

# Predictors of Complementary and Alternative Medicine Use in Chronic Pain Patients

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## Abstract

**Objective.** We used Andersen's behavioral model of healthcare utilization to assess the relationship between sociodemographic, physical and psychosocial factors, and Complementary and Alternative Medicine (CAM) use among chronic pain patients. Three practitioner-based alternative therapies were considered: acupuncture, biofeedback/relaxation training, and manipulation services.

**Design.** A retrospective analysis of self-reported clinical data with 5,750 black and white adults presenting for initial assessment between 1994 and 2000 at the University of Michigan Multidisciplinary Pain Center was performed.

**Results.** CAM therapies were used in high frequencies, with 34.7% users. Specifically 8.3% used acupuncture, 13.0% used biofeedback/relaxation, and 24.9% used manipulation techniques. Race and age were predisposing factors associated with CAM use. Blacks used less biofeedback/relaxation and manipulation services than whites. Aging was related to more acupuncture, but less biofeedback/relaxation use. Women marginally used more biofeedback/relaxation services than men, and education was positively associated with all three CAM use. Perceived pain control was a consistent enabling factor positively correlated with the use of all three CAM services. Among need factors, pain characteristics and physical health were positively associated with at least one of the modalities. Depressive symptoms were not related to CAM services use.

**Conclusion.** This study identifies variable patterns of CAM usage based on sociodemographic and

health factors in chronic pain patients. Overall, who uses CAM depends on the modality; however, education, pain severity, and pain duration are persistent correlates of CAM usage regardless of the therapy considered. We found that mental health, as measured by depressive symptoms, had no noticeable impact on CAM usage among chronic pain patients. The clinical, policy, and research implications of CAM use are discussed.

**Key Words.** Complementary and Alternative Medicine; Health Services Utilization; Andersen's Model; Chronic Pain

## Introduction

The importance of Complementary and Alternative Medicine (CAM) relates to its increasing usage, its economic impact, but also to concerns with safety and effectiveness [1–3]. Who uses CAM is a crucial question for policy makers and clinicians as they attempt to deal with its increasing demand. Answering this question however is not trivial, as CAM researchers often face methodological problems related to differences in the operationalization of CAM modalities, the absence of clear theoretical model for CAM use, and the choice of study populations likely to have some meaning for clinical and policy decision making. Overall there is more or less an agreement that CAM use is associated with sociodemographic factors, including age, gender, and education. Its association with health status and psychological factors such as control of illness, philosophical orientation, and perception of conventional medicine is also recognized [4]. On the other hand, chronic pain, which has been found to double the odds of using CAM services [5], is one of the main reasons for seeking help outside allopathic medicine [4]. However, most CAM studies overlook the particular situation of people living with chronic pain, with regards to their needs and multidimensional symptoms. When CAM studies finally focus on this population, they often fail to assess the role of physical, psychosocial, and medical factors on health seeking behaviors. Furthermore, despite evidence that the predictors of specific CAM services vary for individual modalities [6], most studies focus on multiple CAM services usage, rendering comparisons across studies difficult.

The purpose of the present study is to identify the socio-demographic, physical, and psychosocial correlates of provider-based alternative therapies among chronic pain patients by using Andersen's model of health services utilization as a theoretical framework [7]. The model proposes that health services use is dependent upon individual, societal, and health system factors. Theoretically, it is based on a consecutive sequence of predisposing, enabling, and need factors conceptually linked to health

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care practices. Predisposing factors are nonbehavioral causes that contribute to health services use and are often not readily modified by individual choices. These include race, age, and gender, which all contribute to shape belief systems. Education, marital status, and past experiences with conventional pain care are also individual factors that contribute to the recognition of need and decision to seek care. Enabling factors encompass family and community resources and their accessibility. In the study of pain, individuals' perception of pain control and access to pain care are relevant predictors. As all patients in the study received care from the tertiary pain care center, of interest, financial and physical accessibility of pain services were not assessed. Finally, the need factors encompass functional capacity, symptoms, and health status. The utilization of health services by chronic pain patients depends on multiple need factors, including physical factors such as pain-related symptoms (severity and duration), preexisting medical conditions (co-morbidities and previous operations), functional capacity, and mental health (depressive symptoms). This model has been successfully used in the study of CAM [8].

