Published in final edited form as:

Womens Health Issues. 2008 ; 18(1): 62–71.

A Sociobehavioral Model of Acupuncture Use, Patterns, and Satisfaction Among Women in the US, 2002

Dawn M. Upchurch, PhD¹, Adam Burke, PhD, MPH, LAc², Claire Dye, MSPH³, Laura Chyu, MA⁴, Yasamin Kusunoki, MPH⁵, and Gail A. Greendale, MD⁶

¹ UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095–1772. upchurch@ucla.edu. Phone: (310) 794–9693, Fax: (310) 267–0153.

² Institute for Holistic Health Healing Studies, Department of Health Education, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132. aburke@sfsu.edu. Phone: (415) 338–1774, Fax: (415) 338–0570.

³ UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095–1772. ced6@ucla.edu. Phone: (310) 794–9391, Fax: (310) 267–0153.

⁴ UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095–1772. lchyu@ucla.edu. Phone: (310) 794–9391, Fax: (310) 267–0153.

⁵ UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095–1772. ykusunok@ucla.edu. Phone: (310) 794–9391, Fax: (310) 267–0153.

⁶ UCLA Geffen School of Medicine, Division of Geriatrics, Box 951687, 2339 PVUB Los Angeles, CA 90095–1687. ggreenda@mednet.ucla.edu. Phone: (310) 794–9830, Fax: (310) 794–9824.

Abstract

Objectives—To examine the correlates of recent acupuncture use among American women, applying a sociobehavioral model of utilization of conventional health care. Patterns of use, satisfaction, and reasons for acupuncture use are also examined.

Methods—The 2002 National Health Interview Survey (NHIS) is used, which included the Alternative Health/Complementary Alternative Medicine Supplement. All analyses and estimates used the NHIS individual-level sampling weights; variance estimates were adjusted to account for complex sample design. Bivariate statistics and logistic regression were used. N=17,112 women.

Results—Prevalence of recent acupuncture use was low (1.1 percent), but translates to over 1.2 million American women. Multivariate results found the effects of race and ethnicity on acupuncture use were contingent on educational level. Women living in the West were more likely to use acupuncture, as were women with fair health status, former smokers, current moderate/heavy alcohol users, and women with higher body mass index. Women tended to use acupuncture for conditions not commonly well treated by conventional medicine (e.g., chronic pain) and the majority reported using acupuncture in conjunction with conventional medicine.

*Direct correspondence to Dr. Dawn M. Upchurch, Professor, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, California 90095–1772, upchurch@ucla.edu..

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conclusions—Predisposing and enabling factors, as well as medical need and personal health practices, are associated with women's recent use of acupuncture services, including several that are also associated with conventional health care services.

Introduction and Background

Americans, especially women, are increasingly utilizing complementary and alternative medicine (CAM) and incorporating these therapies into their health and wellness practices (Eisenberg et al., 1998; IOM, 2005; Tindle, Davis, Phillips, & Eisenberg, 2005). In 2002, 40 percent of women reported using some form of CAM in the past 12 months (Upchurch et al., 2007). There is a growing literature characterizing CAM users in general, but relatively less is known about the users of specific CAM therapies like acupuncture. Studies show differences between individuals who utilize alternative health care providers and those who use conventional providers (Furnham & Forey, 1994; Kelner & Wellman, 1997; Sirois & Gick, 2002; Vincent & Furnham, 1996), but few have provided a comprehensive comparative analysis of acupuncture users in the general population (see Burke, Upchurch, Dye & Chyu, 2006 for an exception).

Acupuncture has received considerable attention in the lay press and within the scientific community, and many studies suggest it can effectively treat numerous health conditions, either alone or as an adjunct to conventional medicine (Berman et al., 2004; IOM, 2005; NIH Consensus Statement, 1997; Smith, Crowther, & Bielby, 2002; White, 2003; White, Lewith, Prescott, & Conway, 2004). Many of the conditions for which acupuncture is useful, such as osteoarthritis, nausea during pregnancy, some types of chronic pain, and dysmenorrhea are especially salient for women (IOM, 2005). While biomedical researchers have been investigating the potential effectiveness of acupuncture for several decades, there is less information on the characteristics of women who use acupuncture services, why they go, or their satisfaction with treatment. No studies have used nationally representative US data to characterize these women. Moreover, a continuing interest is to better understand the underlying motivations for seeking CAM services. Thus, this study fills an important gap in the literature by providing a comprehensive national description of women who use acupuncture, their patterns of usage and satisfaction with treatment, and reasons for recent acupuncture use.

Sociobehavioral model of health care utilization

The widely used sociobehavioral model of utilization of conventional health care (Andersen, 1995; Andersen & Newman, 1973) has been successfully applied to individuals' use of alternative health care providers (Kelner & Wellman, 1997; Sirois & Gick, 2002), but the studies were small and did not provide a comparative analysis with non-users. The sociobehavioral model proposes that utilization of conventional health care services is a function of societal, health services system, and individual determinants (Andersen & Newman, 1973). Individual determinants, the focus of this investigation, are categorized into three domains: 1) predisposing factors; 2) enabling resources; and 3) medical need and personal health practices (Andersen, 1995). The model has since been extended to include subsequent health and consumer satisfaction outcomes (Andersen, 1995). Framing women's acupuncture use within a model of conventional health services utilization will allow us to identify the extent to which this model may be a useful tool in better understanding women's use of alternative health providers, acupuncturists in particular. We note, however, that this is one of the first applications of the model to a nationally representative sample of acupuncture users, and thus focus on first establishing patterns of association.

