A Sociobehavioral Wellness Model of Acupuncture Use in the United States, 2007

Dawn M. Upchurch, PhD, LAc, and Bethany Wexler Rainisch, PhD, MPH

Abstract

Objectives: The purpose of this study was to provide updated and more comprehensive data on the correlates and patterns of acupuncture use in the United States, applying a sociobehavioral wellness model of utilization. Predisposing factors, enabling resources, need, and personal health practices were investigated. Patterns of recent usage, including assessing the reason for use based on treatment of a health condition, for wellness, or both, were examined. Also, for the first time, attitudes about acupuncture reported by previous users and never users were presented.

Design: Data from the 2007 National Health Interview Survey (NHIS), a cross-sectional, household survey representative of the U.S. civilian population, were used, which included the Complementary and Alternative Medicine supplement. Adults 18 and over (n = 22,512) were analyzed. Bivariate prevalence estimates were obtained and logistic regression models were estimated. In addition, all analyses were weighted.

Outcome Measures: The primary outcome measure was recent use of acupuncture, defined as any use in the past 12 months.

Results: In 2007, 6.8% of adults reported lifetime use of acupuncture and 1.5% reported use in the past 12 months. Multivariate results showed significant effects in the expected directions for multiple variables in each of the four domains of our conceptual model (predisposing factors, enabling resources, need, and personal health practices). Among recent users, close to half reported some mention of wellness as a reason for use. Musculoskeletal conditions and pain were the top health conditions treated and these users, to some extent, integrated conventional and acupuncture care. Negative attitudes or skepticism about acupuncture were not common reasons for nonuse among prior and never users.

Conclusions: Application of a sociobehavioral wellness model to frame correlates and patterns of recent acupuncture use in the Unites States shows promise.

Introduction

Use of complementary and alternative medicine (CAM) continues to be a salient feature of Americans' health-seeking behavior. Prevalence estimates over the past two decades show increases to almost 40% by 2007.[1–5] CAM encompasses a diversity of medical systems, practices, and products, and individuals' motivations for using CAM are wide-ranging. Some may use CAM as part of a healthy lifestyle while others with health conditions may use CAM in conjunction with conventional medicine for treatment or to improve quality of life.[6–10] There is an increasing recognition for more in-depth research of specific modalities, such as acupuncture, that acknowledges the varied motivations

for use.[11,12] Additionally, there is a call for development of comprehensive, theoretical frameworks to explicate the social, psychological, and behavioral determinants and enhance our understanding of patterns and reasons for use.[8,11–18]

The current study extends recent empirical investigations of acupuncture use in the United States by elaborating and testing a sociobehavioral wellness model using data from the 2007 National Health Interview Survey (NHIS). Our model is framed within a health services perspective, drawing from the widely used Andersen Behavioral Model (ABM).[19–22] To better understand patterns and reasons for use and attitudes about acupuncture, we distinguished recent users, prior users, and never users of acupuncture and separately investigated them.

Department of Community Health Sciences, UCLA School of Public Health, Los Angeles, CA.

Andersen Behavioral Model of health services utilization

The original ABM proposes that individuals' use of conventional health services is a function of their predisposition to use services, the ability to secure services, and their need for care.[19–22] Originally developed in the 1960s, the ABM has been modified and expanded several times to include additional domains such as personal health practices.[22,23] The ABM proposes an *a priori* ordering of domains of variables: predisposing factors are first, followed by enabling resources, then need, and last, personal health practices.[23]

There is strong scientific justification for using the ABM as the template for our own model development. First, decades of research demonstrate the utility and flexibility of the ABM to understand health-services behavior in a diversity of populations in a variety of contexts,[19–22] including CAM. For example, it has been employed to examine CAM use in HIV patients,[24] cancer patients,[25,26] and CAM clinic clients.[16] Second, CAM researchers and policy makers[11] have articulated the need to develop theoretical models to provide an explanatory focus for CAM.[7,8,11,13–18] The most commonly recommended theoretical models of CAM use draw heavily from ABM.[14,16,17,24,26,27] Third, investigation of CAM (including acupuncture) within a unifying health-services framework has the potential to provide new insights on patterns, predictors, and experiences of use, including intersections with conventional medicine.

Sociobehavioral wellness model of acupuncture use

We integrate ABM[19,20,22] with emerging theory conceptualizing CAM as part of healthy self-care and wellness promotion[6–8,10,13–15,17,27] to propose a sociobehavioral wellness model of acupuncture use. For many types of CAM, including Traditional East Asian Medicine (TEAM) (which includes acupuncture), there is an underlying philosophy of "holism" and the idea that the body copes maximally with life stressors when there is balance. Thus, there is theoretical justification for also exploring acupuncture use for health promotion and well-being. Below we detail each domain of our model.