### Methods

Using a clinical database, a secondary data analysis was performed. All patients upon initial presentation to the Multidisciplinary Pain Center completed the self-administered Pain Assessment Inventory Narrative, which contains patients' sociodemographic characteristics, medical history, and previously validated scales measuring physical and psychosocial health. Black and white adult patients ( $\geq 18$  years old) with chronic pain between 1994 and 2000 were included in the analyses ( $N = 5,750$ ).

### Measures

#### Dependent Variable

##### *Complementary and Alternative Medicine Modalities*

Three of the most common CAM modalities reported in the literature requiring a practitioner were available in the dataset. These were alternative medical system, manipulation, and mind-body techniques [6]. Patients provided self-report data about acupuncture, manipulation (chiropractic or osteopathic), and biofeedback and/or relaxation training use for pain upon initial evaluation. The following question was asked: "since your pain condition began, which of the following therapies have you received for pain: 1) acupuncture; 2) manipulation—chiropractic or osteopathic; and 3) biofeedback and/or relaxation training." No further definition of the modalities were provided. Responses were collected in a dichotomous format (0 = never used; 1 = used the CAM service listed).

#### Predisposing Factors

##### *Sociodemographic Factors*

Age; gender (0 = female, 1 = male); race (0 = white, 1 = black); education (1 = less than high school, 2 = high

school graduate, 3 = college graduate); and marital status (0 = other, 1 = married/significant other) were self-reported.

##### *Negative Perception of Pain Care*

Despite a few contradictory findings, dissatisfaction with conventional medicine is widely recognized as a major determinant of CAM use [4,9–11]. Perceived dissatisfaction with pain care was measured using the following item: "how would you rate your overall satisfaction with the care and treatment you have received for pain to date" (1 = very satisfied, 5 = very dissatisfied).

#### Enabling Factors

##### *Perceived Pain Control and Pain Prediction*

Assessment of individuals' adaptation of cognitive and affective state in response to chronic illness has also been linked to CAM use [12]. Two questions derived from the West Haven-Yale Multidisciplinary Pain Inventory [13] were used to assess pain control on a 7-point Likert scale (0 = none; 6 = complete): 1) how much control do you have over your pain; and 2) how often can you predict your pain (0 = never; 6 = always).

##### *Residence Income*

Information on a subject's median household income based on residence zip code was obtained via the 1999 U.S. Census data. This measure provides an indication about the respondent's social standing and community resources, and captures some information about the availability of social services in the place of residence.

#### Need Factors

The use of health services, including CAM, depends on physical, social, and mental health [4,7]. In chronic pain, these dimensions can be measured via pain characteristics, physical and social functioning, and depressive symptoms reflective of changes in mood. Anxiety, which is also an important psychosocial factor in the experience with pain was not available for evaluation.

##### *Medical Factors*

Patients' medical history was assessed via the number of operations prior to accessing the tertiary pain center and number of co-morbidities from a list of five stress-related co-morbidities commonly found among chronic pain patients and available in the dataset (asthma, high-blood pressure, irritable bowel syndrome, gastric ulcer, and colitis).

##### *Pain Characteristics*

Pain severity and pain duration were used. The McGill Pain Questionnaire (MPQ) measures pain severity. The MPQ was designed to quantitatively measure subjective pain

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experience [14]. It has 20 groups of single-word pain descriptors with the words in each group increasing in rank ordered intensity. Summing the rank values for the words chosen by the patient in each group results in the Pain Rating Index (PRI) score. The total PRI score was used to measure the patient's self-reported pain severity. Repeated administration of the MPQ has a 70.3% rate of consistency in the total PRI score [14]. Self-reported pain duration (in months) at time of initial presentation was also used.

