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ORIGINAL RESEARCH

The Association of Chronic Pain and Complementary Health Approach Usage: A Comprehensive Analysis Adjusting for Demographics

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Background: Chronic pain is a significant public health issue linked to reduced quality of life and higher healthcare costs. Its complex etiology complicates treatment plans, leading many to seek complementary health approaches (CHAs). However, utilization patterns and clinical effects remain understudied.

Objective: To quantify the association between chronic pain and CHA utilization in US adults, focusing on osteopathic manipulative treatment and other non-traditional modalities, and to evaluate whether associations persist after adjusting for demographics.

Methods: A cross-sectional online survey of 3022 US adults examined CHA use among individuals diagnosed with chronic pain in the past year. Statistical analyses included Chi-Square tests of bivariate associations and logistic regression to evaluate associations with and without demographic adjustments. CHAs were categorized into the five NIH-defined groups: Physical, Psychological, Nutritional, Combined, and System-Based, encompassing nearly 30 interventions. CHA usage, favorable expectation, and favorable experience of these modalities were analyzed.

Results: Individuals with chronic pain demonstrated significantly higher overall utilization of CHAs than those without (aOR = 2.36, 95% CI: 1.44–3.87), including osteopathic manipulative treatment (aOR = 3.29, 95% CI: 2.15–5.02). Despite low expectancy for positive outcomes across groups, chronic pain patients reported lower expectations for various modalities. Favorable experience for Any CHA among those with chronic pain was high (93.5%), especially for physical CHAs, acupuncture, and art, music, or dance therapy.

Conclusion: The increased use of CHAs among chronic pain patients underscores unmet needs in conventional care. Future longitudinal research should further clarify the factors influencing CHA adoption and evaluate their therapeutic efficacy.

Keywords: chronic pain, complementary health approaches, logistic regression, demographics, health behavior, adjusted analysis

Introduction

Chronic pain, defined as pain persisting for three months or longer, affects over 50 million adults in the United States, contributing substantially to disability, diminished quality of life, and escalating healthcare costs.[1,2] Its impact extends beyond clinical symptoms, influencing patients' daily functioning, emotional well-being, and interactions in the health-care system. The burden of chronic pain is not evenly distributed; it disproportionately impacts older adults, women, and individuals with lower socioeconomic status,[3] emphasizing the need for equitable, patient-centered approaches. Common chronic pain conditions such as low back pain, arthritis, fibromyalgia, and neuropathic pain,[4,5] collectively impose an economic burden that exceeds that of cancer, heart disease, and diabetes.[6]

Dissatisfaction with conventional treatments, particularly pharmacologic options that often carry risks of dependency and side effects, has led many patients to explore complementary health approaches (CHAs). These non-mainstream

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modalities, used alongside or in place of conventional medicine, include nutritional supplements, manual therapies, mind-body practices, and traditional healing systems. In 2012 alone, US out-of-pocket expenditures on CHAs totaled $30.2 billion, with individuals experiencing pain conditions comprising a substantial proportion of that spending.[7–9] This trend reflects a growing desire among patients to actively participate in their treatment decisions and explore holistic options that align with their values and experiences.

CHAs can be categorized based on their relationship to conventional care: complementary (used in conjunction with standard care), alternative (used instead of standard care), or integrative (a coordinated blend of both).[7] The National Center for Complementary and Integrative Health (NCCIH) classifies CHAs into four core domains: Nutritional, Psychological, Combined Psychological/Physical, and Physical approaches.[10] For the purposes of this study, we added a fifth domain—Healing Systems—to include traditional practices such as naturopathy, Traditional Chinese Medicine, and Ayurveda, which were not fully captured in NCCIH's classification (see Table 1).

Although CHAs have grown in popularity, the evidence supporting their efficacy for chronic pain remains mixed. It has been shown that some studies suggest potential benefits: acupuncture may ease chronic pain and headaches; meditation can reduce blood pressure, anxiety, and insomnia; tai chi may improve balance, relieve pain, and enhance quality of life in chronic illness; and yoga supports stress relief, mental health, sleep, and may help with pain and other chronic conditions. These approaches have been extensively studied, however, there are various modalities where the research remains limited and more needs to be learned about the effects of products and their potential interactions with medicines (such as the use of dietary supplements).[10] Meta-analyses suggest modest benefits for modalities such as acupuncture, spinal manipulation, mindfulness practices, and massage therapy for chronic pain.[11,12] Additionally, studies recommend that complementary and integrative medicine is not to be used as a replacement for usual care, but in adjunct.[11] Despite this, insurance coverage for these therapies remains limited, and many individuals pursue CHAs independently of clinician guidance and oversight, often reporting better immediate and long-term symptom relief.[13]

Despite rising use, few studies have comprehensively examined CHA utilization among individuals with chronic pain using adjusted analytic methods.[14,15] Existing studies have yielded inconsistent findings regarding demographic influences. For example, some have found that pain severity correlates with lower educational attainment and Hispanic ethnicity, while others have reported higher disability rates among African American individuals.[15,16]

To address these gaps, we conducted a nationally representative analysis to determine whether chronic pain is independently associated with greater use of CHAs after adjusting for demographic and socioeconomic variables. We hypothesized that individuals with chronic pain would demonstrate significantly higher CHA utilization across multiple modalities compared to those without chronic pain, reflecting both unmet clinical needs and evolving patient preferences in pain management.

Methods

Study Design and Setting

This study is a secondary analysis of a cross-sectional, nationally representative online survey of US adults aged 18 years or older, conducted via Qualtrics Panels in August 2024. The survey assessed complementary health approach (CHA) utilization patterns, chronic pain status, and demographic/socioeconomic variables. Quota sampling ensured population representativeness by aligning with US Census benchmarks for sex, age, ethnicity, region, and education.

Ethics Approval

This study was reviewed by the Campbell University Institutional Review Board and determined to be *Not Human Subjects Research* under 45 CFR 46.102(e). The IRB protocol number is 844. All participants provided electronic written informed consent prior to participation, consistent with 45 CFR 46 guidelines.[17] The study complies with the Declaration of Helsinki. No external funding was received for this work.

Table 1 CHA Types by National Center for Complementary and Integrative (NCCIH) Category

Nutritional CHA	Psychological CHA	Combined Psychological/Physical CHA	Physical CHA	Healing Systems CHA
• Vitamins or Minerals • Supplements • Visit to an herbalist • Special diet not prescribed by a doctor • Visit to a homoeopath	• Visit to a spiritual healer • Prayer • Mindfulness or spiritual practices other than prayer • Shamanic journeys • Guided hypnosis • Self-hypnosis	• Deep breathing exercises • Progressive relaxation • Mediation • Biofeedback • Guided imagery • Visit to an acupuncturist • Yoga • Tai chi or qi gong • Movement therapies other than yoga, tai chi, or qi gong • Art, music, or dance therapy	• Visit to a chiropractor • Osteopathic manipulation • Massage therapy • Light, Magnetic, or Electrical Stimulation other than physical therapy • Other non-conventional devices	• Traditional Systems such as Traditional Chinese Medicine and Ayurveda • Visit to a naturopath

Abbreviation: CHA, Complementary Health Approach.

