7.33)	4.9 (4.11–5.81)	
Education, %				<0.001[b]
Less than high school	15.5 (14.4–16.7)	8.8 (7.45–10.4)	19.2 (17.7–20.7)	
High school graduate/GED	30.4 (29.1–31.7)	25.2 (23.1–27.5)	33.2 (31.6–34.9)	
Some college, no degree	19.1 (18.0–20.2)	21.3 (19.4–23.4)	17.8 (16.5–19.2)	
Associate's or bachelor's degree	28.2 (27.0–29.4)	34.3 (32.2–36.6)	24.8 (23.4–26.3)	
Master's, doctoral, or professional degree	6.9 (6.31–7.53)	10.3 (9.11–11.6)	5.0 (4.42–5.71)	
Family income in $1000s, mean	63.1 (61.6–64.6)	71.7 (69.0–74.3)	58.4 (56.7–60.2)	<0.001[a]
Proximity to metro area, %				<0.001[b]
Nonmetropolitan	19.9 (18.8–21.0)	16.1 (14.5–17.9)	22.0 (20.6–23.5)	
Medium and small metro	33.9 (32.6–35.3)	33.1 (30.9–35.3)	34.4 (32.8–36.1)	
Large fringe metro	21.7 (20.5–22.9)	23.6 (21.6–25.8)	20.6 (19.2–22.1)	
Large central metro	24.4 (23.2–25.7)	27.2 (25.1–29.4)	22.9 (21.4–24.5)	
Number of pain locations, mean	3.1 (3.1–3.1)	3.4 (3.3–3.4)	3.0 (2.9–3.0)	<0.001[a]
Pain limiting life/work, %				<0.001[b]
Never	28.2 (27.0–29.5)	22.9 (21.1–24.9)	31.1 (29.5–32.8)	
Some days	35.6 (34.2–36.9)	38.6 (36.2–40.9)	33.9 (32.2–35.6)	
Most days	15.4 (14.4–16.5)	17.1 (15.2–19.0)	14.5 (13.3–15.8)	
Every day	20.8 (19.7–22.0)	21.5 (19.6–23.5)	20.5 (19.1–21.9)	
Opioid use in past 3 months, %				0.026[b]

(*Continued*)

Table 1 (Continued).

Weighted Variable	All with Chronic Pain	IHM	No IHM	*p* Value
Never	84.8 (83.7–85.8)	85.5 (83.7–87.2)	84.4 (83.1–85.7)	
Some days	4.7 (4.12–5.38)	5.1 (3.97–6.45)	4.5 (3.86–5.27)	
Most days	1.8 (1.47–2.19)	2.2 (1.63–2.91)	1.6 (1.20–2.09)	
Every day	8.7 (7.91–9.53)	7.2 (6.12–8.49)	9.5 (8.47–10.6)	
PHQ-8 total, mean	5.3 (5.1–5.4)	5.7 (5.4–6.0)	5.0 (4.8–5.2)	<0.001[a]

Note: Values in parentheses represent 95% confidence intervals. [a]Wilcoxon rank-sum test for complex survey samples. [b]Chi-squared test with Rao & Scott's second-order correction.

Abbreviations: CI, confidence interval; GED, general equivalency diploma; IHM, integrative health and medicine; metro, metropolitan; NH, Non-Hispanic; PHQ-8, Patient Health Questionnaire-8.

were observed, with subjects engaging in IHM being younger (51.8 vs 57.3 years) and having higher family income ($71,700 vs $58,400), higher PHQ-8 scores (5.7 vs 5.0), and more pain locations (3.4 vs 3.0) than subjects not engaging in IHM. Compared to those not engaging in IHM, subjects that engaged in ≥1 IHM modality reported higher rates of identifying as female (60.3% vs 52.0%), having levels of education beyond high school, and living in large central metropolitan areas (27.2% vs 22.9%). Subjects engaging in ≥1 IHM modality reported lower rates of identifying as NH Black/African American (9.0% vs 12.1%), having less than a high school education (8.8% vs 19.2%), and having pain that never limited their life or work activities (22.9% vs 31.1%).