### Disability

The Pain Disability Index (PDI) evaluates interference with physical and social functioning due to pain. It is a 7-item instrument assessing pain interference in seven areas of functioning. The PDI total score (0 = no disability, 10 = total disability, 70 = maximum disability score) is computed by summing responses to all seven items. PDI is widely used for chronic pain and has good reliability [15].

### Mental Health

Depression is known to be associated with CAM services utilization [12]. It is also very prevalent in chronic pain patients, and worsens individuals' experiences with pain. The Beck Depression Inventory (BDI) is a 21-item survey assessing depressive symptoms by measuring emotions, behavioral changes, and somatic symptoms specific to people with depression. The total score (0–63) covers different depressive symptoms. BDI has good reliability and is also widely used to screen for depression [16].

### Statistical Analyses

The analyses were performed using the Statistical Package for the Social Sciences (SPSS). Preliminary tests demonstrated good reliability for MPQ (Cronbach's  $\alpha = 0.82$ ) and PDI (Cronbach's  $\alpha = 0.85$ ) in our sample. Individual items were not available for BDI. Descriptive statistics were computed to establish sample demographic characteristics; and bivariate analyses assessed the independent effect of the predictors on CAM services use. The data were fitted to four logistic regression models evaluating the conditional relationships between each CAM service, and either of the CAM services on one hand, and the independent variables on the other hand. For each CAM service, the data were analyzed in three blocks corresponding to Andersen's conceptual model for health services utilization. Predisposing factors were entered in block 1: age, gender, race, education, marital status, and pain care perception. Enabling factors were entered in block 2: self-help skills (pain control and pain prediction) and residence income. In the final model, need factors, including co-morbidities, number of operations, pain characteristics, functional limitations, and depressive symptoms were entered. Statistical significance was determined using two-tailed tests, with the probability of Type I error of  $P < 0.05$ .

## Results

Information was available for 5,750 patients, with complete information obtained from 5,079 after imputation for missing data. The majority were white (91.2%), women (60.7%), married or living with a significant other (66.4.0%), and had at least a high school education (84.3%). Age ranged from 18 to 92 years, and the average median household income ranged from \$24,379 to \$45,401 (mean  $\pm$  SD; \$34,758  $\pm$  10,236). More demographic information for the sample is available in Table 1.

### Bivariate Analysis

Table 1 also presents the results from the bivariate analysis for use of at least one of the three CAM modality (0 = no; 1 = at least one CAM service). More than one of three patients reported using at least one CAM service for pain prior to being seen at the pain center (34.7%). Specifically, 8.3% used acupuncture, 13.0% used biofeedback/relaxation training, and 24.9% used manipulation services. Overall, CAM use was less frequent among blacks, but increased with education. CAM use was not independently associated with gender, nor was it associated with age. However, CAM use increased with dissatisfaction with pain care. Of the enabling factors, only perceived pain control was associated with CAM use. As it relates to need factors, CAM users reported poorer physical and mental health, when compared with nonusers on: number of co-morbidities, pain duration, pain severity, functional limitations, and depressive symptoms. Table 2 provides the bivariate analysis for each type of CAM modality. Higher education, more co-morbidities, longer pain duration and greater pain severity were significantly associated with all three CAM use.

### Multivariate Analyses

The model predicting the use of either of the three CAM services support a marginal effect of female gender ( $P = 0.07$ ), and significant positive effects for white race, education, negative perception of pain care, pain control, co-morbidities, pain duration, pain severity and functional limitations (Table 3). Depressive symptoms were no longer associated with CAM use after entering the predisposing, enabling, and other need factors. The model fit statistics were acceptable and the large change in  $-2$  log likelihood statistic suggests a significant contribution of the variable in each block.