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Participants

Adults aged 18 years or older residing in the United States were eligible to participate. Exclusion criteria included incomplete survey responses and failure of embedded attention-check questions. Recruitment was conducted through Qualtrics Panels, which maintains a large pool of registered survey respondents. A quota-controlled survey was used to ensure the final sample reflected the US population distribution across sex at birth, age, ethnicity, region, and educational attainment, as defined by US Census benchmarks. All eligible panelists were invited to participate until demographic quotas were met. The final analytic sample consisted of 3022 respondents, providing sufficient power to detect differences in CHA utilization between participants with and without chronic pain.

Data Collection

Data was collected using an anonymous, self-administered online questionnaire. The survey included two attention-check questions to ensure data quality. One example instructed participants: "How well are you paying attention? If you're giving honest responses, please select 30% as your answer". Participants who failed either check were excluded from analysis. No personally identifiable information was collected. The questionnaire assessed self-reported previous diagnosis of chronic pain within the past 12 months, use of 28 specific CHAs in the prior year (eg, supplements, meditation, chiropractic, acupuncture), and a range of demographic and socioeconomic variables. CHA modalities were grouped according to National Center for Complementary and Integrative Health (NCCIH) categories, with an additional "Healing Systems" category included to capture traditional approaches not listed by NCCIH. Participants were also asked about their expectations and experiences with each CHA modality.

Measures and Variables

Chronic pain status was determined by participant self-report of this diagnosis within the past 12 months. The primary outcome was the use of complementary health approaches (CHAs), assessed by asking participants whether they had used any of 28 specific modalities in the prior year (response options: yes/no for each). Modalities included nutritional supplements, meditation, chiropractic, osteopathic manipulation, acupuncture, and others. These were grouped and calculated according to NCCIH categories: Nutritional, Psychological, Combined Psychological/Physical, and Physical approaches, with an additional "Healing Systems" category added to capture traditional systems not listed by NCCIH – naturopathy, Traditional Chinese Medicine, and Ayurveda. Participants also reported their expectations and experiences with each CHA modality.

Demographic and socioeconomic covariates included age group, sex, race/ethnicity, community size, education level, employment status, insurance status, poverty status, and geographic region. These variables were included in all multivariable models to assess independent associations between chronic pain and CHA utilization.

Statistical Analysis

Descriptive statistics were used to summarize demographic characteristics and patterns of CHA usage. Bivariate associations between chronic pain status and CHA use were examined using chi-square tests for categorical variables. Logistic regression models were constructed to estimate the odds of CHA use among participants with chronic pain, both unadjusted and adjusted for demographic and socioeconomic covariates. Adjusted models included all listed covariates to control for potential confounding. Statistical analyses were performed using Python version 3.9, with the scipy.stats package version 1.4.1 employed for bivariate analyses and statsmodels.api version 0.10.2 for logistic regression. Statistical significance was defined as $p < 0.05$. Participants with missing data on key variables were excluded from analyses to maintain data integrity.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Results

Demographic Characteristics

Table 2 demonstrates that out of the 3022 respondents, 761 individuals (25.2%) reported receiving a diagnosis of chronic pain in the past 12 months. Several significant demographic and health-related differences emerged between those with and without chronic pain.

Table 2 Demographic and Health Characteristics of the Sample by Chronic Pain Status

Subject Characteristic	Has Chronic Pain N (%)	No Chronic Pain N (%)	All Subjects	P value
Total Sample	761 (25.2)	2261 (74.8)	3022	
Age (years)				<0.001
18-34	142 (16.0)	748 (84.0)	890	
35-49	187 (25.0)	561 (75.0)	748	
50-64	275 (36.1)	486 (63.9)	761	
65 and older	157 (25.2)	466 (74.8)	623	
Sex				0.258
Male	363 (24.2)	1134 (75.8)	1497	
Female	398 (26.1)	1127 (73.9)	1525	
Race				<0.001
Asian, non-Hispanic	14 (9.4)	135 (90.6)	149	
White/Caucasian, non-Hispanic	496 (26.8)	1355 (73.2)	1851	
Black/African American, non-Hispanic	63 (19.4)	262 (80.6)	325	
Hispanic	141 (25.7)	407 (74.3)	548	
All additional Categories	47 (31.5)	102 (68.5)	149	
Community Size				0.055
City	373 (23.8)	1192 (76.2)	1565	
Town	223 (25.1)	664 (74.9)	887	
Village or countryside	165 (28.9)	405 (71.1)	570	
Education				0.897
Less than college	288 (25.3)	849 (74.7)	1137	
Some college or more	473 (25.1)	1412 (74.9)	1885	
Employment status				<0.001
Unemployed	459 (29.1)	1120 (70.9)	1579	
Employed Part-time	101 (24.3)	314 (75.7)	415	
Employed Full-time	201 (19.6)	827 (80.4)	1028	

(*Continued*)

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Table 2 (Continued).

Subject Characteristic	Has Chronic Pain N (%)	No Chronic Pain N (%)	All Subjects	P value
Insurance Status				<0.001
Yes	706 (26.1)	1996 (73.9)	2702	
No	55 (17.2)	265 (82.8)	320	
Poverty Category				0.034
In Poverty	246 (28.3)	623 (71.7)	869	
Near Poverty	87 (25.3)	257 (74.7)	344	
Not in Poverty	428 (23.7)	1381 (76.3)	1809	
Region				0.014
East	109 (21.2)	406 (78.8)	515	
Midwest	188 (29.4)	452 (70.6)	640	
South	284 (24.5)	875 (75.5)	1159	
West	180 (25.4)	528 (74.6)	708	

Note: P-values represent the chi-square test for categorical variables and the independent two-sample *t*-test for continuous variables.
Abbreviation: SD, Standard deviation.

Age was strongly associated with chronic pain status. The highest prevalence occurred among adults aged 50 to 64, with 36.1% reporting chronic pain, compared to only 16.0% in the 18 to 34 age group. Race and ethnicity also demonstrated significant variation. White, non-Hispanic respondents had the highest prevalence of chronic pain at 26.8%, followed by Hispanic (25.7%) and Black/African American (19.4%) participants. Asian respondents reported the lowest prevalence at 9.4%.

Employment status was significantly related to chronic pain. Among unemployed individuals, 29.1% reported chronic pain, compared to 24.3% of part-time workers and only 19.6% of those employed full-time. Insurance status and poverty level were also important factors. Respondents without health insurance had a lower prevalence of chronic pain (17.3%) compared to those with insurance (22.3%). Those living below the poverty line were more likely to experience chronic pain (28.3%) than those categorized as not in poverty (23.7%). Geographic region was also associated with chronic pain status, with the highest proportion of chronic pain reported in the Midwest (29.4%) and the lowest in the East (21.2%).