Predisposing factors include demographic variables reflecting differences in social placement, knowledge, attitudes, and beliefs regarding CAM. Women, middle-aged individuals, and those with higher education are more likely to[1,10,28,29] use CAM including acupuncture.[17,30] The effects of race/ethnicity are contingent on the CAM modality under consideration.[1,8,10,28,31,32] Asians have higher rates of acupuncture use.[17,30] Because acupuncture is included in TEAM, we investigated the extent to which gender effects depend on race/ethnicity, and hypothesize that regardless of gender, Asians will be more likely to use acupuncture. Other predisposing factors include union status and place of birth; again their effects depend on the CAM modality.[1,10,17,28,30,33]

Enabling resources are conditions or factors that allow or impede the use of health services. They include both personal resources such as income and health insurance and macro-level factors such as proximity to health-care facilities. Those with higher incomes, who are insured, live in the West, or have a usual source of conventional care, have higher rates of CAM use.[1,10,34] One explanation is that individuals with more enabling resources are higher users of all types of health care, including CAM.[9] There is also evidence that CAM may be substituted for conventional care or increase delays.[1,10,35] Consequently, the current study explored a multiplicity of enabling resources on acupuncture use.

Need includes both perceived and evaluated medical need. Perceived need is how individuals view their own health. Evaluated need represents health professionals' assessment and diagnosis about health status. Several previous studies substantiate that CAM use, including acupuncture,[17,30] is more common among individuals with poorer health.[1,10,28,31,32,34,36] This study examined both perceived and evaluated health-status effects on acupuncture use.

Personal health practices consist of individuals' lifestyles and health behaviors. Our model also conceptualizes acupuncture use as a component of wellness lifestyle.[15] We propose that individuals who engage in healthy behaviors, such as regular physical activity, not smoking, and moderate or little alcohol consumption, or have a healthy weight will be more likely to use it. These findings have been found for CAM use in general.[1,2,10,32,37]

We extend our model to investigate three types of individuals grouped according to their experiences with acupuncture. First, among recent users, we explored patterns of use as well as reasons for using, taking advantage of new information on CAM use for health promotion and wellness, collected for the first time in the 2007 NHIS. Second, among prior users and never users, we examined attitudes about acupuncture and reasons for *not* using it. This secondary analysis provides a more complete picture than previous national studies of acupuncture use and reasons for nonuse in the Unites States.

Materials and Methods

Survey description

The NHIS is an annual, cross-sectional, in-person household interview survey of U.S. civilian, non-institutionalized population.[38] The survey uses a multistage clustered sample design with oversamples of Asian, black, and Hispanic persons. Basic health information is collected on all household members (Family Core). More detailed information is collected on one randomly selected adult age 18 years or over (Sample Adult Core) in each household. The final 2007 sample adult response rate was 67.8%.[39]

The 2007 NHIS included a Complementary and Alternative Medicine supplement administered to the Sample Adult.[1,38] The 2007 supplement collected extensively more information than the 2002 supplement on specific CAM modalities, reasons, attitudes, and patterns of use.[1] Individuals in the Sample Adult Core who provided valid responses pertaining to their use of acupuncture in the past 12 months were included in the analysis. Individuals who reported race or ethnicity as "Other" (n = 244) were excluded because of small size and substantial heterogeneity. The final analytic sample was n = 22,512.

Measures

Acupuncture use measures. Respondents were asked if they had "ever seen a provider for acupuncture"; if the response was "yes," they were then asked if they had seen a practitioner in the past 12 months. The use of acupuncture in

the past 12 months was defined as "recent use" and coded as a dichotomy.

Predisposing factors.* Demographics included gender, race/ethnicity, nativity status, age, education, and marital status. We also created a six-category gender-by-race/ethnicity interaction variable.

Enabling resources. These measures included annual household income, current health insurance status, whether conventional medical care was *delayed* or not *received* because of cost, whether there was a usual place for health care, and the U.S. Census Bureau geographic region.

Need. Health variables included self-reported health status (excellent, very good, good, fair, poor) and the number of self-reported chronic health conditions (0, 1–2, 3–5, 6+).[†]

Personal health practices. Lifestyle factors are four public health indicators of health behaviors, identified as high-priority areas.[40] They include (1) leisure-time physical activity (regular activity: light or moderate activity performed at least 30 minutes for 5 or more times per week and/or vigorous activity performed at least 20 minutes for 3 or more times per week; some activity: less than regular but more than none; no activity); (2) smoking status (current smoker: smokes every day or some days; former smoker: smoked at least 100 cigarettes in life, but not currently; never smoked (less than 100 cigarettes in life); (3) drinking status (lifetime abstainer: ≤12 drinks in lifetime; former drinker: 0 drinks in the past year but ≥12 in lifetime; current infrequent/light drinker: 3 or fewer per week; current moderate/heavy: >3 drinks per week); and (4) body mass index (BMI) (underweight: <18.5; healthy weight: 18.5–24.9; overweight: 25–29.9; obese: >30).