Older age, higher education, and negative perception of pain care were associated with greater odds of acupuncture use (Table 4). The effect of residence income became marginal ( $P = 0.088$ ) in the last block. Both pain duration and pain severity remained positively associated with acupuncture use in the multivariate model. There were no major changes to the regression coefficients from block 1 to 3; which suggests little interdependence among predictors of acupuncture use. The model fit statistics were

**Table 1** Descriptive statistics and bivariate analysis for chronic pain patients users and nonusers of at least one CAM service (N = 5,079)

	Sample descriptive statistics	Utilization of at least one CAM	
		Users	Nonusers
<b>Predisposing factors</b>			
Age	46.42 ± 15.0	46.03 ± 14.27	46.63 ± 15.31
Gender (% female)	60.7	62.2	59.9
Race (% black)	8.8	5.8	10.4**
<b>Education</b>			
<High school	15.7	13.9	16.7**
High school graduate	65.9	64.5	66.6
College graduate	18.4	21.6	16.7
Married/sig. other	66.4	68.0	65.5
Negative pain care perception	3.07 ± 1.25	3.12 ± 1.26	3.03 ± 1.24*
<b>Enabling factors</b>			
Perceived pain control	1.50 ± 1.54	1.60 ± 1.51	1.45 ± 1.54**
Pain prediction	2.21 ± 2.12	2.20 ± 2.12	2.21 ± 2.12
Residence income	34,758 ± 10,236	35,101 ± 10,267	34,576 ± 10,217
<b>Need factors</b>			
Number of co-morbidities	0.76 ± 0.90	0.87 ± 0.95	0.71 ± 0.86**
Number of operations	2.97 ± 4.00	3.12 ± 4.49	2.90 ± 3.71
Pain duration/chronicity	45.82 ± 64.68	66.90 ± 83.03	34.60 ± 48.79**
Pain severity	25.97 ± 12.42	27.86 ± 12.06	24.97 ± 12.50**
Functional limitations	39.34 ± 12.38	39.99 ± 11.95	38.99 ± 12.59*
Depressive symptoms	16.40 ± 10.60	17.00 ± 10.54	16.08 ± 10.62**

\*  $P < 0.05$ ; \*\*  $P \leq 0.005$ .

CAM = Complementary and alternative medicine.

acceptable, but the enabling factors did not contribute to the model.

Multivariate analyses confirmed most biofeedback/relaxation services findings at univariate analysis. Younger age, female gender (trend level with  $P = 0.05$ ), white race, and higher education were associated with usage. We also found a positive relationship with higher pain control, and most need factors, including co-morbidities, pain duration, pain severity, and functional limitations. With all other variables in the model, depressive symptoms were no longer associated with biofeedback/relaxation services use. In block 3, the effect of education is increased from a likelihood of biofeedback/relaxation services use of 28.5–51.0%. The effect of education on use is therefore mediated by need for care. The data generally fitted the models.

The multivariate models also confirmed the associations observed in the bivariate analysis for manipulation technique usage. Apart from higher number of operations, being white or more educated, more negative perception of pain care, and greater pain control were significant predictors of CAM usage. So were higher number of co-morbidities, longer pain duration, and greater pain severity. The data also fitted the models, except for block 2, where the model did not reach significance ( $\Delta$ -2log likelihood = 7.022, for 3 degrees of freedom).

## Discussion

Concurrent use of CAM both in general [4] and chronic pain populations [17] is well described in the literature. The current study was designed to identify the correlates of CAM services use in a chronic pain population upon initial assessment at a tertiary pain care center. We confirm high (35%) CAM services utilization to manage pain, with variable rates by therapeutic modality. Overall, predisposing factors had a stronger association with CAM use, compared with enabling and need factors. In agreement with the current literature [18], CAM users were younger, white, more educated, and more dissatisfied with pain care. Contrary to empirical evidence in the general population, however, no significant gender effect was found among chronic pain sufferers. CAM usage was also determined by patients' past experiences with pain care, perceived pain control, and physical health (co-morbidities, pain duration, pain severity, and functional limitations). Neither marital status nor depressive symptoms, both being related to psychosocial health, were associated with overall CAM use.