Predisposing factors—Demographics, social structure characteristics, and beliefs are hypothesized to reflect differences in women's propensities to seek acupuncture services. In

general, whites and Asians have higher rates of CAM use and blacks and Hispanics lower rates of use (Barnes, Powell-Griner, McFann, & Nahin, 2004; Graham et al., 2005; Keith, Kronenfeld, Rivers, & Liang, 2005), although these patterns depend to some extent on the types of CAM under consideration (Mackenzie, Taylor, Bloom, Hufford, & Johnson, 2003; Upchurch et al., 2007). Acupuncture is a part of traditional East Asian medicine, thus, Asian women are more likely to use it than other racial and ethnic groups (Burke et al., 2006).

Individuals with higher levels of education are more likely to use CAM, including acupuncture, net of other factors (Burke et al., 2006; Eisenberg et al., 1998; Mackenzie et al., 2003; Upchurch et al., 2007). Most prior research on CAM use has assumed main effects for race and ethnicity and for education, yet other related research on health care utilization suggests possible interactions between the two (MacDowell, Guo, & Short, 2002). Specifically, because of the sociocultural roots of acupuncture, increases in education among Asian women may have less effect on use than among other racial and ethnic groups. Nativity status, age, and union status have also been found to be associated with CAM use and the effects depend on the specific type of CAM therapy (Barnes et al., 2004; Upchurch & Chyu, 2005; Upchurch et al., 2007). In this study, we examine the effects of these demographic factors on acupuncture use and explore the interaction of race/ethnicity and education.

Enabling resources—A woman may be inclined to utilize acupuncture services, but she must also have the means to do so and the services must be locally available. Individual enabling resources include income, employment, and health insurance and are associated with CAM use (Barnes et al., 2004; Upchurch & Chyu, 2005; Upchurch et al., 2007). There are also regional differences in CAM and in acupuncture use, with those living in the West having higher usage (Barnes et al., 2004; Burke et al., 2006; Upchurch et al., 2007). In general, we propose women with greater enabling resources and living in the West, will be more likely to use acupuncture.

Medical need and personal health behaviors—Before seeking acupuncture services, a woman must perceive some degree of illness or discomfort and/or be motivated by preventive and wellness concerns. Poorer health status is associated with greater CAM use and with acupuncture use (Barnes et al., 2004; Burke et al., 2006; Ni, Simile, & Hardy, 2002; Upchurch & Chyu, 2005; Upchurch et al., 2007). In addition, health behaviors such as smoking, alcohol consumption and body mass index (BMI) (an indirect measure of diet and exercise practices) are also associated with CAM use, but the effects of CAM use depend somewhat on the type of CAM therapy (Barnes et al., 2004; Upchurch et al., 2007). Our general proposition here is that poorer health status and behaviors will be positively associated with use.

Patterns of acupuncture usage, satisfaction, and reasons for use

The health conditions for which individuals use CAM are often related to pain, musculoskeletal disorders, and psychological concerns (Barnes et al., 2004; Upchurch et al., 2007). Less is known about the specific health conditions for which individuals seek acupuncture treatment, although there is some evidence that they may be similar to CAM users in general (Burke et al., 2006; Kelner & Wellman, 1997; Sherman et al., 2005). The top five health conditions for which women utilize acupuncture, the number of conditions treated, and the numbers of treatments obtained are considered, as well as women's assessment of the extent to which they felt acupuncture helped the health condition for which they sought treatment. Last, insurance coverage, motivations, and reasons for acupuncture use are also examined. Investigation of this last set of factors is largely descriptive and exploratory in nature.

Methods

Survey Description

The 2002 NHIS is a cross-sectional, in-person household interview survey, representative of the US civilian, noninstitutionalized population conducted under the auspices of the National Center for Health Statistics (NCHS, 2003a). The NHIS is a multistaged, clustered sample design, and interviews were conducted using computer-assisted personal interviews. Basic information was collected for all family members (Family Core) and additional, more detailed, information was collected from one randomly selected adult from each family (Sample Adult Core). The 2002 survey included the Alternative Health/Complementary Alternative Medicine Supplement, which was administered to adults in the Sample Adult Core. A total of 31,044 adults completed the Sample Adult Core with a response rate of 74.3% (NCHS, 2003b)¹. The current analysis was limited to women only; 17,539 were interviewed. After dropping observations without acupuncture history information or that were “other” races, the final analytic sample of women was 17,112.

Measures

Dependent variable – acupuncture use in the past 12 months—Respondents were asked if they had “ever seen a practitioner of acupuncture for their health”; if the response was “yes” they were then asked if they had seen a practitioner for acupuncture in the past 12 months. The final dependent variable was recent acupuncture use and was coded as a dichotomy.

Predisposing factors—Race and ethnicity was coded assigning priority to Hispanic ancestry (coded as: non-Hispanic white; non-Hispanic black; Hispanic; and non-Hispanic Asian). Educational attainment was coded into four categories (coded as: < 12 years; high school graduate; some college; college graduate or more). An additional variable was constructed to interact race and ethnicity with educational attainment. Nativity status was coded as US-born or not. Age was coded into 10 year intervals (except for the youngest and oldest categories). Current union status was coded as never married, married, cohabiting, divorced/separated, and widowed.