There were no statistically significant differences in the prevalence of chronic pain by sex or educational attainment. While pain was slightly more common among females (26.1%) than males (24.2%), this difference was not statistically significant ($p = 0.258$). Similarly, those with and without a college education reported nearly identical rates of chronic pain ($p = 0.897$).

Community size approached significance ($p = 0.055$), with a trend toward higher chronic pain prevalence among those living in rural or village settings (28.9%) compared to those in urban areas (23.8%).

Overall, chronic pain was more commonly reported among older adults, individuals who were unemployed, insured, living in poverty, and residents of the Midwest. These patterns are consistent with previous research highlighting sociodemographic disparities in chronic pain prevalence.

CHA Use by Chronic Pain Status

Table 3 shows CHA usage was widespread across the sample, with significantly higher rates among individuals reporting chronic pain. Overall, 97.4% of respondents with chronic pain reported using at least one CHA in the past year, compared to 93.9% of those without chronic pain ($p < 0.001$).

Table 3 Complementary Health Approach Usage, Expectation, and Experience Among Subjects with and without Chronic Pain

Demographic Category		CHA Usage			Favorable Expectation of CHAs			Favorable Experience with CHAs		
		Without Chronic Pain N (%)	With Chronic Pain N (%)	p-value	Without Chronic Pain N (%)	With Chronic Pain N (%)	p-value	Without Chronic Pain N (%)	With Chronic Pain N (%)	p-value
Totals (3022)		2261 (74.8)	761 (25.2)							
Any CHA Use	No	138 (6.1)	20 (2.6)	0.0003	1399 (62.0)	487 (64.2)	0.2971	123 (5.8)	48 (6.5)	0.5575
	Yes	2123 (93.9)	741 (97.4)		859 (38.0)	272 (35.8)		2000 (94.2)	693 (93.5)	
Any Nutritional CHA Use	No	467 (20.7)	117 (15.4)	0.0017	1152 (51.5)	438 (58.9)	0.0006	164 (9.1)	74 (11.5)	0.0999
	Yes	1794 (79.3)	644 (84.6)		1085 (48.5)	306 (41.1)		1630 (90.9)	570 (88.5)	
Vitamins or Minerals	No	577 (25.5)	157 (20.6)	0.0076	202 (35.0)	67 (42.7)	0.0941	122 (7.2)	59 (9.8)	0.0596
	Yes	1684 (74.5)	604 (79.4)		375 (65.0)	90 (57.3)		1562 (92.8)	545 (90.2)	
Supplements	No	1312 (58.0)	372 (48.9)	<0.0001	499 (38.0)	157 (42.2)	0.1628	128 (13.5)	58 (14.9)	0.5513
	Yes	949 (42.0)	389 (51.1)		813 (62.0)	215 (57.8)		821 (86.5)	331 (85.1)	
Herbalist	No	2125 (94.0)	696 (91.5)	0.0195	1171 (55.1)	418 (60.1)	0.025	28 (20.6)	13 (20.0)	1
	Yes	136 (6.0)	65 (8.5)		954 (44.9)	278 (39.9)		108 (79.4)	52 (80.0)	
Non-RX Diet	No	1944 (86.0)	594 (78.1)	<0.0001	895 (46.0)	327 (55.1)	0.0001	60 (18.9)	32 (19.2)	1
	Yes	317 (14.0)	167 (21.9)		1049 (54.0)	267 (44.9)		257 (81.1)	135 (80.8)	
Homeopathic Medicine	No	2156 (95.4)	712 (93.6)	0.064	1287 (59.7)	448 (62.9)	0.138	23 (21.9)	9 (18.4)	0.7713
	Yes	105 (4.6)	49 (6.4)		869 (40.3)	264 (37.1)		82 (78.1)	40 (81.6)	
Any Physical CHA Use	No	1708 (75.5)	477 (62.7)	<0.0001	1179 (52.2)	416 (55.3)	0.1544	51 (9.2)	39 (13.7)	0.0606
	Yes	553 (24.5)	284 (37.3)		1078 (47.8)	336 (44.7)		502 (90.8)	245 (86.3)	
Chiropractic Care	No	2015 (89.1)	639 (84.0)	0.0002	809 (40.1)	278 (43.5)	0.145	18 (7.3)	17 (13.9)	0.0646
	Yes	246 (10.9)	122 (16.0)		1206 (59.9)	361 (56.5)		228 (92.7)	105 (86.1)	
Osteopathic Manipulation	No	2207 (97.6)	713 (93.7)	<0.0001	1211 (54.9)	404 (56.7)	0.4278	17 (31.5)	9 (18.8)	0.2131
	Yes	54 (2.4)	48 (6.3)		996 (45.1)	309 (43.3)		37 (68.5)	39 (81.2)	
Massage Therapy	No	1932 (85.4)	598 (78.6)	<0.0001	630 (32.6)	210 (35.1)	0.2764	28 (8.5)	11 (6.7)	0.6145
	Yes	329 (14.6)	163 (21.4)		1302 (67.4)	388 (64.9)		301 (91.5)	152 (93.3)	
Light, Magnetic, or Electric Stimulation other than PT	No	2124 (93.9)	672 (88.3)	<0.0001	1261 (59.4)	406 (60.4)	0.6619	21 (15.3)	21 (23.6)	0.1657
	Yes	137 (6.1)	89 (11.7)		863 (40.6)	266 (39.6)		116 (84.7)	68 (76.4)	
Other Non-Conventional Devices	No	2153 (95.2)	701 (92.1)	0.0017	1337 (62.1)	440 (62.8)	0.7856	27 (25.0)	11 (18.3)	0.4253
	Yes	108 (4.8)	60 (7.9)		816 (37.9)	261 (37.2)		81 (75.0)	49 (81.7)	
Any Psychological CHA Use	No	690 (30.5)	167 (21.9)	<0.0001	640 (39.7)	148 (43.9)	0.1698	47 (7.2)	33 (7.8)	0.8329
	Yes	1571 (69.5)	594 (78.1)		972 (60.3)	189 (56.1)		602 (92.8)	391 (92.2)	
Spiritual Healing	No	2134 (94.4)	692 (90.9)	0.0011	1579 (70.5)	553 (73.2)	0.162	111 (7.1)	49 (8.2)	0.3969
	Yes	127 (5.6)	69 (9.1)		661 (29.5)	202 (26.8)		1460 (92.9)	545 (91.8)	
Prayer	No	849 (37.5)	225 (29.6)	0.0001	1361 (63.8)	449 (64.9)	0.6298	20 (15.7)	17 (24.6)	0.1842
	Yes	1412 (62.5)	536 (70.4)		773 (36.2)	243 (35.1)		107 (84.3)	52 (75.4)	
Mindfulness	No	1490 (65.9)	426 (56.0)	<0.0001	537 (63.3)	166 (73.8)	0.0041	82 (5.8)	41 (7.6)	0.165
	Yes	771 (34.1)	335 (44.0)		312 (36.7)	59 (26.2)		1330 (94.2)	495 (92.4)	
Shamanic Journey	No	2145 (94.9)	718 (94.3)	0.6442	843 (56.6)	266 (62.4)	0.0352	58 (7.5)	38 (11.3)	0.0503
	Yes	116 (5.1)	43 (5.7)		647 (43.4)	160 (37.6)		713 (92.5)	297 (88.7)	
Guided Hypnosis	No	2183 (96.6)	726 (95.4)	0.1818	1568 (73.1)	536 (74.7)	0.4434	36 (31.0)	8 (18.6)	0.1749
	Yes	78 (3.4)	35 (4.6)		577 (26.9)	182 (25.3)		80 (69.0)	35 (81.4)	

(*Continued*)

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Table 3 (Continued).