Figure 1 and Supplemental Table 1 summarize the aOR and 95% CI of each covariate on engagement in ≥1 IHM modality. Among subjects with chronic pain, the following were associated with increased odds (aOR, 95% CI) of engagement in IHM after adjusting for all other covariates: (1) higher family income (1.037, 1.021–1.053), (2) higher levels of education as compared to less than high school (ie, high school/GED [1.516, 1.163–1.975], some college, no degree [2.193, 1.661–2.896], associate's or bachelor's degree [2.868, 2.197–3.744], masters, doctoral, or professional degree [4.043, 2.815–5.806]), (3) living in large fringe (1.301, 1.027–1.648) or central (1.590, 1.261–2.004) metropolitan areas as compared to non-metropolitan areas, (4) increasing number of pain locations (1.198, 1.130–1.271), and (5) pain limiting life or work activities on some days (1.388, 1.147–1.680), most days (1.508, 1.186–1.916), or every day (1.604, 1.268–2.029) as compared to never. Alternatively, the following were associated with decreased odds of engagement in IHM: (1) older age (0.858, 0.820–0.899), (2) identifying as male as compared to female (0.804, 0.692–0.934), (3) identifying as NH Black/African American (0.683, 0.531–0.879) or other single and multiple races (0.702, 0.503–0.980) as compared to NH White, and (4) using opioids to manage pain every day as compared to never (0.708, 0.533–0.942).

Supplemental Table 2 and Figure 2 summarize the changes in the count of IHM modalities engaged in for pain assuming engagement in at least one IHM modality. Having higher levels of education beyond high school (ie, some college, no degree [1.894, 1.275–2.814], associate's or bachelor's degree [1.772, 1.199–2.619], master's, doctoral, or professional degree [1.913, 1.236–2.959]) and more pain locations (1.102, 1.041–1.167) were associated with increases in the count of IHM modalities used to manage pain. Older age (0.866, 0.825–0.910), male sex (0.775, 0.663–0.907), and an increase of 5 units on the PHQ-8 (0.901, 0.834–0.973) were associated with decreases in the count of IHM modalities used to manage pain. Supplemental Figure 1 provides a comparison between observed and predicted values to summarize the weighted hurdle Poisson model's performance within the training (R^2=0.1182, RMSE=0.8069) and testing (R^2=0.0001, RMSE=0.9067) samples.

Model 2: Nonpharmacologic Only Vs Opioids Only

Table 2 summarizes the socio-demographic, pain, and mental health variables among adults with chronic pain engaging in nonpharmacologic modalities only or opioids only (weighted total *N*=22,707,275). Substantial between-group differences (p<0.001) were observed, with subjects engaging in nonpharmacologic modalities exclusively being younger (53.0 vs 59.2 years) and having higher family income ($72,800 vs $45,600) than subjects using opioids. Compared to those