Enabling resources—To address nonresponse for annual family income in 2001 (29% of cases), multiple imputation procedures were used, utilizing methodologies developed and recommended by statisticians at NCHS (Carlin, Li, Greenwood, & Coffey, 2003; Schenker et al., 2005). Income was then coded into five categories (coded as: < \$20,000; \$20,000–\$34,999; \$35,000–\$54,999; \$55,000–\$74,999; ≥ \$75,000). Current employment status was categorized as employed, unemployed, and retired. Health insurance status at the time of interview was categorized as private, public, and no insurance. Region, which reflects, in part, local availability of acupuncture services, was based on four areas used by the US Census Bureau and categorized as South, Northeast, Midwest, and West (Barnes et al., 2004).

Medical need and personal health practices—The categories for current self-reported health status were excellent, very good, good, fair, and poor. Smoking status was coded as current smoker, former smoker, and never smoker. Alcohol consumption was categorized as lifetime abstainer, former drinker, current infrequent (12+ drinks in lifetime and 1–11 drinks in past year) or light (12+ drinks in lifetime and ≤ 3 drinks per week on average) drinker, and current moderate (12+ drinks in lifetime and 3–7 drinks per week on average) or heavy (12+ drinks in lifetime and >7 drinks per week on average) drinker. BMI, based on self-report of height and weight and calculated in kilograms/(meters)², was categorized as underweight (BMI

¹The total household response rate was 89.6%; 7.1% of the non-interview rate was because the respondent refused and/or had unacceptable partial interview and the remaining 3.3% was due to inability to locate eligible respondent after repeated attempts (NCHS, 2003b).

< 18.5), healthy weight (BMI 18.5–24.9), overweight (BMI 25–29.9), and obese (BMI $\geq$ 30). Standard coding categories were used for these personal health practice variables to allow for comparability across studies (Barnes et al., 2004).

Missing cases were coded into the modal categories for all variables except smoking status, alcohol consumption, and BMI; for these variables, values were imputed using multinomial regression models.

Patterns of acupuncture usage, satisfaction, and reasons for use—For recent users, the top five health conditions for which acupuncture treatment was used, the number of conditions treated, number of treatments, degree of help acupuncture provided for the named health condition, and health insurance coverage are presented. We also assessed five questions available in the NHIS that pertained to women's reasons for using acupuncture as well as women's assessment of the importance of acupuncture in maintaining health.

Analysis

All analyses and estimates used the NHIS individual-level sampling weights which adjust for non-response and post-stratification. Variance estimates were adjusted to account for the complex sample design (NCHS, 2003b). Descriptive statistics and bivariate prevalence estimates of acupuncture use were computed; bivariate statistical tests account for the complex sample design (Rao & Scott, 1981). Weighted logistic regression was used to examine the associations between predisposing, enabling, medical need, and personal health practices on recent acupuncture use; these domains were added sequentially to our sociobehavioral model of acupuncture use.² Adjusted odds ratios are presented. Last, among recent acupuncture users, bivariate statistics of patterns of use and satisfaction are presented by race and ethnicity. All analyses were performed using Stata 9.1 (StataCorp, 2005). The research was approved by the institution's review board for the protection of research subjects.

Results

Table 1 shows the distribution of selected characteristics (column one) and prevalence of recent acupuncture use by these characteristics (column two), which is described below. Overall, 1.1 percent of American women reported having acupuncture in the past 12 months. There was significant variation by race and ethnicity; Asian women reported the highest usage and black women reported the lowest. Use did not vary by nativity status. Educational attainment was significantly associated with use; women with a college degree or more reported the highest use. Age was significantly associated with use, with women ages 40–49 reporting the highest usage. Union status was not associated with use. Women with the highest income reported the highest prevalence of recent use. Neither employment nor health insurance status were associated with acupuncture use. Region was significantly associated with use; women in the West reported the highest and those living in the South reported the lowest usage. Current health status was not associated with use at the bivariate level. Smoking status and alcohol use were associated with recent acupuncture use, with former smokers and current moderate/heavy drinkers reporting the highest use. BMI was not significant.

Table 2 presents the results from the weighted logistic models. When only predisposing factors were considered, the findings suggested that the effects of race and ethnicity on recent acupuncture use depended on educational attainment (Model 1). Specifically, compared to white women with less than 12 years of schooling, white women with some college or who

²Because recent acupuncture use is relatively rare in the population, analyses were also conducted using complementary log-log and probit analyses. The results from these specifications did not differ significantly from those of the logistic specification; consequently, we present the results from the logistic model since its interpretation is more intuitive.

were college graduates had higher odds of acupuncture. Similarly, Hispanic women with some college or who were college graduates had higher odds than white women with less than 12 years of schooling. Asian women with less than 12 years, who have some college, or were college graduates, also had higher odds. Race effects did not vary by education among black women. Nativity status and union status were not associated with use. Compared to women ages 18–29, women aged 40–49 had higher odds of recent acupuncture use. Model 2 includes the combined effects of predisposing and enabling variables. Once enabling factors were controlled for, black women who were college graduates had higher odds of use than white women with less than 12 years; the effect for Hispanic women with some college was no longer significant. Nativity, age, and union status effects remained the same. Family income, employment status, and health insurance status were not independently associated with recent acupuncture use. Women living in the Northeast and the West had higher odds of use than those living in the South.

When medical need and personal health practices were added (Model 3), age was no longer significant; all other substantive results remained the same as in Model 2. Compared to women reporting excellent health, those reporting fair health had higher odds of use. Former smokers also had higher use compared to never smokers and women who were moderate to heavy alcohol users had higher odds of acupuncture use compared with women who were infrequent or light alcohol users. Last, compared to women with healthy BMI, those who were overweight had higher odds of recent use.