Reasons, patterns, and motivation for acupuncture use and attitudes about acupuncture. Among recent users (n = 342), a trichotomous variable was created according to respondents' stated reason for use (treatment only, wellness only, both treatment and wellness). The treatment category was based on an affirmative response to using acupuncture "for a specific health problem or condition." The wellness category was based on an affirmative response to at least one of the following: "to improve or enhance energy," "for general health and disease prevention," and "to improve or enhance immune function." Respondents who stated they used acupuncture for both a health condition and for at least one of the wellness items were coded as "both." Number of treatments, out-of-pocket cost of treatment, top 5 health conditions for which acupuncture was used, and use in relation to conventional medicine were assessed. Last, we report, for the first time, information for why acupuncture was *not* used in the past 12 months among prior users (n = 1,168) and among never users (n = 21,002).

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*See tables for additional detail on coding of Predisposing Factors and Enabling Resources. To the extent possible, variables were coded using standard categories presented in national health reports.[1]

[†]Number of health conditions is a count variable of approximately 55 chronic conditions.

Analysis

All analyses and estimates used the NHIS individual-level sampling weights that adjust for nonresponse and post-stratification. Variance estimates were adjusted to account for complex sample design.[39] Descriptive statistics and bivariate prevalence estimates of recent acupuncture use were computed. The design-based F test, similar to a weighted chi square, was used for bivariate analyses. Weighted multiple logistic regression was used to examine associations between covariates and recent acupuncture use. Multivariate model building occurred in two steps and followed the sequential ordering proposed by ABM. First, four submodels were estimated, one for each substantive domain (predisposing factors, enabling resources, need, and personal health practices). Then, a final, combined model was estimated that included all four submodels to investigate the net effects of all covariates. A test for specification error for full model using (linktest in Stata) demonstrated no significant misspecification bias (p < 0.91). Adjusted odds ratios are presented. Last, bivariate statistics of patterns and reasons for acupuncture use were computed for recent users, prior users, and never users. All analyses were performed using Stata 12.0.[41]

Results

Prevalence of acupuncture use

Approximately 6.8% of adults reported lifetime use of acupuncture (not shown), and 1.5% reported use in the past 12 months. Columns 1 and 2 in Tables 1–4 show population characteristics and prevalence of recent use based on predisposing factors (Table 1), enabling resources (Table 2), need (Table 3), and personal health practices (Table 4).

Characteristics of recent acupuncture users

Predisposing factors (Table 1). Results did not change across the two model specifications. Compared to white females, black women were significantly less likely and Asian women more likely to use acupuncture; white men and black men were less likely to use. Nativity status was significant at the bivariate level; the effects were reduced to nonsignificance in the multivariate models. Compared to the youngest age category, all other ages were more likely to use acupuncture with the difference greatest during middle age. The most educated were more likely than the least educated to be users. Both age and education effects were reduced from submodel 1 to the full model, although still significant. Married and divorced individuals were less likely to use acupuncture than those who were never married.

Enabling resources (Table 2). Those with the highest incomes were more likely than those with the lowest to use acupuncture and effects were reduced in the combined model. There were significant differences in health insurance status and delaying conventional care because of cost on the odds of use in submodel 2 but not in the combined model. Lack of conventional care due to cost was significant at the bivariate level, but not in either of the multivariate models. Regional differences were the same across models, although less pronounced in the combined model.

Table 1. Predisposing Factors, Prevalence of Recent Acupuncture Use, and Adjusted Odds Ratios, Submodel 1 and Combined Model, NHIS 2007

	Weighted %	Recent use %	Submodel 1 AORs	Combined model AORs
Total	100.0	1.5		
Gender				
Male	45.5	1.1***	—	—
Female	54.5	1.9	—	—
Race/ethnicity				
White	72.9	1.6***	—	—
Black	12.4	0.6	—	—
Hispanic	11.1	1.1	—	—
Asian	3.6	4.2	—	—
Gender-by-race/ethnicity				
White females	39.4	2.1***	—	—
Black females	7.5	0.6	0.29***	0.39**
Hispanic females	5.8	1.1	0.62+	0.65+
Asian females	1.9	5.9	2.45***	2.47***
White males	33.5	1.1	0.46***	0.45***
Black males	5.0	0.6	0.26***	0.31**
Hispanic males	5.3	1.2	0.69	0.68
Asian males	1.7	2.3	0.79	0.74
Nativity Status				
U.S. born	86.2	1.5*	—	—
Foreign born	13.8	2.0	1.28	1.27
Age				
18–29	19.8	0.7***	—	—
30–39	17.6	1.7	3.05***	2.73***
40–49	18.6	2.1	4.30***	3.35***
50–59	16.6	2.3	4.99***	3.46***
60–69	12.9	1.4	3.56***	2.47**
70+	14.3	0.9	2.51**	1.74
Education				
<12 yrs	14.9	0.5***	—	—
High school grad	29.0	0.7	1.43	1.43
>12 yrs	56.2	2.2	4.11***	3.35***
Marital status				
Never married	22.3	1.9	—	—
Married	46.8	1.5	0.46***	0.44***
Cohabit	5.3	1.6	0.81	0.71
Divorced	25.6	1.3	0.42***	0.42***