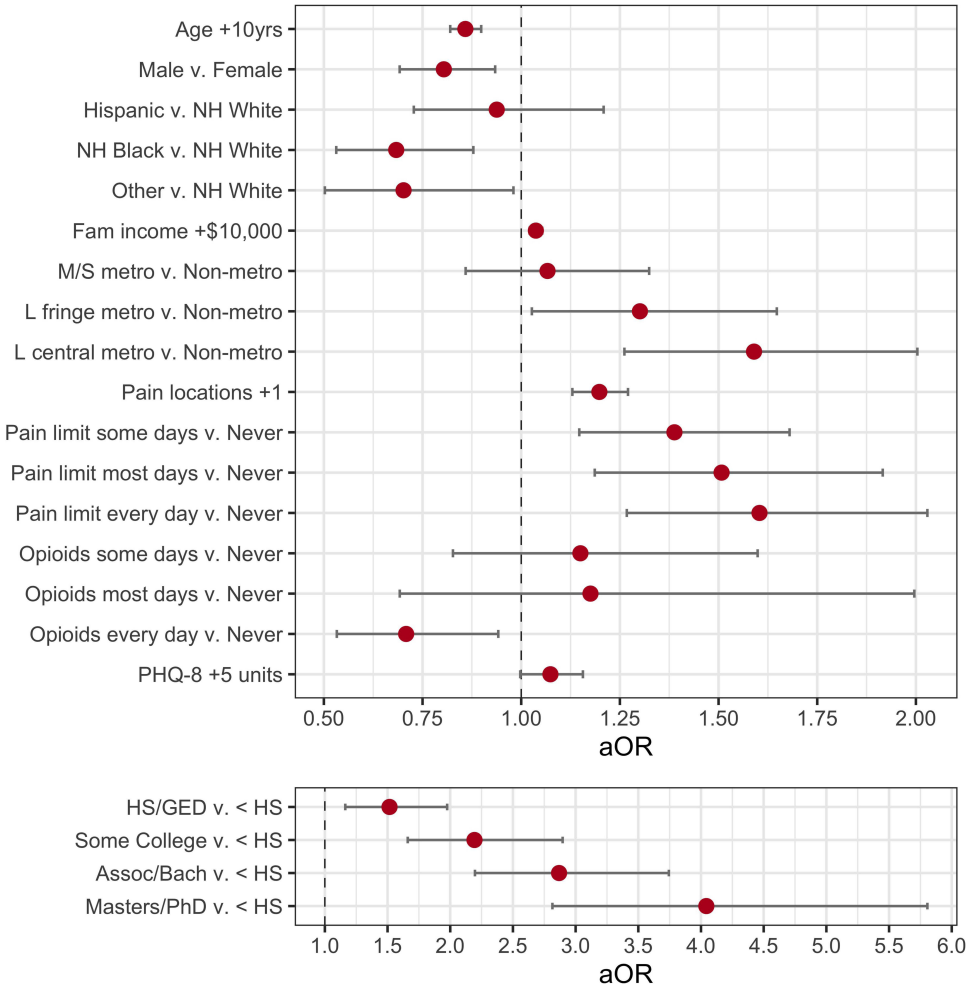

Figure 1 Adjusted Odds Ratios of Engaging in ≥1 IHM Modality for Pain.
Notes: Red dots represent point estimates for adjusted odds ratios, and error bars represent 95% confidence intervals. Education covariates are placed on a separate axis given their size to not obscure the other covariates.
Abbreviations: aOR, adjusted odds ratio; Assoc, associate's; Bach, bachelor's; fam, family; GED, general equivalency diploma; HS, high school; L, large; M, medium; metro, metropolitan; NH, Non-Hispanic; PHQ-8, Patient Health Questionnaire-8; S, small; v., versus; yrs, years.

using opioids, subjects using nonpharmacologic modalities exclusively reported higher rates of having levels of education beyond high school, living in large fringe metropolitan areas (23.3% vs 15.7%), and pain never limiting their life or work activities (24.2% vs 10.9%). Compared to those using opioids only, having less than a high school education (9.6% vs 25.0%), living in nonmetropolitan areas (16.5% vs 25.9%), and having pain limit life or work activities every day (19.6% vs 36.0%) were less prevalent among subjects using nonpharmacologic modalities exclusively. Additionally, subjects engaging in nonpharmacologic modalities exclusively reported lower scores on the PHQ-8 compared to subjects using opioids (5.4 vs 6.5). No large between-group differences were observed in sex (p=0.797), race/ethnicity (p=0.221), or number of pain locations (p=0.086).