Table 3 presents the patterns of use among recent acupuncture users, for all women and separately by race and ethnicity. The majority of women reported using acupuncture for a specific health condition (86.3 percent, not shown). Among those reporting a condition, back pain was number one, followed by joint pain or stiffness, severe headache or migraine, and neck pain. Arthritis, gout, lupus, and fibromyalgia comprised the fifth most commonly reported health condition (unfortunately, NHIS collapsed all of these conditions into one category). Although not significant, there were differences by race and ethnicity in the rank order of the health conditions. Among women who sought acupuncture treatment for a specific condition, almost three-quarters reported treatment of one condition; and there were no racial/ethnic differences in the number of conditions. About one-fifth of women reported only one treatment, another third reported 2–4 treatments, one-quarter reported 5–10 treatments, and the remainder had more than 10 treatments. Although not significant, black women had the highest percentage with only one treatment and Hispanic women had the highest percentage with 10 or more treatments. Close to half of all users felt that acupuncture helped their condition “a great deal,” and about 11 percent felt it did not help them at all. There were significant differences in reported degree of help by race and ethnicity. Hispanic women reported the highest percentage for the category “a great deal.” White and Asian women reported the highest percentage of “not at all.” Slightly over one-quarter reported that their health insurance covered acupuncture services, two-thirds said insurance did not cover services, and the remainder had either no costs for their services or no health insurance.

Table 4 shows the reasons for use among recent users and the importance of acupuncture in maintaining health. Almost half of all users said they used acupuncture because conventional medicine would not help. Overall, a low percentage of women said they used acupuncture because conventional medicine was too expensive; however, the percentage was higher for Hispanic women and was significant. About two-thirds of women said acupuncture combined with conventional medicine would help their condition; this percentage was lower for black and higher for Hispanic women. Close to one-quarter of women said acupuncture was suggested by a conventional health practitioner. Over half of women used acupuncture because they thought it would be interesting to try. Last, slightly over half of women reported that

acupuncture was “very important” in maintaining their overall health and another 17 percent stated it was “somewhat” important.

Discussion

The findings from this study demonstrate a low prevalence of recent acupuncture use among American women, that multiple characteristics are associated with use, and that women use acupuncture for a variety of health conditions and reasons. Although the prevalence is low, it translates to over 1.2 million women nationwide. The prevalence of other provider-administered CAM therapies included in NHIS is widely variable. For example, 7.5 percent of adults used chiropractic services in the past 12 months and 5.0 percent used massage; in contrast, only 0.2 percent used naturopathy and 0.1 percent used biofeedback (Barnes et al., 2004). The reasons for these differences in provider-based CAM therapies are complex and undoubtedly reflect variability in the numbers of providers, the geographic distribution of different CAM providers, and women's preferences and knowledge with respect to these therapies. However, recent trends in CAM use, including acupuncture, show that rates of use are stable or increasing (Tindle, Davis, Philips, & Eisenberg, 2005), and with the growing research supporting the usefulness of acupuncture for a variety of health conditions (IOM, 2005), acupuncture may be a viable alternative for some women.

Our results demonstrate that multiple factors are associated with women's recent use of acupuncture services, including several that are also associated with conventional health services. Characteristics from all three individual domains of the sociobehavioral model — predisposing, enabling, and medical need and personal health practices — were significantly associated with recent acupuncture use. We found that the effects of race and ethnicity on acupuncture use are contingent upon women's educational attainment. In particular, somewhat contrary to our expectations, Asian women with similar education as the white comparison group, as well as those with higher levels, were more likely to use acupuncture. It may be that these effects reflect differences in country of origin and nativity status among Asian subgroups. Also, Asian women with lower levels of education may be more likely to use acupuncture because of adherence or familiarity with this traditional medical system. Other studies focusing specifically on Asians of Chinese and Vietnamese ancestry found that those with lower levels of education or who had poor English proficiency were more likely to use traditional East Asian therapies (Ahn, et al., 2006; Wu, Burke, LeBaron, 2007). Because of data limitations we were not able to include relevant attitudes that have been shown to distinguish CAM users from non-users (Astin, 1998; Furnham & Beard, 1995). The sustained race and ethnicity-by-education interaction effects are probably due to unexplained differences in these attitudes and beliefs. Nevertheless, our findings point to continued importance of better understanding racial and ethnic differences in CAM use, especially with respect to group norms and knowledge and attitudes about health and health care services.

The only enabling resource that was significantly associated with acupuncture use was the region where women reside, with women in the West and Northeast having higher odds of use compared to those in the South. Although these are rather gross measures, they are proxies for differences in local access to services and normative differences regarding the acceptability of acupuncture. For example, of the over 16,000 licensed acupuncturists in the US in 2006, over half reside in the West (Acupuncture Today, 2006). The NHIS does not contain state-level information so it is not possible to examine these general patterns more precisely, but our findings suggest additional research of this type would be fruitful. Surprisingly, income, employment and insurance status were not associated with use. It may be, however, that these factors are not necessarily predictive of having *any* acupuncture in the recent past, but rather, the *number* of treatments and the *specific conditions* covered by insurers. For example, almost one-quarter of women reported only one treatment, a pattern of use which may not be overly

economically burdensome for most women. And while health insurers are increasingly covering CAM therapies, including acupuncture, the majority of payments for these treatments are still out of pocket (Burke et al., 2006; Sturm & Unutzer, 2000), as we also demonstrated.