$N=22,512$; percentages are weighted to U.S. population estimates. $+p<0.1$; $*p<0.05$; $**p<0.01$; $***p<0.001$. Divorced category includes separated and widowed. See text for additional information.

AOR, adjusted odds ratios; NHIS, National Health Interview Survey.

Table 2. Enabling Resources, Prevalence of Recent Acupuncture Use, and Adjusted Odds Ratios, Submodel 2 and Combined Model, NHIS 2007

	Weighted %	Recent use %	Submodel 2 AORs	Combined model
Income				
0–$34,999	45.6	1.1***	—	—
$35,000–$49,999	13.7	1.3	1.09	1.01
$50,000–$74,999	17.6	1.8	1.55*	1.26
$75,000–$99,999	9.3	1.6	1.32	1.04
+$100,000	13.8	2.6	2.21***	1.56*
Insurance Status				
Private	66.4	1.7**	—	—
Public	18.2	0.9	0.67*	0.81
Uninsured	15.4	1.3	0.71	1.04
Delayed care because could not afford				
Yes	11.5	2.6***	2.48***	1.63+
No	88.5	1.4	—	—
Did not receive care because could not afford				
Yes	8.6	2.3*	1.02	0.97
No	91.4	1.5	—	—
Usual place for healthcare				
Yes	85.4	1.6	0.90	1.07
No	14.6	1.4	—	—
Region				
Northeast	17.2	1.7***	—	—
Midwest	25.1	0.9	0.55**	0.59*
South	36.7	1.2	0.73	0.88
West	21.0	2.7	1.60**	1.43+

$N=22,512$; percentages are weighted to U.S. population estimates. $+p<0.1$; $*p<0.05$; $**p<0.01$; $***p<0.001$. See text for additional information.

smokers were less likely and former smokers were more likely to be users than never smokers. Results did not change across models. Compared to lifetime abstainers, current drinkers (regardless of quantity) were more likely to use acupuncture. Again, results did not change across models. BMI was significant at the bivariate level but not in either of the multivariate models.

Table 3. Need, Prevalence of Recent Acupuncture Use, and Adjusted Odds Ratios, Submodel 3 and Combined Model, NHIS 2007

	Weighted %	Recent use %	Submodel 3 AORs	Combined model AORs
Perceived Health status				
Excellent	27.9	1.3	—	—
Very good	32.1	1.6	1.15	1.39+
Good	26.0	1.8	1.25	1.97***
Fair	10.4	1.4	0.96	2.03**
Poor	3.6	2.3	1.66	4.24***
Health conditions				
0	36.1	1.1**	—	—
1–2	34.6	1.8	1.64**	1.46*
3–5	20.3	1.8	1.58*	1.56*
6+	9.1	1.5	1.23	1.44

$N=22,512$; percentages are weighted to U.S. population estimates. $+p<0.1$; $*p<0.05$; $**p<0.01$; $***p<0.001$.

Need (Table 3). In bivariate analysis and submodel 3, health status was not associated with acupuncture use, but in the combined model, the effects became significant. As health status decreased, the likelihood of using acupuncture increased when predisposing, enabling, and need variables were taken into account. Compared to individuals who reported no health conditions, those with one or more were more likely to use acupuncture.

Personal health practices (Table 4). Individuals who engaged in regular physical activity compared to no activity were more likely to be users in submodel 4, but effects were only marginally significant in the combined model. Current

TABLE 4. PERSONAL HEALTH PRACTICES, PREVALENCE OF RECENT ACUPUNCTURE USE, AND ADJUSTED ODDS RATIOS, SUBMODEL 4 AND COMBINED MODEL, NHIS 2007