Demographic Category		CHA Usage			Favorable Expectation of CHAs			Favorable Experience with CHAs		
		Without Chronic Pain N (%)	With Chronic Pain N (%)	p-value	Without Chronic Pain N (%)	With Chronic Pain N (%)	p-value	Without Chronic Pain N (%)	With Chronic Pain N (%)	p-value
Self-Hypnosis	No	2124 (93.9)	714 (93.8)	0.9769	1443 (66.1)	469 (64.6)	0.4882	19 (24.4)	9 (25.7)	1
	Yes	137 (6.1)	47 (6.2)		740 (33.9)	257 (35.4)		59 (75.6)	26 (74.3)	
Any Combined CHA	No	674 (29.8)	180 (23.7)	0.0013	1545 (72.7)	542 (75.9)	0.1069	29 (21.2)	12 (25.5)	0.6765
	Yes	1587 (70.2)	581 (76.3)		579 (27.3)	172 (24.1)		108 (78.8)	35 (74.5)	
Deep Breathing	No	1191 (52.7)	340 (44.7)	0.0002	1287 (57.1)	465 (61.4)	0.0395	97 (6.1)	30 (5.2)	0.4655
	Yes	1070 (47.3)	421 (55.3)		968 (42.9)	292 (38.6)		1490 (93.9)	551 (94.8)	
Progressive Relaxation	No	1734 (76.7)	540 (71.0)	0.0018	510 (42.8)	175 (51.5)	0.0057	72 (6.7)	25 (5.9)	0.6595
	Yes	527 (23.3)	221 (29.0)		681 (57.2)	165 (48.5)		998 (93.3)	396 (94.1)	
Meditation	No	1373 (60.7)	392 (51.5)	<0.0001	778 (44.9)	280 (51.9)	0.0052	41 (7.8)	21 (9.5)	0.526
	Yes	888 (39.3)	369 (48.5)		956 (55.1)	260 (48.1)		486 (92.2)	200 (90.5)	
Biofeedback	No	2169 (95.9)	723 (95.0)	0.3252	628 (45.7)	217 (55.4)	0.001	68 (7.7)	26 (7.0)	0.7967
	Yes	92 (4.1)	38 (5.0)		745 (54.3)	175 (44.6)		820 (92.3)	343 (93.0)	
Guided Imagery	No	2100 (92.9)	686 (90.1)	0.0186	1477 (68.1)	493 (68.2)	1	21 (22.8)	6 (15.8)	0.5081
	Yes	161 (7.1)	75 (9.9)		692 (31.9)	230 (31.8)		71 (77.2)	32 (84.2)	
Acupuncture	No	2130 (94.2)	703 (92.4)	0.0864	1450 (69.0)	490 (71.4)	0.2586	23 (14.3)	7 (9.3)	0.3933
	Yes	131 (5.8)	58 (7.6)		650 (31.0)	196 (28.6)		138 (85.7)	68 (90.7)	
Yoga	No	1793 (79.3)	627 (82.4)	0.0728	1198 (56.2)	390 (55.5)	0.7552	33 (25.2)	12 (20.7)	0.6277
	Yes	468 (20.7)	134 (17.6)		932 (43.8)	313 (44.5)		98 (74.8)	46 (79.3)	
Tai-Chi	No	2153 (95.2)	717 (94.2)	0.3165	828 (46.2)	339 (54.1)	0.0008	34 (7.3)	14 (10.4)	0.3085
	Yes	108 (4.8)	44 (5.8)		965 (53.8)	288 (45.9)		434 (92.7)	120 (89.6)	
Movement Therapy	No	2079 (92.0)	673 (88.4)	0.0042	1210 (56.2)	442 (61.6)	0.012	12 (11.1)	9 (20.5)	0.2095
	Yes	182 (8.0)	88 (11.6)		943 (43.8)	275 (38.4)		96 (88.9)	35 (79.5)	
Art, Music, or Dance	No	1147 (50.7)	349 (45.9)	0.0225	1061 (51.0)	377 (56.0)	0.0274	23 (12.6)	16 (18.2)	0.303
	Yes	1114 (49.3)	412 (54.1)		1018 (49.0)	296 (44.0)		159 (87.4)	72 (81.8)	
Healing Systems CHA Use	No	1994 (88.2)	656 (86.2)	0.1674	571 (49.8)	191 (54.7)	0.1194	57 (5.1)	12 (2.9)	0.089
	Yes	267 (11.8)	105 (13.8)		576 (50.2)	158 (45.3)		1057 (94.9)	400 (97.1)	
Traditional Systems	No	2030 (89.8)	686 (90.1)	0.8288	1198 (54.5)	421 (57.3)	0.2095	47 (17.6)	16 (15.2)	0.6937
	Yes	231 (10.2)	75 (9.9)		999 (45.5)	314 (42.7)		220 (82.4)	89 (84.8)	
Naturopathy	No	2161 (95.6)	705 (92.6)	0.0021	1115 (54.9)	405 (59.0)	0.0671	32 (13.9)	15 (20.0)	0.272
	Yes	100 (4.4)	56 (7.4)		915 (45.1)	281 (41.0)		199 (86.1)	60 (80.0)	

Note: Statistical significance was set as <0.05 as calculated by Pearson Chi Square analysis.
Abbreviations: CHA, Complementary Health Approach; OR, Odds ratio; 95% CI, 95% Confidence Interval; RX, Prescription; PT, Physical Therapy.

Participants with chronic pain reported significantly greater use of CHAs across nearly all categories, including nutritional, physical, psychological, and combined psychological/physical modalities. The most notable differences were observed in physical approaches such as osteopathic manipulation (6.3% vs 2.4%, $p < 0.001$), massage therapy (21.4% vs 14.6%, $p < 0.001$), and chiropractic care (16.0% vs 10.9%, $p < 0.001$). Similarly, individuals with chronic pain were more likely to use supplements (51.1% vs 42.0%, $p < 0.001$), engage in mindfulness practices (44.0% vs 34.1%, $p < 0.001$), and practice deep breathing (55.3% vs 47.3%, $p < 0.001$).

Combined psychological and physical modalities were also more frequently used by those with chronic pain. This included higher usage of progressive relaxation (29.0% vs 23.3%, $p = 0.002$), meditation (48.5% vs 39.3%, $p < 0.001$),

and guided imagery (9.9% vs 7.1%, p = 0.019). Use of psychological approaches such as prayer (70.4% vs 62.5%, p < 0.001) and spiritual healing (9.1% vs 5.6%, p = 0.001) was also significantly more common in the chronic pain group.