We also found the associations between predisposing, enabling, need factors, and CAM use to be dependent on the type of CAM services used [4,6,17]. Not surprisingly, education was a major driver of CAM use for chronic pain patients [4–6,18]. Education, by increasing access to

**Table 2** Results from the bivariate analysis for chronic pain patients users and nonusers of specific CAM services (N = 5,079)

	Acupuncture		Biofeedback/relaxation services		Manipulation services	
	Users	Nonusers	Users	Nonusers	Users	Nonusers
<b>Predisposing factors</b>						
Age	50.1 ± 16	46.1 ± 15**	43.3 ± 12.0	46.9 ± 15.3**	46.12 ± 46.52	46.52 ± 15.11
Gender (% female)	61.0	60.7	64.6	60.1*	61.5	60.4
Race (% black)	6.4	9.0	5.1	9.4**	4.7	10.2**
<b>Education</b>						
<High school	12.5	16.0**	12.7	16.1**	12.9	16.6**
High school graduate	58.9	66.5	63.4	66.3	66.7	65.6
College graduate	28.6	17.5	23.9	17.6	20.4	17.7
Married/sig. other	66.0	66.4	66.9	66.3	68.3	65.7
Negative pain care perception	3.25 ± 3.04	3.04 ± 1.25**	3.02 ± 1.28	3.07 ± 1.25	3.18 ± 1.26	3.03 ± 1.25**
<b>Enabling factors</b>						
Perceived pain control	1.56 ± 1.52	1.49 ± 1.54	1.67 ± 1.49	1.47 ± 1.54**	1.59 ± 1.52	1.47 ± 1.54*
Pain prediction	2.15 ± 2.13	2.21 ± 2.12	2.24 ± 2.11	2.20 ± 2.12	2.20 ± 2.13	2.21 ± 2.11
Residence income	36,214 ± 11,194	34,626 ± 10,136**	34,407 ± 9,982	34,811 ± 10,274	25,098 ± 10,135	34,646 ± 10,269
<b>Need factors</b>						
Number of co-morbidities	0.88 ± 0.94	0.75 ± 0.89**	0.97 ± 1.00	0.73 ± 0.88**	0.86 ± 0.94	0.73 ± 0.88**
Number of operations	3.01 ± 3.82	2.97 ± 4.01	3.18 ± 4.24	2.94 ± 3.97	3.21 ± 4.93	2.89 ± 3.64*
Pain duration/chronicity	72.1 ± 87.2	43.4 ± 87.2**	74.32 ± 83.62	41.56 ± 60.21**	70.16 ± 87.68	37.73 ± 52.52**
Pain severity	27.4 ± 12.4	25.8 ± 12.4*	30.5 ± 12.12	25.29 ± 12.33**	27.23 ± 11.86	25.56 ± 12.59**
Functional limitations	40.0 ± 11.5	39.3 ± 12.4	41.53 ± 11.17	39.00 ± 12.52**	39.52 ± 12.18	39.27 ± 12.45
Depressive symptoms	16.4 ± 10.0	16.4 ± 10.6	18.41 ± 11.06	16.10 ± 10.50**	16.73 ± 10.31	16.29 ± 10.69

\* P < 0.05; \*\* P ≤ 0.005.