Figure 3 and Supplemental Table 3 summarize the aOR and 95% CI of each covariate on engagement in nonpharmacologic modalities exclusively rather than opioid utilization, with quantitative variables presented comparing the 75th to the 25th percentile. Within the weighted logistic regression model (validated c-statistic=0.728), the following were associated with increased odds (aOR, 95% CI) of engagement in nonpharmacologic modalities only after adjusting for all other covariates: (1) higher family income ($85,000 vs $22,000: 1.596, 1.352–1.883), (2) higher levels of education as compared to less than high school (ie, high school/GED [1.639, 1.232–2.179], some college, no degree [2.094, 1.522–2.881], associate's or bachelor's degree [3.176, 2.301–4.383], master's, doctoral, or professional degree [3.943, 2.325–6.687]),

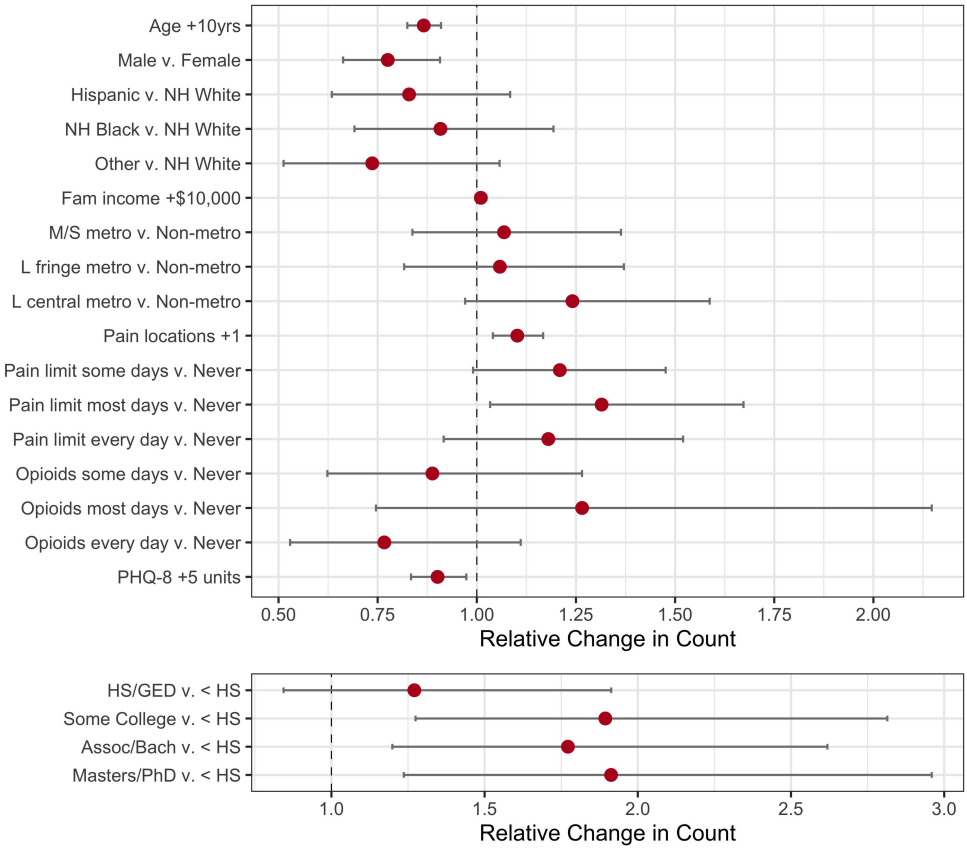

Figure 2 Relative Change in Count of IHM Modalities Used for Pain.
Notes: Red dots represent point estimates for relative change in count, and error bars represent 95% confidence intervals. Education covariates are placed on a separate axis given their size to not obscure the other covariates.
Abbreviations: aOR, adjusted odds ratio; Assoc, associate's; Bach, bachelor's; fam, family; GED, general equivalency diploma; HS, high school; L, large; M, medium; metro, metropolitan; NH, Non-Hispanic; PHQ-8, Patient Health Questionnaire-8; S, small; v., versus; yrs, years.