Fewer differences were observed for less frequently used modalities. While the use of acupuncture (7.6% vs 5.8%, p = 0.086) and guided hypnosis (4.6% vs 3.4%, p = 0.189) trended higher in the chronic pain group, these differences were not statistically significant. Similarly, there were no significant differences in the use of traditional healing systems (9.9% vs 10.2%, p = 0.829) or yoga (17.6% vs 20.7%, p = 0.073).

Despite higher usage rates, individuals with chronic pain generally reported less favorable expectations of CHA effectiveness in several domains, including nutritional approaches, prayer, mindfulness, meditation, and yoga. However, favorable experiences frequently exceeded expectations across nearly all categories. Respondents with chronic pain reported more favorable experiences than expectations for modalities such as acupuncture, herbalism, osteopathic manipulation, massage therapy, guided imagery, and naturopathy.

Figure 1 demonstrates the CHA usage percentage, comparing those with chronic pain vs those without.

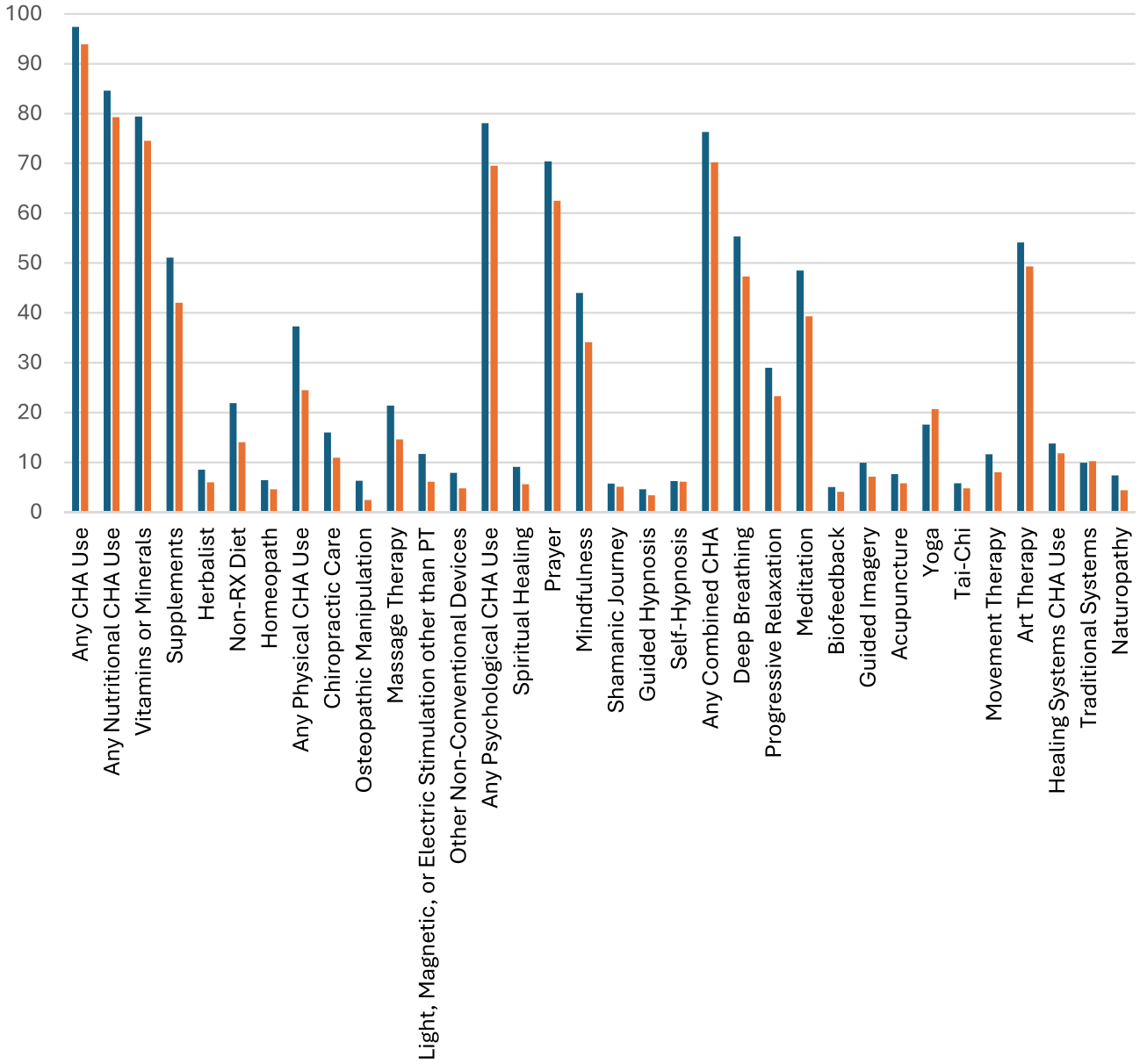

Figure 1 CHA Percentage Usage of those With and Without Chronic Pain. Blue (Did have chronic pain (%)); Orange (Did not have chronic pain (%)).

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Logistic Regression Results

Table 4 presents the results of logistic regression analyses that were conducted to evaluate the independent association between chronic pain status and the use of complementary health approaches (CHAs), both before and after adjusting for demographic and socioeconomic variables.

In unadjusted analyses, individuals with chronic pain had significantly higher odds of using any CHA compared to those without chronic pain (unadjusted OR = 2.41, 95% CI: 1.50–3.88). After adjusting for covariates including age, sex, race/ethnicity, education, employment, insurance status, poverty level, and region, the association remained robust and slightly increased (adjusted OR = 2.36, 95% CI: 1.44–3.87), indicating that chronic pain is an independent predictor of CHA use.

Table 4 Unadjusted and Adjusted Odds Ratios for the Use of CHA Amongst Subjects with Chronic Pain Compared to Those Without Chronic Pain