Medical need and personal health practices were also associated with acupuncture use. The effect of health status is in the expected direction, although the magnitude of the effect was less than anticipated. Other CAM studies have found more marked differences in CAM use by health status (Barnes et al., 2004; Upchurch & Chyu, 2005; Upchurch et al., 2007). The more modest findings may be due to the lower prevalence of acupuncture use, and more imprecisely estimated coefficients. Former smokers, moderate to heavy drinkers, or women who were overweight, however, were more likely to use acupuncture than their “healthier” counterparts as we anticipated. It appears that these personal health practices are capturing other dimensions of health not picked up by the global measure of health status, but a more comprehensive interpretation requires additional information on beliefs and attitudes towards health and wellness.

The majority of women reported they used acupuncture for treatment of a specific health condition (rather than for “health and wellness”), and most were treated for only one condition. Moreover, women tended to use acupuncture for conditions not well treated by conventional medicine and include pain, musculoskeletal, and autoimmune disorders. The use of CAM for chronic conditions and for conditions difficult to treat with conventional medicine has been found by others (Barnes et al., 2004; Burke et al., 2006; Upchurch et al., 2007). Acupuncture may be a viable option for these women (Berman et al., 2004; Smith, Crowther, & Beilby, 2007; White, 2003). Although most acupuncture treatment requires multiple visits, many women only had a single treatment; it may be that these women were simply curious or had a negative reaction to this first treatment. Also, most women said that acupuncture was at least somewhat helpful in treating their condition. Close to half of women felt conventional medicine was not helpful for their condition, but close to two-thirds reported using acupuncture with conventional medicine. CAM users often express both pragmatic and ideological/lifestyle reasons for using these therapies (Astin, 1998; Vincent & Furnham, 1996), and our findings support a somewhat more pragmatic interpretation for reasons for use. Further investigation into the motivations for use, factors that influence initiating and sustaining use, as well as use of acupuncture and other CAM therapies for health and wellness is warranted.

Although this study provides one of the first comprehensive assessments of women's acupuncture use in the US, there are limitations beyond those already described. Importantly, our analysis was based on cross-sectional data and, as such, we were unable to model the contours and patterns of acupuncture use over time. In particular, there was no information available regarding the training of the acupuncturists (e.g., licensed acupuncturist or MD), the clinical setting, and other aspects of women's acupuncture experience. And while our findings suggest the sociobehavioral model of health care utilization is a productive theoretical approach to investigate acupuncture, we did not have an exhaustive set of variables necessary to fully operationalize each of the major domains in the model. Of particular concern is the lack of any psychosocial measures. Nor were we able to more comprehensively contextualize acupuncture use by including macro-level factors, such as state-level acupuncture resources or other CAM (and conventional medicine) resources that may compete with acupuncturists. Our expressed purpose was to characterize women who use acupuncture and to provide some descriptive information about patterns of use. The overall low prevalence of American women who have used acupuncture precluded any more detail than what is here. Women are higher users of health care services generally, higher users of CAM and acupuncture specifically, and primary agents in family health care utilization decisions. As acupuncture and CAM become more integrated into healthcare services, learning more about usage attitudes and behaviors by women is essential.

Footnotes

Acknowledgements

This research is supported by NCCAM grant K01AT002156 (Dr. Upchurch) and NICHD grant R24HD041022 (pilot grant to Dr. Upchurch).

Cited References

- Acupuncture Today. Acupuncturist density map – USA. 2006 [April 15, 2006]. from <http://www.acupuncturetoday.com/list/info/aculocatorzip/>
- Ahn AC, Ngo-Metzger Q, Legedza ATR, Massagli MP, Clarridge BR, Phillips RS. Complementary and alternative medical therapy use among Chinese and Vietnamese Americans: Prevalence, associated factors, and effects of patient-clinician communication. *American Journal of Public Health* 2006;96:647–653. [PubMed: 16380575]
- Andersen R. Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior* 1995;36(1):1–10. [PubMed: 7738325]
- Andersen R, Newman JF. Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly* 1973;51:95–124.
- Astin JA. Why patients use alternative medicine: Results of a national study. *Journal of the American Medical Association* 1998;279:1548–1553. [PubMed: 9605899]
- Barnes, PM.; Powell-Griner, E.; McFann, K.; Nahin, RL. Complementary and alternative medicine use among adults: United States, 2002 (Advance data from vital and health statistics, no. 343). National Center for Health Statistics; Hyattsville, MD: 2004.
- Berman BM, Lao L, Langenberg P, Lee WL, Gilpin AM, Hochberg MC. Effectiveness of acupuncture as adjunctive therapy in osteoarthritis of the knee: a randomized, controlled trial. *Annals of Internal Medicine* 2002;141:901–910. [PubMed: 15611487]
- Burke A, Upchurch DM, Dye CE, Chyu L. Acupuncture Use in the United States: Findings from the National Health Interview Survey. *Journal of Alternative and Complementary Medicine* 2006;12:639–648.
- Carlin JB, Li N, Greenwood P, Coffey C. Tools for analyzing multiple imputed datasets. *The Stata Journal* 2003;3:226–244.
- Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, et al. Trends in alternative medicine use in the United States, 1990–1997: Results of a follow-up national survey. *Journal of the American Medical Association* 1998;280:1569–1575. [PubMed: 9820257]
- Furnham A, Beard R. Health, just world beliefs and coping style preferences in patients of complementary and orthodox medicine. *Social Science and Medicine* 1995;40:1425–1432. [PubMed: 7638651]
- Furnham A, Forey J. The attitudes, behaviors and beliefs of patients of conventional vs. complementary (alternative) medicine. *Journal of Clinical Psychology* 1994;50:458–469. [PubMed: 8071452]
- Graham RE, Ahn AC, Davis RB, O'Connor BB, Eisenberg DM, Phillips RS. Use of complementary and alternative medical therapies among racial and ethnic minority adults: Results from the 2002 National Health Interview Survey. *Journal of the National Medical Association* 2005;97:535–545. [PubMed: 15868773]
- Institute of Medicine [IOM] of the National Academies. *Complementary and Alternative Medicine In the United States*. The National Academies Press; Washington, D.C.: 2005. Committee on the Use of Complementary and Alternative Medicine by the American Public..
- Keith VM, Kronenfeld JJ, Rivers PA, Liang SY. Assessing the effects of race and ethnicity on use of complementary and alternative therapies in the USA. *Ethnicity and Health* 2005;10:19–32. [PubMed: 15841585]
- Kelner M, Wellman B. Health care and consumer choice: Medical and alternative therapies. *Social Science and Medicine* 1997;45:203–212. [PubMed: 9225408]
- MacDowell M, Guo L, Short A. Preventive health services use, lifestyle health behavior risks, and self-reported health status of women in Ohio by ethnicity and completed education status. *Women's Health Issues* 2002;12:96–102. [PubMed: 11879762]