and (3) living in medium/small (1.327, 1.016–1.734), large fringe (1.864, 1.356–2.562) or central (1.449, 1.075–1.954) metropolitan areas as compared to non-metropolitan areas. Older age (69 years vs 46 years: 0.614, 0.530–0.711) and having pain limiting life or work activities on some days (0.541, 0.390–0.750), most days (0.493, 0.341–0.713), or every day

Table 2 Socio-Demographic, Pain, and Mental Health Characteristics by Nonpharmacologic Modality Engagement

Weighted Variable	Combined Groups	Nonpharm Only	Opioids Only	*p* Value
Total, n	22,707,275	19,099,216	3,608,059	
Age in years, mean	54.0 (53.2–54.7)	53.0 (52.2–53.8)	59.2 (57.6–60.8)	<0.001[a]
Sex, %				0.797[b]
Female	59.2 (57.1–61.3)	59.4 (57.1–61.6)	58.6 (53.0–63.9)	
Male	40.8 (38.7–42.9)	40.6 (38.4–42.9)	41.4 (36.1–47.0)	
Race/Ethnicity, %				0.221[b]
NH White only	74.3 (72.4–76.1)	74.6 (72.6–76.6)	72.6 (67.2–77.3)	
Hispanic	10.1 (8.91–11.5)	10.0 (8.73–11.5)	10.7 (7.59–14.8)	

(*Continued*)

Table 2 (Continued).

Weighted Variable	Combined Groups	Nonpharm Only	Opioids Only	*p* Value
NH Black/African American only	9.8 (8.60–11.1)	9.2 (7.96–10.6)	12.8 (9.77–16.5)	
Other single and multiple races	5.8 (4.82–6.92)	6.1 (5.11–7.31)	4.0 (1.84–8.57)	
Education, %				<0.001[b]
Less than high school	12.1 (10.7–13.7)	9.6 (8.25–11.2)	25.0 (20.3–30.2)	
High school graduate/GED	26.7 (24.8–28.6)	25.4 (23.5–27.5)	33.4 (28.4–38.8)	
Some college, no degree	20.4 (18.8–22.2)	20.6 (18.8–22.5)	19.4 (15.4–24.2)	
Associate's or bachelor's degree	31.2 (29.4–33.1)	33.7 (31.6–35.8)	18.3 (14.8–22.4)	
Master's, doctoral, or professional degree	9.6 (8.54–10.7)	10.6 (9.47–11.9)	3.9 (2.47–6.07)	
Family income in $1000s, mean	68.5 (66.2–70.8)	72.8 (70.3–75.4)	45.6 (41.6–49.6)	<0.001[a]
Proximity to metro area, %				<0.001[b]
Nonmetropolitan	18.0 (16.5–19.6)	16.5 (15.0–18.2)	25.9 (21.7–30.7)	
Medium and small metro	33.0 (31.1–35.0)	32.8 (30.8–34.9)	33.9 (28.9–39.3)	
Large fringe metro	22.1 (20.4–23.9)	23.3 (21.5–25.3)	15.7 (12.4–19.7)	
Large central metro	26.8 (25.0–28.8)	27.3 (25.3–29.4)	24.5 (19.8–29.8)	
Number of pain locations, mean	3.2 (3.2–3.3)	3.2 (3.1–3.3)	3.3 (3.2–3.5)	0.086[a]
Pain limiting life/work, %				<0.001[b]
Never	22.1 (20.5–23.8)	24.2 (22.4–26.1)	10.9 (8.13–14.5)	
Some days	38.5 (36.4–40.6)	39.3 (37.1–41.5)	34.3 (29.1–39.9)	
Most days	17.2 (15.8–18.8)	16.9 (15.3–18.7)	18.9 (15.3–23.1)	
Every day	22.2 (20.5–24.0)	19.6 (17.9–21.5)	36.0 (30.9–41.3)	
PHQ-8 total, mean	5.6 (5.3–5.8)	5.4 (5.1–5.6)	6.5 (5.9–7.2)	<0.001[a]

Note: Values in parentheses represent 95% confidence intervals. [a]Wilcoxon rank-sum test for complex survey samples. [b]Chi-squared test with Rao & Scott's second-order correction.