Demographic Category	OR Unadjusted (CI 95%)	OR Adjusted (CI 95%)
Any CHA Use	2.41 (1.50–3.88)	2.36 (1.44–3.87)
Any Nutritional CHA Use	1.43 (1.15–1.79)	1.42 (1.12–1.79)
Vitamins or Minerals	1.32 (1.08–1.61)	1.28 (1.03–1.58)
Supplements	1.45 (1.23–1.70)	1.46 (1.22–1.73)
Herbalist	1.46 (1.07–1.98)	1.91 (1.38–2.65)
Non-RX Diet	1.72 (1.40–2.12)	1.82 (1.46–2.26)
Homeopathic Medicine	1.41 (1.00–2.00)	1.80 (1.24–2.59)
Any Physical CHA Use	1.84 (1.54–2.19)	2.14 (1.78–2.58)
Chiropractic Care	1.56 (1.24–1.98)	1.68 (1.31–2.15)
Osteopathic Manipulation	2.75 (1.85–4.10)	3.29 (2.15–5.02)
Massage Therapy	1.60 (1.30–1.97)	1.99 (1.59–2.50)
Light, Magnetic, or Electric Stimulation other than PT	2.05 (1.55–2.72)	2.42 (1.80–3.25)
Other Non-Conventional Devices	1.71 (1.23–2.37)	2.13 (1.51–3.01)
Any Psychological CHA Use	1.56 (1.29–1.90)	1.52 (1.24–1.86)
Spiritual Healing	1.68 (1.23–2.27)	2.15 (1.56–2.98)
Prayer	1.43 (1.20–1.71)	1.34 (1.11–1.62)
Mindfulness	1.52 (1.29–1.80)	1.70 (1.43–2.03)
Shamanic Journey	1.11 (0.77–1.59)	1.31 (0.90–1.91)
Guided Hypnosis	1.35 (0.90–2.03)	1.73 (1.12–2.67)
Self-Hypnosis	1.02 (0.72–1.44)	1.29 (0.90–1.84)
Any Combined CHA	1.37 (1.13–1.66)	1.60 (1.31–1.96)
Deep Breathing	1.38 (1.17–1.63)	1.57 (1.32–1.87)
Progressive Relaxation	1.35 (1.12–1.62)	1.60 (1.32–1.95)
Meditation	1.46 (1.23–1.72)	1.70 (1.42–2.02)
Biofeedback	1.24 (0.84–1.83)	1.49 (0.99–2.25)
Guided Imagery	1.43 (1.07–1.90)	1.69 (1.25–2.28)
Acupuncture	1.34 (0.97–1.85)	1.68 (1.19–2.36)
Yoga	0.82 (0.66–1.01)	1.06 (0.84–1.33)
Tai-Chi	1.22 (0.85–1.75)	1.51 (1.03–2.20)
Movement Therapy	1.49 (1.14–1.95)	1.67 (1.26–2.22)
Art, Music, or Dance	1.22 (1.03–1.43)	1.38 (1.16–1.65)
Healing Systems CHA Use	1.20 (0.94–1.52)	1.49 (1.15–1.93)
Traditional Systems	0.96 (0.73–1.26)	1.17 (0.88–1.56)
Naturopathy	1.72 (1.22–2.41)	2.28 (1.59–3.27)

Notes: Results were calculated through two separate logistic regressions. The unadjusted logistic regression entered only surgery use as a predictor without the demographics, and then the adjusted included demographics.
Abbreviations: CHA, Complementary Health Approach; OR, Odds ratio; 95% CI, 95% Confidence Interval; RX, Prescription; PT, Physical Therapy.

Adjusted models revealed significantly increased odds of CHA use among individuals with chronic pain across most categories. Physical approaches showed some of the strongest associations: osteopathic manipulation (adjusted OR = 3.29, 95% CI: 2.15–5.02), massage therapy (adjusted OR = 1.99, 95% CI: 1.59–2.50), and chiropractic care (adjusted OR = 1.68, 95% CI: 1.31–2.15). Use of light, magnetic, or electrical stimulation (adjusted OR = 2.13, 95% CI: 1.80–3.25) and non-conventional therapeutic devices (adjusted OR = 2.13, 95% CI: 1.51–3.01) were also more likely among those with chronic pain.

Nutritional CHAs, including supplements (adjusted OR = 1.46, 95% CI: 1.22–1.73), vitamins or minerals (adjusted OR = 1.28, 95% CI: 1.03–1.58), and visits to herbalists (adjusted OR = 1.91, 95% CI: 1.38–2.65), were also significantly associated with chronic pain. Psychological modalities such as prayer (adjusted OR = 1.34, 95% CI: 1.11–1.62), mindfulness (adjusted OR = 1.70, 95% CI: 1.43–2.03), and spiritual healing (adjusted OR = 2.15, 95% CI: 1.56–2.98) remained elevated, even after controlling for demographic factors.

Several combined psychological/physical approaches also showed significant associations with chronic pain. These included deep breathing (adjusted OR = 1.57, 95% CI: 1.32–1.87), progressive relaxation (adjusted OR = 1.60, 95% CI: 1.32–1.95), and meditation (adjusted OR = 1.70, 95% CI: 1.42–2.02). Other modalities such as guided imagery (adjusted OR = 1.69, 95% CI: 1.25–2.28) and guided hypnosis (adjusted OR = 1.73, 95% CI: 1.12–2.67) also showed statistically significant associations.

Not all CHA categories were significantly associated with chronic pain after adjustment. Traditional healing systems (adjusted OR = 1.17, 95% CI: 0.88–1.57), biofeedback (adjusted OR = 1.49, 95% CI: 0.99–2.27), shamanic journey (adjusted OR = 1.31, 95% CI: 0.90–1.91), self-hypnosis (adjusted OR = 1.29, 95% CI: 0.90–1.84), and yoga (adjusted OR = 1.07, 95% CI: 0.85–1.34) did not show statistically significant differences. Although the odds ratios increased slightly after adjustment, their confidence intervals included 1.00, suggesting no independent association.

Interestingly, in a few cases, adjusting for demographics slightly attenuated the strength of association. For example, the odds ratio for Any CHA use decreased from 2.41 (95% CI: 1.50–3.88) to 2.36 (95% CI: 1.44–3.87), Any Nutritional CHA use decreased from 1.43 (95% CI: 1.15–1.79) to 1.42 (95% CI: 1.12–1.79), Vitamins or Supplement use decreased from 1.32 (95% CI: 1.08–1.61) to 1.28 (95% CI: 1.03–1.58), psychological CHA use decreased from 1.56 (95% CI: 1.29–1.90) to 1.52 (95% CI: 1.24–1.86), and for prayer from 1.43 (95% CI: 1.20–1.71) to 1.34 (95% CI: 1.11–1.62), indicating some confounding by demographic variables.

Figure 2 illustrates the impact of demographic adjustment on the estimated odds ratios (ORs) for CHA usage associated with chronic pain. In most cases, adjustment for covariates resulted in a slight reduction in effect size, with adjusted ORs shifting to the right, indicating a smaller, but still significant, association. Notably, the ORs for "Any CHA Use", "Any Nutritional CHA Use", "Vitamins or Minerals", "Any Psychological CHA Use" and "Prayer" were the only ones that shifted leftward after adjustment, suggesting demographic factors may partially explain these associations.