	Weighted %	Recent use %	Submodel 4 AORs	Combined model AORs
Leisure-time physical activity				
None	39.8	1.1***	—	—
Some	40.4	1.6	1.23	0.98
Regular	19.8	2.3	1.73***	1.42+
Smoking status				
Never	57.3	1.5***	—	—
Current	20.1	0.9	0.58*	0.59*
Former	22.6	2.3	1.45**	1.47**
Drinking status				
Life abstainer	22.0	0.8***	—	—
Former	15.1	1.1	1.31	1.28
Current	43.2	1.8	2.16***	1.95***
Infrenquent/light				
Current mod/heav	19.8	1.9	2.17***	2.20**
BMI				
Underweight	1.8	2.0**	—	—
Healthy	35.7	2.0	0.85	0.94
Overweight	37.7	1.3	0.53	0.68
Obese	24.9	1.3	0.55	0.62

$N = 22{,}512$; percentages are weighted to U.S. population estimates. $+p < 0.1$; $*p < 0.05$; $**p < 0.01$; $***p < 0.001$. See text for additional information.

Patterns of recent acupuncture use

Among recent users, half stated they had acupuncture only for treatment of a specific health condition, 10.5% used it for wellness only, and the remainder used it for both treatment and wellness (Table 5). About one-quarter reported only one visit to the acupuncturist; over two-thirds had five or fewer visits. One-third reported average out-of-pocket expense per treatment was less than U.S. $25. About 46% reported they used acupuncture because conventional treatment did not help, and one-quarter said their conventional health-care provider recommended it. Among those who reported using acupuncture for treatment of a health condition (second panel of Table 5), four of the five top ailments mentioned pertained to musculoskeletal pain. Over one-third did not use any conventional medicine for their condition; 43% and 30% respectively used prescription or over-the-counter medication for the condition. Over half said they told their conventional medical provider about using acupuncture.

Attitudes about acupuncture among prior users and never users

Among prior users, the most common reason mentioned for not using acupuncture in the past 12 months was because it was not needed (39%); about 18% said that acupuncture had not worked for them (Table 6). Concerns about side effects, negative recommendations from health-care providers, or lack of scientific evidence were reasons voiced by less than 1% of prior users. Among never users (second panel of Table 6), the most common reasons mentioned for not using acupuncture was because they never thought about it

TABLE 5. ACUPUNCTURE USAGE PATTERNS, NHIS 2007

All recent users (n = 342)	Percentage %
Reasons for use	
Treatment of specific health condition	50.6
Wellness only	10.5
Both treatment and wellness	38.7
Number of visits	
1 only	24.1
2–5	44.8
6–10	17.7
11–15	4.9
16–20	4.6
>20	3.9
Average out-of-pocket expense per visit	
$0–$24	34.2
$25–$49	15.7
$50–$74	26.1
$74–$99	9.9
≥$100	14.1
Used because[a]	
…medical treatment did not help	46.4
…medical treatment too expensive	11.0
…recommended by health care provider	25.4
…recommended by family or friends	43.6

Recent users who mentioned health condition (n = 289)	
Top 5 health conditions treated	
Back pain	23.0
Joint pain/stiffness or other joint conditions	10.3
Neck pain	7.9
Arthritis	5.4
Stomach or intestinal illness	2.8
Received no conventional treatment for condition, used acupuncture	38.1
Received prescription medication for condition, used acupuncture	43.0
Received over-the-counter medication for condition, used acupuncture	29.7
Let conventional medical professional know about use of acupuncture	61.0

Percentages are weighted to U.S. population estimates.
[a]Percentages do not add to 100% because respondents were allowed multiple mentions.

(21.6%), for no reason (32.5%), or because they did not need it (24.7%). The percentages reporting concerns about cost, safety, efficacy, or negative recommendations from health-care providers were in single digits.

Discussion

The results show a low prevalence of acupuncture use among Americans. In 2007, 6.8% had used acupuncture in their lifetime and 1.5% in the past 12 months. Although low, it translates to 3.14 million adults and reflects a significant increase in acupuncture use between 2002 and 2007.[1] The multivariate analyses demonstrate that multiple factors are independently associated with recent acupuncture use and that the sociobehavioral model we propose shows promise. Among recent users, almost half mentioned wellness either alone or in combination with treatment as a reason for use; the medical conditions treated are primarily musculoskeletal pain. Last, negative attitudes or skepticism about

TABLE 6. REASONS FOR NOT USING ACUPUNCTURE
IN THE PAST 12 MONTHS AMONG PRIOR USERS
AND NEVER USERS, NHIS 2007

Ever used acupuncture, but not in past 12 months (n=1,168)	Percentage %
Didn't use in past 12 months because. . .	
Never thought about it	5.8
No reason	22.7
Didn't need it	39.0
Didn't work for me before	17.7
Costs too much	10.3
Had side effects last time	0.4
Health care provider told me not to use it	0.7
Medical science has not shown it works	0.5
Other	2.9

Never used acupuncture (n=21,002)	
Why never used acupuncture	
Never heard of it/don't know much about it	12.4
Never thought about it	21.5
No reason	32.5
Don't need it	24.7
Don't believe in it/it doesn't work	5.5
Costs too much	2.2
Is not safe	0.5
Health care provider told me not to use it	0.2
Medical science has not shown it works	0.5

Percentages are weighted to U.S. population estimates.

acupuncture were not common reasons for nonuse among prior and never users.