Abbreviations: CI, confidence interval; GED, general equivalency diploma; metro, metropolitan; NH, Non-Hispanic; Nonpharm, nonpharmacologic; PHQ-8, Patient Health Questionnaire-8.

(0.363, 0.256–0.513) as compared to never were associated with decreased odds of engaging in nonpharmacologic modalities.

Discussion

This study examined which demographic, pain, and mental health variables were associated with engagement in (1) the number of IHM modalities used for pain and (2) exclusively nonpharmacologic modalities rather than opioid utilization among a representative sample of US adults with chronic pain. Our study identified several contrasts between factors prevalent among individuals with chronic pain and factors associated with engagement in nonpharmacologic and IHM modalities.

While older adults report higher rates of chronic pain[1,18] and are more likely to take opioids for chronic pain,[27] our study found that increased age was associated with reduced odds of engagement in nonpharmacologic and IHM therapies, a finding consistent with previous studies.[6–9,14] A qualitative study identified several barriers to engaging in

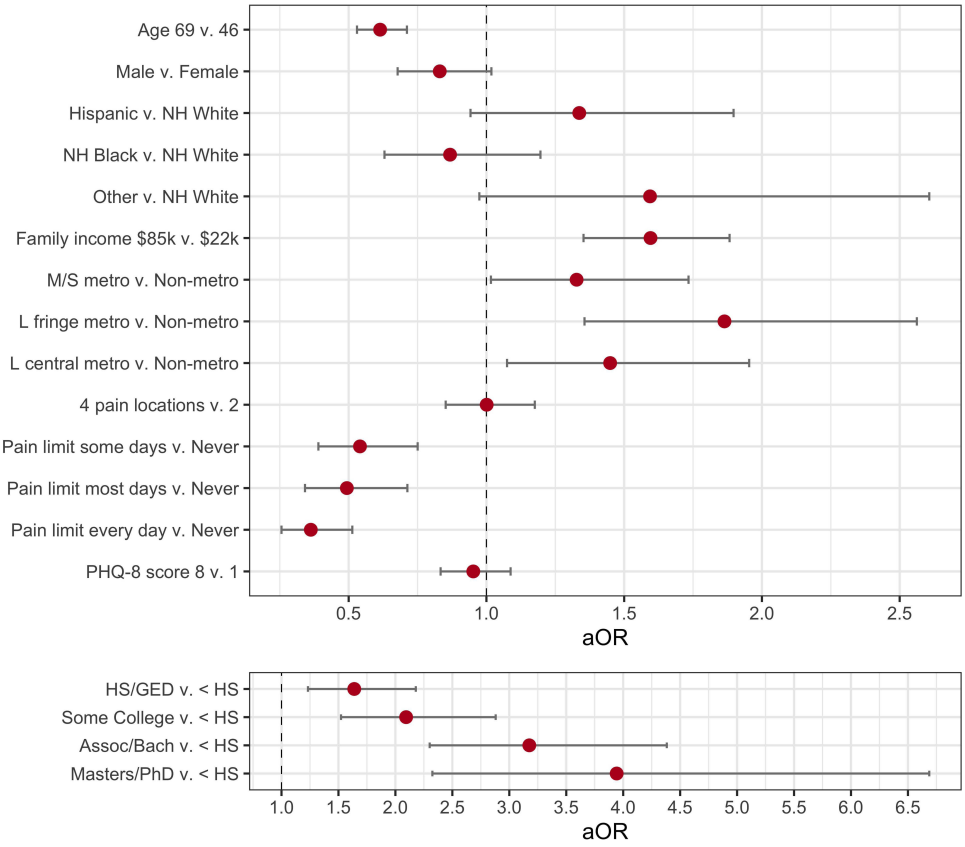

Figure 3 Adjusted Odds Ratios of Using Nonpharmacologic Only vs Opioids Only.
Notes: Red dots represent point estimates for adjusted odds ratios, and error bars represent 95% confidence intervals. Education covariates are placed on a separate axis given their size to not obscure the other covariates.
Abbreviations: aOR, adjusted odds ratio; Assoc, associate's; Bach, bachelor's; fam, family; GED, general equivalency diploma; HS, high school; L, large; M, medium; metro, metropolitan; NH, Non-Hispanic; PHQ-8, Patient Health Questionnaire-8; S, small; v., versus; yrs, years.

these therapies among older adults with chronic pain including embarrassment, lack of faith in effectiveness, and lack of treatment availability.[28] Inconsistent Medicare coverage for nonpharmacologic treatments may also prohibit older adults from accessing these modalities.[10–12]

Chronic pain is more prevalent in rural areas,[20] yet we found that non-metropolitan residence was associated with reduced odds of engagement in nonpharmacologic and IHM modalities. Previous NHIS studies examining predictors of engagement in these modalities used markers of US region (eg, Northeast, South) rather than proximity to metropolitan areas,[6,15] hindering a direct comparison to our results. Nevertheless, our novel finding may be explained by a lack of access to healthcare facilities, nonpharmacologic modality providers, and public transportation in rural settings.[29]