Several modalities not statistically significant in unadjusted models became significant after adjustment, including homeopathic medicine (unadjusted OR = 1.41, 95% CI: 1.00–2.00; adjusted OR = 1.80, 95% CI: 1.24–2.59), guided hypnosis (unadjusted OR = 1.35, 95% CI: 0.90–2.03; adjusted OR = 1.73, 95% CI: 1.12–2.67), acupuncture (unadjusted OR = 1.34, 95% CI: 0.97–1.85; adjusted OR = 1.68, 95% CI: 1.19–2.36), tai chi (unadjusted OR = 1.22, 95% CI: 0.85–1.75; adjusted OR = 1.51, 95% CI: 1.03–2.20), and Healing Systems CHA use (unadjusted OR = 1.20, 95% CI: 0.94–1.52; adjusted OR = 1.49 95% CI: 1.15–1.93). In contrast, some modalities remained non-significant after adjustment, including shamanic journey (unadjusted OR =1.11, 95% CI: 0.77–1.59; adjusted OR = 1.31, 95% CI: 0.90–1.91), self-hypnosis (unadjusted OR =1.02, 95% CI: 0.72–1.44; adjusted OR = 1.29, 95% CI: 0.90–1.84), biofeedback (unadjusted OR =1.24, 95% CI: 0.84–1.83; adjusted OR = 1.49, 95% CI: 0.99–2.25), yoga (unadjusted OR = 0.82, 95% CI: 0.66–1.01; adjusted OR = 1.06, 95% CI: 0.84–1.33), and traditional healing systems (unadjusted OR =0.96, 95% CI: 0.73–1.26; adjusted OR = 1.17, 95% CI: 0.88–1.56). These results highlight that demographic and socioeconomic variables can either obscure or exaggerate true associations between chronic pain and CHA utilization, depending on the modality.

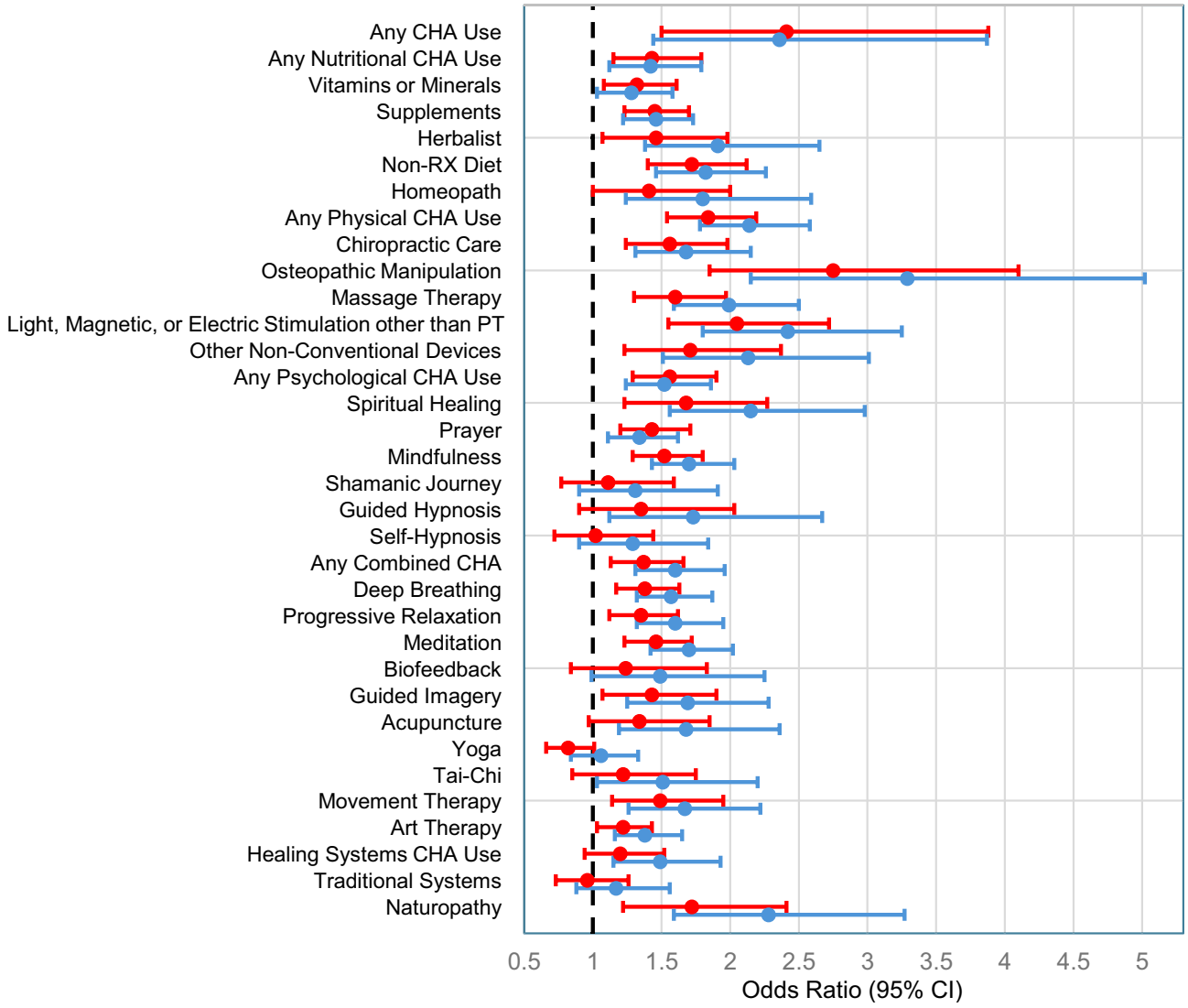

Figure 2 Forest Plot of Unadjusted vs Adjusted Odds Ratios. Red (Unadjusted OR); Blue (Adjusted OR).

Discussion

Summary of Key Findings

This nationally representative study found that individuals with chronic pain are significantly more likely to use CHAs than those without chronic pain. The association remained strong after adjusting for a wide range of demographic and socioeconomic variables, suggesting that chronic pain independently predicts increased CHA utilization. Among the 28 CHA modalities examined, the greatest differences were observed in physical approaches such as osteopathic manipulation, massage therapy, and chiropractic care. Psychological and mind-body practices, including mindfulness, meditation, and deep breathing, were also more commonly used by those with chronic pain. In contrast, use of traditional systems and yoga did not significantly differ between groups after adjustment. These results highlight the real-world relevance of CHA use as a self-directed strategy for managing chronic pain, reflecting patient preferences and perceived gaps in conventional care. They also suggest opportunities for multidisciplinary teams to better support patients through integrative care planning.

Interpretation of Results

The elevated use of CHAs among individuals with chronic pain likely reflects a combination of dissatisfaction with conventional treatments and a desire for more holistic or personalized care. Many patients turn to non-pharmacologic strategies due to the limitations or side effects of standard medical interventions, particularly opioids. This demonstrates a shift in behavior where individuals are actively seeking out therapies that align with their values, experiences, and goals. Mind-body and manual therapies may offer perceived or actual benefits in addressing the physical, emotional, and existential aspects of chronic pain. Practices like mindfulness, prayer, and spiritual healing may provide emotional support or a sense of control, while modalities such as massage, osteopathic manipulation, and acupuncture may offer direct symptom relief. The strength of these associations, even after demographic adjustment, suggests that CHA use is not merely a function of access or background characteristics but reflects a meaningful behavioral response to the burden of chronic pain.

The pattern of increased usage for nearly all modalities—paired with consistently more favorable experiences than expectations—suggests that individuals with chronic pain find CHA interventions both appealing and beneficial. Interestingly, while expectations were often modest, particularly for nutritional or spiritual practices, users frequently reported more positive experiences than anticipated. Importantly from this evidence, there is potential for clinicians to engage patients in shared decision-making around CHA use, especially when initial skepticism may be overcome by positive outcomes. This discrepancy may reflect low initial expectations due to unfamiliarity or skepticism, followed by perceived improvements after engagement with these modalities.