- Mackenzie ER, Taylor L, Bloom BS, Hufford DJ, Johnson JC. Ethnic minority use of complementary and alternative medicine (CAM): A national probability survey of CAM utilizers. *Alternative Therapies in Health and Medicine* 2003;9(4):50–56. [PubMed: 12868252]
- National Center for Health Statistics [NCHS]. National Center for Health Statistics. Centers for Disease Control and Prevention; Hyattsville, Maryland: 2003a. Data file documentation, National Health Interview Survey, 2002 (machine readable data file and documentation)..
- National Center for Health Statistics [NCHS]. 2002 National Health Interview Survey (NHIS) Public use data release: NHIS survey description. Centers for Disease Control and Prevention; Hyattsville, MD: 2003b.
- Ni H, 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. [PubMed: 12021691]
- NIH Consensus Statement. Acupuncture. 15. Nov 3–5. 1997 p. 1-34.
- Rao JNK, Scott AJ. The analysis of categorical data from complex sample surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American Statistical Association* 1981;76:221–230.
- Schenker N, Raghunathan TE, Chiu PL, Makuc DM, Zhang G, Cohen AJ. Multiple imputation of family income and personal earnings in the National Health Interview Survey: Methods and examples. 2005 from <http://www.cdc.gov/nchs/data/nhis/tecdoc1.pdf>
- Sherman KJ, Cherkin DC, Eisenberg DM, Erro J, Hrbek A, Deyo RA. The practice of acupuncture: Who are the providers and what do they do? *Annals of Family Medicine* 2005;3:151–158. [PubMed: 15798042]
- Sirois FM, Gick ML. An investigation of the health beliefs and motivations of complementary medicine clients. *Social Science and Medicine* 2002;55:1025–1037. [PubMed: 12220087]
- Smith C, Crowther C, Beilby J. Acupuncture to treat nausea and vomiting in early pregnancy: a randomized controlled trial. *Birth* 2002;29(1):1–9. [PubMed: 11843784]
- StataCorp. Stata Statistical Software: Release 9. StataCorp LP; College Station, TX: 2005.
- Sturm R, Unutzer J. State legislation and the use of complementary and alternative medicine. *Inquiry* 2000;37:423–429. [PubMed: 11252450]
- Tindle HA, Davis RB, Phillips RS, Eisenberg DM. Trends in use of complementary and alternative medicine by US adults: 1997–2002. *Alternative Therapies in Health and Medicine* 2005;11(1):42–49. [PubMed: 15712765]
- Upchurch DM, Chyu L. Use of complementary and alternative medicine among American women. *Women's Health Issues* 2005;15:5–13. [PubMed: 15661582]
- Upchurch DM, Chyu L, Greendale GA, Utts J, Bair YA, Zhang G, et al. Complementary and Alternative Medicine Use among American Women: Findings from the National Health Interview Survey, 2002. *Journal of Women's Health* 2007;16:102–113.
- Vincent C, Furnham A. Why do patients turn to complementary medicine? An empirical study. *British Journal of Clinical Psychology* 1996;35:37–48. [PubMed: 8673034]
- White AR. A review of controlled trials of acupuncture for women's reproductive health care. *The Journal of Family Planning and Reproductive Health Care* 2003;29:233–236. [PubMed: 14662058]
- White P, Lewith G, Prescott P, Conway J. Acupuncture versus placebo for the treatment of chronic mechanical neck pain. *Annals of Internal Medicine* 2004;141:911–919. [PubMed: 15611488]
- Wu APW, Burke A, LeBaron S. Use of traditional medicine by immigrant Chinese patients. *Family Medicine* 2007;39:548–553.

Table 1

Distribution of selected characteristics and percentage of women using acupuncture in the past 12 months, NHIS 2002.