Predisposing factors. Contrary to our expectations, we did not find strong support that the effects of gender are contingent on race/ethnicity. Asian women were more likely than white women to use acupuncture, but Asian men were not. Although Asian men had the highest use rates among men, their rates were similar to white women. Black men and women and white men were less likely to use than white women. These findings confirm earlier studies showing Hispanics and blacks have lower use of CAM in general.[1,28,31,42] Unfortunately, small sample sizes of Asian subgroups precluded more detailed examination of variation by country of origin.[43,44] The effects of the remaining predisposing factors were in the expected directions, similar to those for general CAM use and for acupuncture.[1,10,17,30,33,45] A limitation of the NHIS is that it does not include information on health and illness beliefs and values, predisposing factors known to be associated with CAM use.[16,46] Incorporating the ways in which health beliefs and values, especially related to CAM, will contribute to better understanding of both gender and race/ethnic differences in use.

Enabling resources. In contrast to the other domains, the effects of these indicators changed substantially across the two multivariate models, indicating enabling resources are correlated with other variables in the combined model, especially demographic characteristics. To the extent that these variables capture the underlying construct of access, the results suggest individuals are not necessarily substituting acupuncture for conventional care as has been found for CAM use more generally[35] and support prior acupuncture

studies.[17,30] Among recent users, almost half reported using acupuncture because medical treatment did not help, and 43% used a prescription medication for the condition for which they sought acupuncture. In addition, almost two-thirds of those using acupuncture for health conditions also used conventional medicine for the condition. Also, acupuncture users tend to be treated for health conditions that are often difficult to manage with conventional medicine. These additional results indicate individuals are often incorporating both acupuncture and conventional medicine as part of their health-care-seeking behaviors.

Need and personal health practices. As expected, recent acupuncture users were more likely than nonusers to report both poorer health and somewhat healthier lifestyle practices, providing indirect support that acupuncture may be part of a wellness lifestyle for some users.[15] Overall, the findings confirm previous studies investigating need and lifestyle variables on use of any type of CAM,[2,10] including acupuncture.[17,30] The positive relationship between current drinking status and CAM use, including acupuncture, has been found in several other studies[2,10,17,30] and warrants further investigation. Other research finds linkages between light to moderate alcohol consumption and positive health behaviors[47,48] Taken together, the findings demonstrate adults are making lifestyle choices that incorporate both health-related behaviors and acupuncture use.[6–8,15,49,50]

Our additional investigation of recent users of acupuncture further confirms the above statement. Although half of recent users mentioned treatment only as a reason for using acupuncture, half also mentioned wellness, either alone or in combination with treatment. The small sample size prevented more detailed analysis regarding correlates of reason for acupuncture use. Other studies find that those who used CAM for health and wellness report better health and healthier behaviors than those who use CAM as treatment.[6,9] Last, negative attitudes or skepticism about acupuncture were not common reasons for nonuse among prior and never users.

Although this research provides one of the most up-to-date and comprehensive investigations of acupuncture use in the United States, there are limitations beyond those already discussed. The NHIS data are generalizable to the U.S. adult population and thus have good external validity, but the cross-sectional nature of the study does not allow disentangling the timing of health behaviors, health conditions, and acupuncture use. The design also precludes investigation of acupuncture use over time. Additionally, despite the large sample size of the NHIS, low prevalence of use severely limited the sample size and power available to more fully characterize acupuncture usage patterns beyond bivariate analyses. Last, among acupuncture users, the type of information collected in the NHIS is very limited and does not include relevant outcome measures.[51] These limitations underscore the importance of having a multi-faceted research agenda for acupuncture and TEAM that includes national survey-based studies, clinical observational studies, as well as ongoing trials.[11,52]

Conclusion

The results demonstrate the potential utility of the socio-behavioral wellness model to assess factors associated with

acupuncture use in the United States and contribute to the ongoing development of relevant theoretical frameworks for exploring CAM use.[6,8,14,15,17,27] The findings show that many of the characteristics found to be associated with use of conventional care are also associated with acupuncture use, pointing to the plausibility of applying an already well-developed and empirically tested ABM health-services model.[19–21] However, the findings also demonstrate the need to incorporate motivations for use for health promotion and wellness.[12,15,16] Further investigation of CAM use (including acupuncture) as part of wellness lifestyles is warranted in light of national public health priorities and the high burden of lifestyle diseases.[11,53]