CAM = Complementary and alternative medicine.

information about the availability, safety, and effectiveness of CAM modalities, and by providing patients with the ability to challenge conventional medicine is a major and consistent contributor to CAM use for chronic pain [4, 17, 19]. Other predisposing factors were less consistent based on the CAM modality considered. The literature proposes that gender difference in CAM use mirrors that of conventional medicine. Women are more likely to use alternative therapies than men [17, 18, 20]. However, we failed to find a gender effect in CAM use for chronic pain, except for a marginal effect with biofeedback/relaxation services. These findings can be interpreted in two ways. Chronic pain could eliminate gender differences in CAM services utilization by altering pain seeking behaviors among men. Alternatively, gender differences in the distribution of chronic conditions may explain our findings. In a Canadian study, greater rates of back pain among men explained their higher usage of CAM services compared with women [21]. There is also empirical evidence that women experience a greater psychological benefit from relaxation training when compared with men [22]; which could explain the slightly higher frequency of biofeedback/relaxation services usage among women.

Overall, our study supports that, blacks use less CAM services than whites [6, 18]. However, we also found that

this racial difference depends on the modality. Black patients with chronic pain were approximately 50% less likely to use CAM services than their white counterparts, but we did not find a difference for acupuncture. This is consistent with the literature, describing lower usage of body-based techniques (i.e., chiropractic services) [23, 24], and psychological therapies (i.e., biofeedback/relaxation) in blacks [25]. Information on the utilization of spirituality and prayers among blacks is abundant, but few attempts have been made to explain the persistent racial differences in CAM use [4, 6, 26, 27]. The only study to our knowledge that focused on the issue of race/ethnicity and CAM use was limited to women, and it identified the media as the driver of usage among blacks, while cost and dissatisfaction with conventional medicine did not explain racial differences in CAM use [28].

Disparities in insurance coverage for provider-based CAM and service availability are also likely to explain the relationship between race and CAM usage. For instance, CAM providers such as chiropractors may be able to close the gap in need for care in underserved areas, especially as it relates to musculoskeletal conditions [29]. However, even under state mandate to cover services provided by licensed CAM practitioners, regional differences in the number of insurance claims for CAM services



**Table 3** Results from the multivariate analysis for users and nonusers of at least one CAM service (N = 5,079)

	Utilization of at least one CAM		
	Block 1	Block 2	Block 3
<b>Predisposing factors</b>			
Age	0.997	0.997	0.995*
Gender (female)	1.123	1.130*	1.122†
Race (black)	0.528**	0.533**	0.512**
Education	1.237**	1.223**	1.336**
Married/sig. other	1.104	1.105	1.136
Negative pain care perception	1.080**	1.093**	1.064*
<b>Enabling factors</b>			
Perceived pain control		1.069**	1.077**
Pain prediction		0.994	0.995
Residence income		0.997	1.027
<b>Need factors</b>			
Number of co-morbidities			1.141**
Number of operations			1.007
Pain duration/chronicity			1.008**
Pain severity			1.016**
Functional limitations			1.006*
Depressive symptoms			0.999
-2 log likelihood	6,492.290	6,480.642	6,119.477
Model fit	0.356	0.819	0.025

\*  $P < 0.05$ ; \*\*  $P \leq 0.005$ ; †  $P = 0.07$ .

CAM = Complementary and alternative medicine.

remain [30]. One can extrapolate from these findings that if either regional maldistribution of CAM providers or uneven opportunity for insurance coverage for CAM services mirror that of conventional medicine, blacks may be at a disadvantage.

In agreement with the literature, dissatisfaction with pain care was overall, an important predisposing factor associated with CAM use [4,9–11]. Age on the other hand was surprisingly associated with increased acupuncture use in our population. Acupuncture users had the greatest average age among both users and nonusers of other modalities. The age at which individuals become aware of CAM services determines their usage, and usually, CAM services are more acceptable to younger individuals [31]. Increasing incidence of chronic illnesses, such as arthritis and chronic back pain; increasing empirical evidence of acupuncture’s effectiveness at relieving pain symptoms, and its’ greater acceptability by both conventional medicine and society at large may be shaping new trends of acupuncture use among older persons with chronic pain.