Lower income is associated with increased risk of chronic pain.[30] This is important given that we found that lower income was associated with reduced odds of engagement in nonpharmacologic and IHM modalities. This finding is consistent with previous studies.[6,8,9] One possible contributing factor is that Medicaid health insurance provides inconsistent coverage for these modalities.[10] Similarly, chronic pain is more prevalent among those with lower levels of education,[18] yet our study found that lower education was associated with reduced odds of engagement in nonpharmacologic and IHM modalities. This finding is consistent with previous studies,[6–9,14,31] and may be explained by lack of exposure to a broader range of treatment options among individuals with chronic pain and lower levels of education.[32]

While an increasing frequency of pain limiting life or work activities was associated with higher odds of engagement in IHM modalities, it was also associated with lower odds of engaging in nonpharmacologic modalities exclusively. In addition, the positive association between pain limiting life or work activities and number of pain locations with IHM

engagement supports the clinical relevance of these modalities for addressing pain rather than general wellness, which is a common reason for seeking IHM care among those without chronic pain.[33,34]

The association between opioid use and chronic pain is well-established.[3,5] Importantly, our study found that individuals taking opioids daily were less likely to engage in IHM. This finding supports a previous qualitative study which found that Veterans with chronic pain taking opioids long-term held pervasive attitudes that discouraged them from engaging in multimodal treatments.[35] In addition, US practitioners (eg, chiropractors and yoga therapists) providing nonpharmacologic modalities or IHM to adults with chronic pain are often unable to prescribe opioids within their scope of practice. Accordingly, a negative association between daily opioid use and IHM could be explained by patients' general preference towards pharmacologic care pathways.[36] We also found a negative relationship between increased PHQ-8 score and count of IHM modalities used for pain. Given the prevalence of depression among individuals with chronic pain[37] and the common neural mechanisms between the two conditions,[38] depressive symptoms may be a barrier to engaging in additional IHM modalities within this population.