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References

1. Barnes PM, Bloom B, Nahin RL. Complementary and alternative medicine use among adults and children: United States, 2007. National Health Statistics Report 2008. Available online at http://suporior-surrogacy.com/nchs/data/nhsr/nhsr012.pdf Accessed February 12, 2011.
2. Barnes PM, Powell-Griner E, McFann K, Nahin RL. Complementary and alternative medicine use among adults: United States, 2002. Seminars in Integrative Medicine 2004;2:54–71.
3. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in Alternative Medicine Use in the United States, 1990–1997. JAMA 1998;280:1569–1575.
4. Ni HY, Simile C, Hardy AM. Utilization of complementary and alternative medicine by United States adults—Results from the 1999 National Health Interview Survey. Medical Care 2002;40:353–358.
5. Paramore LC. Use of alternative therapies: Estimates from the 1994 Robert Wood Johnson Foundation National Access to Care Survey. J of Pain and Symptom Management 1997;13:83–89.
6. Davis MA, West AN, Weeks WB, Sirovich BE. Health behaviors and utilization among users of complementary and alternative medicine for treatment versus health promotion. health serv res. 2011;46:1402–1416.
7. Grzywacz JG, Lang W, Suerken C, et al. Age, race, and ethnicity in the use of complementary and alternative medicine for health self-management. J Aging Health 2005; 17:547–572.
8. Grzywacz JG, Suerken CK, Neiberg RH, et al. Age, ethnicity, and use of complementary and alternative medicine in health self-management. J Health Soc Behav 2007;48:84–98.
9. Kannan V, Gaydos L, Atherly A, Druss B. Medical utilization among wellness consumers. Med Care Res Rev. 2010;67:722–736.
10. Nahin R, Dahlhamer J, Taylor B, et al. Health behaviors and risk factors in those who use complementary and alternative medicine. BMC Public Health 2007;7:217.
11. National Center for Complementary and Alternative Medicine. Exploring the science of complementary and alternative medicine: third strategic plan 2011–2015. U.S. Department of Health and Human Services 2011.
12. Stibich M, Wissow L. Meaning shift: Findings from wellness acupuncture. Altern Ther Health Med 2006;12:42–48.
13. Davis MA, Weeks WB, Coulter ID. A proposed conceptual model for studying the use of complementary and alternative medicine. Altern Ther Health Med 2011;17:32–36.
14. Fouladbakhsh JM, Stommel M. Using the behavioral model for complementary and alternative medicine: the CAM healthcare model. J Complement Integr Med 2007;4:Article 11.
15. Schuster TL, Dobson M, Jauregui M, Blanks RHT. Wellness lifestyles I: A theoretical framework linking wellness, health lifestyles, and complementary and alternative medicine. J Altern Complement Med 2004;10:349–356.
16. Sirois FM, Gick ML. An investigation of the health beliefs and motivations of complementary medicine clients. Soc Sci Med 2002;55:1025–1037.
17. Upchurch DM, Burke A, Dye C, et al. A sociobehavioral model of acupuncture use, patterns, and satisfaction among women in the united states, 2002. Women's Health Issues 2008;18:62–71.
18. Upchurch DM, Rainisch BK. Racial and ethnic profiles of complementary and alternative medicine use among young adults in the united states: findings from the national longitudinal study of adolescent health. J Evid Based Complementary Altern Med 2012;17:172–179.
19. Aday L, Andersen R. A framework for the study of access to medical care. Health Serv Res 1974;H(9):208–220.
20. Andersen R, Newman JF. Societal and Individual Determinants of Medical Care Utilization in the United States. Milbank Quarterly 1973;51:95–124.
21. Andersen RM. Behavioral models of families' use of health services. Chicago: University of Chicago, Center for Administrative Studies, 1968.
22. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? J Health Soc Behav 1995;36:1–10.
23. Andersen RM. National health surveys and the Behavioral Model of Health Services Use. Medical Care 2008;46:647–653.
24. Tsao JC, Dobalian A, Myers CD, Zeltzer LK. Pain and use of complementary and alternative medicine in a national sample of persons living with HIV. Journal of Pain and Symptom Management 2005;30:418–432.
25. Fouladbakhsh JM, Stommel M, Given BA, Given CW. Predictors of use of complementary and alternative therapies among patients with cancer. Oncol Nurs Forum 2005;32:1115–1122.
26. Shen J, Andersen RM, Albert PS, et al. Use of Complementary/Alternative Therapies by Women with Advanced-Stage Breast Cancer. BMC Complement Altern Med 2002;2:8.
27. Lorenc A, Ilan-Clarke Y, Robinson N, Blair M. How parents choose to use CAM: a systematic review of theoretical models. BMC Complement Altern Med. 2009;9:9.
28. Bishop FL, Lewith GT. Who uses CAM? A narrative review of demographic characteristics and health factors associated with CAM use. J Evid Based Complementary Altern Med 2010;7:11–28.
29. Wootton JC, Sparber A. Surveys of complementary and alternative medicine: Part I. General trends and demographic groups. J Altern Complement Med 2001;7:195–208.
30. Burke A, Upchurch DM, Dye C, Chyu L. Acupuncture use in the United States: Findings from the National Health Interview Survey. J Altern Complement Med 2006;12:639–648.