Enabling factors contribute little to our models. This observation is probably due to our population, which already had access to pain care. Nonetheless, Walsko identified insurance coverage as one of the strongest predictors of CAM use [32]. Chiropractic care is widely covered by both private and public insurance, and this may in part explain

the higher proportion of use in our sample. Although biofeedback/relaxation techniques are seldom covered, they were the second most frequently used service for chronic pain care. As most indicators of physical health included in the analysis as measures of need had a significant effect, our study is potentially identifying unmet need for insurance coverage for biofeedback/relaxation services in chronic pain populations. Chronic pain patients are already at risk for income loss due to their condition. It follows that out-of-pocket expenses for additional care may be an added financial burden. The only enabling factor that made a difference in CAM use for chronic pain was perceived pain control. Previous research found a positive relationship between a sense of control over one’s illness and CAM use [20,33–37]. Our study supports this evidence, but only for biofeedback/relaxation/techniques and manipulation services.

CAM services are often used in conjunction with traditional medicine, and people dealing with chronic pain may experiment with CAM for pain relief. Thus, it is not surprising that both pain severity and pain duration were positively associated with all three CAM modalities. This study also provides evidence of differential use of CAM services based on functional limitations and co-morbidities. Although pain symptoms were consistent correlates of CAM use, their effect was relatively small compared with functional limitations and co-morbidities. It is also impor-

**Table 4** Results from the multivariate analysis for specific CAM services (N = 5,079)

	Acupuncture			Biofeedback/relaxation services			Manipulation services		
	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3
<b>Predisposing factors</b>									
Age	1.019**	1.018**	1.018**	0.983**	0.984**	0.979**	0.998	0.998	0.996
Gender (% female)	1.012	1.011	1.008	1.200*	1.213*	1.197†	1.073	1.079	1.064
Race (% black)	0.708	0.756	0.754	0.525**	0.497**	0.463**	0.427**	0.425**	0.420**
Education	1.624**	1.587**	1.696**	1.278**	1.285**	1.510**	1.202**	1.193**	1.262**
Married/sig. other	0.895	0.893	0.914	1.068	1.073	1.148	1.095	1.096	1.103
Negative pain care perception	1.161**	1.168**	1.148**	0.984	0.998	0.946	1.125**	1.137**	1.120**
<b>Enabling factors</b>									
Perceived pain control		1.030	1.036		1.082*	1.114**		1.058*	1.057*
Pain prediction		0.988	0.990		1.005	1.007		0.995	0.996
Residence income		1.076	1.090		0.915*	0.959		0.985	0.998
<b>Need factors</b>									
Number of co-morbidities			1.052			1.224**			1.110*
Number of operations			1.000			1.003			1.014
Pain duration/chronicity			1.004**			1.006**			1.007**
Pain severity			1.013*			1.028**			1.008*
Functional limitations			1.006			1.015**			1.002
Depressive symptoms			0.996			1.002			
-2 log likelihood	—	2,837.104	2,771.419	—	3,848.620	3,591.078	—	5,632.407	5,625.385
Model fit	0.612	0.650	0.085	0.003	0.193	0.066	0.004	0.189	0.980

\*  $P < 0.05$ ; \*\*  $P \leq 0.005$ ; †  $P = 0.05$ .  
CAM = Complementary and alternative medicine.

tant to note that pain symptoms were the only correlates of acupuncture use, while most physical determinants assessed contributed to greater biofeedback/relaxation services and/or manipulation services use. These findings have some clinical implications for pain care, as patients with severe pain symptoms are likely to seek alternative care regardless of the type of service, predisposing, or enabling factors. Another important finding is that pain patients with the most severe physical presentation are more likely to have used CAM services; thus, it is unclear whether patients' access to a tertiary pain care center is an indicator for the failure of both conventional medicine and alternative therapies, or whether the use of alternative therapies constitute a marker for delayed access to tertiary pain care. What is known is that chronic pain doubles the odds of using both alternative and conventional medicine [21]. What is not well understood yet, is the patterns of CAM use among chronic pain patients as it relates to the intersection of the timing, lags, and delays between CAM use and access to specialized pain care.