Racial differences were also evident in our study. NH Black/African American adults were 31.7% less likely to engage in IHM modalities compared to individuals who identified as NH White after adjusting for all other covariates. A previous study among cancer-free adults with chronic pain similarly found that Black/African American individuals were 50% less likely to engage in nonpharmacologic therapies compared to White individuals.[6] In addition, previous studies have reported lower odds of engagement in IHM modalities among Black/African American adults with low back pain (aOR=0.4)[9] and those receiving treatment at a multidisciplinary pain center (aOR=0.5).[8] Specific reasons underlying racial and ethnic disparities specific to IHM and nonpharmacologic care may stem from biases in care delivery or cultural preferences and warrant further exploration.[39,40] These findings underscore the need to address racial disparities in chronic pain management, particularly given the history of racial bias among healthcare professionals treating pain.[39]

Our study highlights a gap in IHM and nonpharmacologic utilization among those at greatest risk of chronic pain despite demonstrated efficacy and guideline recommendations for these forms of care.[2,3] We suggest that several steps are necessary to mitigate barriers to accessing IHM and nonpharmacologic care. These include: (1) further qualitative exploration of reasons for use or non-use of IHM and nonpharmacologic modalities among patients or potential patients; (2) an examination of regional access to care including associations between socio-economic markers and clinician density; and (3) examination of IHM and nonpharmacologic care utilization between regions with expanded Medicaid versus those without, or pre- and post-comparisons of within-region changes following Medicaid expansion.

As the question of insurance coverage is beyond the scope of the present study, further research is needed to corroborate whether inadequate coverage is a limiting factor to accessing IHM and nonpharmacologic care. In addition, insurance coverage for IHM and nonpharmacologic modalities not only depends on the barriers we have identified, but stakeholder input and data demonstrating efficacy, effectiveness, and safety as well.[2,10]

Our study had several limitations. Data were based on self-reported responses and thus potentially influenced by recall bias and respondents' willingness to report treatment engagement. While our analysis accounted for several socio-demographic, pain, and mental health covariates, we did not include other NHIS variables such as the specific etiology of chronic pain, pain severity, insurance coverage, employment, or self-reported general health status. The 2019 NHIS did not provide information regarding other clinically effective IHM modalities such as acupuncture and music therapy,[2] the frequency or intensity of nonpharmacologic or IHM engagement, whether engagement involved personal practice (eg, yoga at home) or seeing a professional (eg, a licensed yoga therapist), or opioid dose.

These findings are specific to patterns of care utilization for chronic pain among US adults and may not generalize to other countries with differing healthcare systems, insurance coverage models, IHM availability, and cultural preferences. Additionally, we did not examine specific branches of IHM and nonpharmacologic care (eg, chiropractic or yoga) or specific pain conditions (eg, back pain or headache), and reasons for seeking individual therapies may vary according to condition. This study is limited by the lack of granular data in the NHIS regarding respondents' specific state of residence and whether that state had expanded Medicaid, thereby hindering an analysis of possible regional differences in IHM utilization. Strengths of this study include a multidisciplinary author team, use of a large, nationally representative sample of US adults with chronic pain, and using modalities specifically for pain management as outcome measures.

Conclusions

In conjunction with recent guidelines from the Centers for Disease Control[3] and American College of Physicians,[41] as well as position statements from The Pain Task Force of the Academic Consortium for Integrative Medicine and Health[2] advising clinicians to consider evidence-based nonpharmacologic modalities as first-line treatments for chronic pain, the present findings support the need to better understand and reduce barriers to accessing nonpharmacologic and IHM modalities. Our results support efforts to address barriers among adults with chronic pain who are older, identify as NH Black/African American, lack higher levels of education, reside in rural areas, have lower income, have higher levels of pain interference, report higher depressive symptoms, and have a high frequency of opioid use. Further mixed methods participatory action research is recommended to identify what patients within these populations perceive as barriers to accessing nonpharmacologic and IHM modalities. In turn, this research may inform policy change and help increase the utilization of IHM and nonpharmacologic care among populations with chronic pain.

Data Sharing Statement

Data are publicly available and can be accessed at https://www.cdc.gov/nchs/nhis/2019nhis.htm. Supporting documentation containing the R code (.qmd) file for the full statistical analysis is available at https://samrodgersmelnick.github.io/NHIS2019ChronicPain/.

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Disclosure

The authors reports no conflicts of interest in this work.

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