Comparison with Previous Literature

These findings align with prior research showing elevated CHA use among individuals with chronic pain, but they extend the literature by adjusting for key demographic confounders across a large national sample. Previous studies have documented increased use of acupuncture, chiropractic, and meditation among pain sufferers, though most lacked the scope or analytical rigor to isolate the independent effect of chronic pain status from demographic influences.[12,15,16]

Clinical Implications

The findings of this study have several important clinical implications. The high prevalence of CHA use among individuals with chronic pain suggests that healthcare providers should routinely inquire about these practices during clinical encounters. Open, nonjudgmental communication about CHA use allows clinicians to assess potential interactions with conventional treatments, guide patients toward evidence-based options, and better understand patients' self-management strategies and values. This approach supports a more holistic, patient-centered model of care that integrates diverse therapeutic modalities into multidisciplinary treatment plans.

Although many patients report more favorable experiences than expected, clinical recommendations should acknowledge that evidence for complementary health approaches remains mixed and there are gaps in the current literature. Integration into care should emphasize modalities with demonstrated safety and moderate efficacy, prioritizing those supported by the strongest scientific evidence as part of a comprehensive, multidisciplinary pain management plan.

The strong associations observed for physical and mind-body modalities highlight the potential value of integrating these approaches into mainstream care. Techniques such as osteopathic manipulation, mindfulness, and massage therapy have shown benefit in managing chronic musculoskeletal pain, and may help reduce reliance on pharmacologic treatments, including opioids. Incorporating these therapies into multidisciplinary care teams, alongside physicians, physical therapists, psychologists, and other providers, can enhance treatment outcomes and align with best practices for pain management. Encouraging the use of effective, nonpharmacologic therapies aligns with clinical guidelines that recommend multidisciplinary approaches for chronic pain and supports ongoing efforts to combat the opioid crisis.[18]

Policy Implications

From a policy perspective, this study underscores the need to expand access CHAs, especially for vulnerable populations. Many CHAs, including acupuncture and massage therapy, are not covered by public or private insurance plans, creating

financial barriers for those most in need. This limited coverage persists despite growing evidence supporting the efficacy of certain CHAs for chronic pain management.[13]

Our findings suggest that individuals with chronic pain are highly motivated to explore alternative options, but access may be constrained by income, insurance status, and geographic region. Policies that promote equitable access to evidence-based CHAs, through insurance coverage, provider training, and integrative care models, could empower patients and reduce the burden of untreated or poorly managed chronic pain. Expanding access to integrative care models may also reduce downstream healthcare costs by preventing complications associated with chronic pain and medication overuse.

Strengths of the Study

This study offers several methodological strengths. It used a large, demographically representative national sample of US adults, achieved through quota sampling aligned with US Census benchmarks. Unlike previous surveys, it employed multivariable logistic regression to adjust for key demographic and socioeconomic factors, allowing for a more accurate assessment of the independent association between chronic pain and CHA utilization.

In addition, the survey captured a broad array of 28 specific CHA modalities and included participant-reported expectations and experiences with each. This level of detail provides a nuanced understanding of how individuals engage with CHAs and perceive their effectiveness. Including an additional "Healing Systems" category beyond the standard NCCIH classifications also enhances the relevance of findings to a diverse range of health beliefs and practices.

Limitations

While this study contributes valuable insights, several limitations must be acknowledged. First, the cross-sectional design precludes causal inference; while chronic pain is associated with greater CHA use, we cannot determine whether CHA use reduces pain, results from inadequate conventional care, or both. Longitudinal studies are needed to clarify temporal relationships.

Second, all data were self-reported, including chronic pain diagnosis and CHA use. This introduces potential for recall bias or social desirability bias. Respondents may have underreported or overreported their use of certain modalities based on perceived acceptability or memory constraints. Additionally, the study did not assess the frequency, duration, or clinical effectiveness of CHA use, limiting the interpretation of the health impact of these behaviors.

Although the sample was quota-balanced for key demographics, it was not drawn using true probability sampling, and responses were collected online, which may bias the sample toward individuals with internet access or specific engagement preferences. Non-binary gender identities were not included in the final analysis due to low representation (<1%), limiting the findings' inclusivity.

Individual CHA use was assessed with a single yes/no question regarding use in the past year. Users were asked to rate how favorable their experience had been, while non-users rated how positive they would expect their experience to be. Consequently, "favorability" ratings reflect actual user experiences, whereas "expectation" ratings reflect non-user perceptions. Because expectation data were not collected from individuals with actual use experience, the observed discrepancies between expectations and experiences cannot be interpreted as expectations improving after use. Instead, the results more strongly suggest that individuals with positive expectations are more likely to try CHAs, while those with negative expectations tend to avoid them, introducing potential bias in the findings.

Lastly, although we adjusted for a broad demographic and socioeconomic covariates, unmeasured confounders (eg, private vs public insurance, comorbid mental health conditions, prior trauma, or healthcare access) could influence the observed associations.

Future Research Directions

Future research should prioritize longitudinal designs to explore whether CHA use contributes to changes in pain severity, functional status, or healthcare utilization over time. Additionally, qualitative studies could explore patient motivations for choosing CHAs, perceived benefits or barriers, and satisfaction with care. Understanding these factors can inform integrative pain care models that are more responsive to patient decision-making and lived experiences.

Further research is also warranted to assess the clinical effectiveness and cost-efficiency of specific CHA modalities in managing chronic pain and reducing opioid medication use. Evaluating how CHAs fit within multidisciplinary care frameworks, especially when combined with conventional treatments, could guide more holistic and sustainable pain management strategies. Trials that evaluate combinations of conventional and complementary therapies may help guide evidence-based integration into routine care. Finally, policy-oriented studies examining insurance coverage trends, regulatory frameworks, and access disparities could support more equitable delivery of integrative services.

Conclusion

This study demonstrates that chronic pain is independently associated with significantly greater use of complementary health approaches among US adults, even after adjusting for a wide range of demographic and socioeconomic variables. The findings reflect substantial unmet needs within conventional care and suggest that many individuals with chronic pain are actively seeking alternative methods to manage their symptoms.

The consistent pattern of higher CHA engagement—particularly for physical and mind-body modalities—emphasizes the relevance of these approaches in real-world pain management. This emphasizes the importance of recognizing patient agency in treatment choices and the need for care models that accommodate diverse therapeutic preferences. Healthcare providers, policymakers, and researchers should recognize the growing role of CHAs and work toward integrating evidence-based, accessible, and patient-centered options into multidisciplinary care strategies that address the complex nature of chronic pain.

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Author Contributions

TMM and RO contributed to the conception and design of the study. TMM was responsible for data acquisition and management. ADA, KA, and TMM performed the data analysis and interpretation. ADA drafted the initial manuscript. TMM, RA KA, and RO critically revised the manuscript for important intellectual content. All authors—TMM, ADA, KA, RA, and RO—made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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