Psychological health is little studied in the context of CAM use, and the existing results are inconclusive [18]. Kessler's milestone study examining psychological health and CAM use in a general population, supports more frequent usage among individuals with severe depression [12]. Psychological health as measured by depressive symptoms does not determine CAM usage among chronic pain patients as we found out. Depressive symptoms were not associated with any of the three CAM services in our chronic pain population, and the independent effect observed for biofeedback/relaxation services

was explained by the other covariates. When faced with chronic pain and its physical symptoms, emotionally impaired individuals may be less likely to identify the need for care, to have the energy to seek information about CAM, or to engage in the process of seeking alternative care. Future studies also should further explore this hypothesis and test the possible role of anxiety in this relationship.

Our results must be interpreted in the context of the study limitations. First, the retrospective and clinical data do not allow us to comment on the directionality of the relationships. Thus, the causal relationships between pain severity, pain duration, and CAM use needs to be further investigated using a prospective design to determine whether patient's disillusion with conventional medicine leads to CAM service use or whether CAM is a marker for delayed access to pain care. The existing literature seems to favor the former, but our analysis shows a reminiscent delay in using pain care after accounting for dissatisfaction with CAM use. Thus, only a prospective study can provide a conclusive direction. Second, as the data were primarily collected for clinical purposes, there are some limitations related to the choice of CAM services on the survey and their classification. For instance, biofeedback and relaxation services were collected as one entity, yet not all biofeedback techniques are based on relaxation. When considering the measures, it is also worth noting that there is limited variability in zip code income, used in the study as a measure of community resources; and this may explain its lack of effect on CAM use. Third, with self-reports about CAM use, variable knowledge and under-

standing of CAM terminology among patients may lead to misclassifications. Social desirability and differential attitudes toward CAM services could further have prevented patients from disclosing information about CAM use. If so, our estimates are conservative. Fourth, there is evidence that personal orientation such as spirituality and personal belief lead to CAM services usage [4], therefore our models could suffer from omitted variable bias that can affect the regression coefficients. Finally, with regards to the study's external validity, our findings can only be inferred to patients accessing tertiary pain care, referred by a physician, and who have access to insurance coverage or financial resources for care.

### Conclusion

The three practitioner-based CAM services studied are used in high frequencies by chronic pain patients prior to accessing a tertiary pain care center; but who uses CAM depends on the modality. Overall, we identified healthcare gaps with reduced CAM therapy use among blacks and individuals with low education. Both dissatisfaction with care and perceived pain control increased the odds of CAM use for at least one of the CAM studied. As it relates to need factors, contrary to the general population, psychological health as measured by depressive symptoms does not explain CAM use among chronic pain patients. Physical health as measured by severity and duration of pain, however, was the most consistent determinant of CAM use in chronic pain patients across CAM modalities. Other measures of physical health, including functional limitations and co-morbidities were positively correlated with biofeedback/relaxation techniques usage in addition to pain characteristics. Unfortunately, patients are often reluctant to share their CAM experiences with their conventional care providers. Thus, inquiries and discussions about CAM use in chronic pain patients, especially those with severe pain symptoms, may improve quality of pain care and patient safety. Finally we observed that biofeedback/relaxation services are frequently used. Their use is also highly related to poor physical health but not to dissatisfaction with pain care. Thus, the use of biofeedback/relaxation services could represent an unmet need for insurance coverage when not included in private or public health plans. Future CAM studies should focus on confirming whether physical and pain symptoms at time of assessment for tertiary pain care are essentially markers for delayed access to tertiary pain care and of poor quality of care.

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