Characteristics	Percent Distribution	Percent Used Acupuncture in the Past 12 Months
Total	100.0	1.1
<i>Predisposing factors</i>		
Race and ethnicity **		
White	73.9	1.1
Black	12.1	0.6
Hispanic	10.9	1.3
Asian	3.1	2.7
Nativity status		
Foreign-born	13.8	1.3
US-born	86.2	1.1
Educational attainment ***		
Less than 12 years	16.5	0.6
High school graduate	31.2	0.5
Some college	29.8	1.2
College graduate or more	22.6	2.4
Age **		
18–29 years	20.9	0.8
30–39 years	19.3	1.1
40–49 years	20.9	1.7
50–59 years	15.8	1.3
60–69 years	9.9	0.8
70+ years	13.2	0.8
Union status		
Never married	16.9	0.9
Married	55.7	1.2
Cohabiting	5.5	1.7
Divorced/Separated	11.8	1.2
Widowed	10.1	0.7
<i>Enabling resources</i>		
2001 Family Income [§]		
Less than \$20,000	22.9	0.9
\$20,000–34,999	19.5	0.7
\$35,000–54,999	19.2	1.1
\$55,000–74,999	13.7	1.4
\$75,000 or more	24.7	1.7
Employment status		
Employed	58.3	1.2
Unemployed	26.5	1.1
Retired	15.2	0.8
Health insurance status		
Private	71.1	1.2
Public	15.5	0.7
Uninsured	13.4	1.1
Region ***		
Northeast	19.6	1.3
Midwest	24.5	1.0
South	36.9	0.7
West	18.9	1.9
<i>Medical Need and Personal Health Practices</i>		
Health status		
Excellent	28.9	1.2
Very good	32.0	1.1
Good	26.3	1.0
Fair	9.6	1.2
Poor	3.2	1.3
Smoking status ***		
Current smoker	19.9	0.9
Former smoker	19.1	1.9
Never smoked	61.0	1.0
Alcohol use ***		
Lifetime abstainer	28.6	0.6
Former drinker	14.9	1.0
Current, infrequent/light	45.5	1.2
Current, moderate/heavy	11.0	2.6
Body mass index (BMI)		
Underweight	2.9	1.3
Healthy weight	46.5	1.1
Overweight	28.0	1.4
Obese	22.6	0.8

Characteristics	Percent Distribution	Percent Used Acupuncture in the Past 12 Months
N	17,112	193

**
p≤.01

p≤.001 (Design-based F-test)

§
p-value cannot be determined because of multiple imputation

Table 2

Multiple logistic regression results: Adjusted odds ratio (95% confidence interval in parentheses) for recent acupuncture use among women, NHIS 2002.

Characteristics	Model 1	Model 2	Model 3
Predisposing factors			
Race and Ethnicity* Educational attainment (White, < 12 years)			
White, High school graduate	1.49 (0.55, 3.99)	1.46 (0.54, 3.92)	1.46 (0.53, 4.02)
White, Some college	3.73** (1.55, 8.98)	3.56** (1.47, 8.62)	3.41** (1.38, 8.41)
White, College graduate	6.55*** (2.67, 16.05)	6.26*** (2.43, 16.15)	6.10*** (2.31, 16.13)
Black, < 12 years	2.96 (0.54, 16.16)	3.23 (0.55, 19.11)	3.16 (0.52, 19.21)
Black, High school graduate	0.36 (0.07, 1.86)	0.39 (0.08, 2.05)	0.41 (0.08, 2.18)
Black, Some college	2.04 (0.75, 5.54)	2.26 (0.83, 6.12)	2.36 (0.85, 6.58)
Black, College graduate	3.58 (0.99, 13.02)	3.93* (1.06, 14.53)	4.52* (1.17, 17.46)
Hispanic, < 12 years	2.95 (0.87, 9.96)	2.28 (0.65, 7.98)	2.52 (0.69, 9.21)
Hispanic, High school graduate	2.63 (0.39, 17.60)	2.25 (0.39, 13.08)	2.35 (0.40, 13.78)
Hispanic, Some college	3.97* (1.06, 14.81)	3.30 (0.87, 12.50)	3.45 (0.90, 13.26)
Hispanic, College graduate	16.91*** (5.34, 53.50)	15.29*** (4.73, 49.43)	16.30*** (4.94, 53.78)
Asian, < 12 years	10.01* (1.93, 52.00)	8.08* (1.58, 41.25)	8.71* (1.55, 49.03)
Asian, High school graduate	1.78 (0.20, 16.08)	1.39 (0.15, 13.01)	1.78 (0.18, 17.24)
Asian, Some college	9.11** (1.92, 43.14)	6.92* (1.48, 32.29)	8.80** (1.78, 43.59)
Asian, College graduate	13.95*** (4.28, 45.52)	11.22*** (3.32, 37.91)	13.92*** (4.09, 47.35)
Nativity status (US-born)	0.81 (0.43, 1.52)	0.79 (0.42, 1.50)	0.88 (0.46, 1.66)
Age (18 to 29 years)			
30–39 years	1.22 (0.70, 2.15)	1.22 (0.69, 2.16)	1.18 (0.66, 2.10)
40–49 years	2.01* (1.11, 3.63)	1.99* (1.07, 3.68)	1.76 (0.93, 3.33)
50–59 years	1.67 (0.92, 3.03)	1.66 (0.90, 3.06)	1.27 (0.66, 2.43)
60–69 years	1.18 (0.53, 2.62)	1.28 (0.55, 2.96)	0.93 (0.40, 2.18)
70+ years	1.36 (0.67, 2.77)	1.51 (0.68, 3.33)	1.11 (0.48, 2.56)
Union status (Married)			
Never married	0.89 (0.57, 1.38)	0.87 (0.55, 1.38)	0.87 (0.54, 1.38)
Cohabiting	1.86 (0.97, 3.55)	1.80 (0.90, 3.59)	1.61 (0.80, 3.25)
Divorced	1.05 (0.69, 1.61)	1.09 (0.65, 1.85)	1.03 (0.62, 1.72)
Widowed	0.93 (0.49, 1.78)	0.93 (0.46, 1.89)	0.99 (0.48, 2.02)
Enabling resources			
2001 Family income (< \$20,000)			
\$20,000–\$34,999		0.64 (0.33, 1.24)	0.64 (0.32, 1.26)
\$35,000–\$54,999		0.84 (0.44, 1.61)	0.81 (0.42, 1.57)
\$55,000–\$74,999		0.96 (0.49, 1.89)	0.93 (0.46, 1.86)
\$75,000+		0.86 (0.41, 1.79)	0.80 (0.37, 1.73)
Employment status (Employed)			
Not employed		1.20 (0.78, 1.86)	1.17 (0.76, 1.81)
Retired		1.00	0.97