31. Graham RE, Ahn AC, Davis RB, et al. Use of complementary and alternative medical therapies among racial and ethnic minority adults: Results from the 2002 National Health Interview Survey. J Natl Med Assoc 2005;97:535–545.

32. Upchurch DM, Dye CE, Chyu L, et al. Demographic, behavioral, and health correlates of complementary and alternative medicine and prayer use among midlife women: 2002. J Womens Health 2010;19:23–30.

33. Su DJ, Li LF, Pagan JA. Acculturation and the use of complementary and alternative medicine. Soc Sci Med 2008;66:439–453.

34. Institute of Medicine of the National Academies. Complementary and Alternative Medicine in the United States. Washington D.C: The National Academic Press, 2005.

35. Pagan JA, Pauly MV. Access to conventional medical care and the use of complementary and alternative medicine. Health Aff 2005;24:255–262.

36. Upchurch DM, Chyu L. Use of complementary and alternative medicine among American women. Women's Health Issues 2005;15:5–13.

37. Upchurch DM, Chyu L, Greendale GA, et al. Complementary and alternative medicine use among American women: Findings from the National Health Interview Survey, 2002. J Womens Health 2007;16:102–113.

38. National Center for Health Statistics. Data File Documentation, National Health Interview Survey, 2007 (machine readable data file and documentation). Hyattsville, Maryland: Centers for Disease Control and Prevention, 2008.

39. National Health Interview Survey. Centers for Disease Control and Prevention, 2007. Available online at www.cdc.gov/nchs/nhis.htm Accessed February 2011.

40. U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health, 2000. Available online at www.healthypeople.gov/2020/default.aspx Accessed January 25, 2011.

41. Stata Statistical Software: Release 12 [computer program]. College Station, TX: StataCorp LP, 2010.

42. Mackenzie ER, Taylor L, Bloom BS, et al. Ethnic minority use of complementary and alternative medicine (CAM): a national probability survey of CAM utilizers. Altern Ther Health Med 2003;9:50–56.

43. Hsiao AF, Wong MD, Goldstein MS, et al. Complementary and Alternative Medicine Use Among Asian-American Subgroups: Prevalence, Predictors, and Lack of Relationship to Acculturation and Access to Conventional Health Care. J Altern Complement Med 2006;12:1003–1010.

44. Mehta D, Phillips R, Davis R, McCarthy E. Use of complementary and alternative therapies by Asian Americans. Results from the National Health Interview Survey. J Gen Intern Med 2007;22:762–767.

45. Bishop FL, Yardley L, Lewith GT. A systematic review of beliefs involved in the use of complementary and alternative medicine. Journal of Health Psychology 2007;12:851–867.

46. Astin JA. Why patients use alternative medicine. JAMA 1998;279:1548–1553.

47. Berrigan D, Dodd K, Troiano RP, et al. Patterns of health behavior in U.S. adults. Prev Med 2003;36:615–623.

48. Naimi TS, Brown DW, Brewer RD, et al. Cardiovascular risk factors and confounders among nondrinking and moderate-drinking U.S. adults. Am J Prev Med 2005;28:369–373.

49. Arcury TA, Quandt SA, McDonald J, Bell RA. Faith and health self-management of rural older adults. J Cross Cult Gerontol 2000;15:55–74.

50. Thorne S, Paterson B, Russell C, Schultz A. Complementary/alternative medicine in chronic illness as informed self-care decision making. Int J Nurs Stud 2002;39:671–683.

51. Long AF. Outcome measurement in complementary and alternative medicine: Unpicking the effects. J Altern Complement Med 2002;8:777–786.

52. Langevin HM, Wayne PM, MacPherson H, et al. Paradoxes in acupuncture research: strategies for moving forward. Evid Based Complement Altern Med 2011;11:180805.

53. Office of Disease Prevention and Health Promotion. Developing Healthy People 2020: The Road Ahead, 2009. Available online at http://healthypeople.gov/HP2020/ Accessed May 1, 2011.

Address correspondence to:
Dawn M. Upchurch, PhD, LAc
Department of Community Health Sciences
UCLA School of Public Health
650 Charles Young Drive South
Los Angeles, CA 90095-1772

E-mail: upchurch@ucla.edu