Characteristics	Model 1	Model 2	Model 3
Health insurance status (Private insurance)		(0.51, 1.97)	(0.49, 1.92)
Public insurance		0.79	0.77
No health insurance		(0.40, 1.57)	(0.38, 1.56)
Region (South)		1.19	1.20
Northeast		(0.56, 2.53)	(0.56, 2.58)
Midwest		1.68*	1.56*
West		(1.11, 2.54)	(1.03, 2.37)
		1.34	1.35
		(0.83, 2.17)	(0.83, 2.21)
		2.17**	2.06**
		(1.28, 3.67)	(1.23, 3.47)
<i>Medical need and personal health practices</i>			
Health status (Excellent)			1.06
Very good			(0.70, 1.61)
Good			1.32
Fair			(0.84, 2.07)
Poor			1.97*
Smoking status (Never smoker)			(1.09, 3.59)
Current smoker			2.32
Former smoker			(0.99, 5.41)
Alcohol use (Current, infrequent/light)			0.89
Lifetime abstainer			(0.52, 1.53)
Former drinker			1.72**
Current, moderate/heavy			(1.14, 2.58)
Body mass index (Healthy weight, BMI 18.5–24.5)			0.64
Underweight (BMI < 18.5)			(0.38, 1.08)
Overweight (BMI 25–29.9)			0.97
Obese (BMI ≥ 30)			(0.54, 1.72)
Constant	–6.07*** (–7.09, –5.04)	–6.29*** (–7.35, –5.22)	–6.53*** (–7.69, –5.37)
N	17,112	17,112	17,112

Reference categories in parentheses.

*
p≤.05

**
p≤.01

p≤.001

Table 3
Acupuncture usage patterns among women who are recent users, total and by race, NHIS 2002.

	Total	White	Black	Hispanic	Asian
Top five health conditions					
Back pain	26.4	24.2	34.1	34.0	31.9
Joint pain or stiffness	16.4	16.1	6.5	20.8	20.8
Severe headache/migraine	13.1	11.8	19.4	16.7	15.7
Neck pain	11.1	12.0	0.0	10.0	13.3
Arthritis/gout/lupus/fibromyalgia	8.8	10.5	13.9	0.0	0.0
Number of conditions treated					
1	72.9	75.0	65.0	60.1	76.7
2	14.7	15.2	27.8	6.8	10.0
3+	12.5	9.8	7.2	33.2	13.3
Number of treatments					
1	21.1	21.2	41.6	16.3	8.7
2-4	34.4	34.6	14.1	42.6	37.7
5-10	25.0	25.9	20.0	9.5	46.9
> 10	19.6	18.4	24.3	31.7	6.7
Degree of help (Overall) *					
Great deal	47.6	50.7	29.4	64.0	0.0
Some	26.7	24.5	39.7	26.3	41.1
Only a little	15.0	11.9	30.9	9.7	45.9
Not at all	10.8	12.9	0.0	0.0	13.1
Acupuncture costs covered by insurance					
Yes	27.0	25.2	57.9	20.7	27.0
No	61.4	62.4	19.4	74.1	68.5
No acupuncture service costs	4.3	4.9	4.8	2.8	0.0
No health insurance	7.4	7.6	17.9	2.4	4.4
N	193	132	17	30	14

Note: Estimates and standard errors adjusted to account for complex sample design. Overall N is based on the number of women who had used acupuncture recently. Some of the above percentages (specifically top five health conditions, overall degree of help, and number of conditions treated) are based on an N that also excludes women who did not use acupuncture to treat a specific condition.

* $p \leq 0.05$ (Design-based F-test).

Table 4
Reasons for acupuncture use and importance in maintaining health among women who are recent users, total and by race, NHIS 2002.

	Total	White	Black	Hispanic	Asian
Conventional medical treatments would not help	47.0	48.4	40.1	39.4	50.6
Conventional medical treatments were too expensive *	9.3	7.0	7.2	30.1	3.2
Acupuncture combined with conventional medical treatments would help	62.2	60.9	53.6	72.1	68.3
Acupuncture was suggested by a conventional medical professional	23.6	24.5	18.2	30.6	7.0
Interesting to try acupuncture	51.0	47.6	61.7	55.5	73.7
Importance in maintaining health and well being					
Very important	50.5	53.0	37.0	47.3	42.9
Somewhat	17.0	13.8	13.0	35.7	21.9
Slightly	15.7	15.7	18.8	12.8	16.9
Not at all	16.8	17.4	31.2	4.2	18.3

* p ≤0.05 (Design-based F-test).